JOURNAL OF ENGINEERING AND MANAGEMENT IN INDUSTRIAL SYSTEM VOL. 14 NO. 1 YEAR 2026

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

DESIGNING ISO-BASED FAILURE MANAGEMENT FRAMEWORK TO ENHANCE COMPLAINT MANAGEMENT

Rahman Dwi Wahyudi[1*)], Mochammad Arbi Hadiyat[1)]
Industrial Engineering, University of Surabaya, Surabaya, Indonesia[1)]

Abstract Complaints are a critical indicator that can reveal problems or failures in internal processes and require quick recovery. Therefore, complaint management must be well-designed. However, this will not be meaningful if failure, a cause of complaint, is not managed well. This article aims to establish a framework for failure management that can enhance the effectiveness of complaint management. Failure is a probability that can be prevented, anticipated, and managed. Failure management frameworks must be designed in accordance with global standards to achieve acceptance. In addition, the failure management framework must be flexible, robust, and comprehensive. Based on the definition of failure, ISO 31000:2018 provides a suitable basis for developing a failure management framework to enhance complaint management. Industry can utilize the findings to improve complaint management effectiveness by increasing stakeholder involvement in anticipating failures. This involves managing, assessing, preventing, handling, monitoring, reviewing, and recording failures to facilitate continuous improvement.

Keywords: Complaint management ;Extended failure analysis; Failure management; ISO 31000:2018

1. Introduction

Stakeholder theories show the important role of stakeholder engagement in product development and market information [1]. Other research also states that commodities reflect ultimate stakeholder engagement in customer and company relationships [2]. This relationship is mutually beneficial in terms of resources, innovation, costs, performance, credibility, ensuring transparency and accountability, anticipating controversy, increasing relevance, improving quality, and enriching feedback [2], [3]. One stakeholder can provide feedback on customer complaints. It is recommended that companies study systematic negative customer experiences, restore satisfaction, and strengthen business relationships by providing a channel for customers to express their dissatisfaction [4]. The company can consider customer complaints as key performance indicators. They indicate problems or failures in internal processes that require quick recovery [5]. The decline in customer satisfaction and profits, along with the spread of negative news, highlights the importance of effective complaint management.

Efforts to prevent complaints can be made by ensuring that every customer-facing activity runs according to plan. Efforts to control potential failure in each activity will be critical. Failure analysis is a tool used to identify, assess, and manage potential failures. To date, several failure analyses can be conducted using Failure Mode and Effects Analysis (FMEA) [6], Function Failure Design Method (FFDM) [6], and Computer-Aided FMEA [7]. Over time, failure analysis has evolved through the development of life cycle simulations, which utilize product behavior to inform the analysis [7]. Another development in FMEA is the use of FMEA based on expected cost scenarios, which informs investment decisions regarding product reliability [8]. This development highlights the importance of applying failure analysis to processes, rather than focusing solely on managing product failures [9], [10], [11]. Activity-based failure analysis applies FMEA to processes to cover the weaknesses of implementing FMEA, which is only carried out on product aspects [12]. However, such approaches have not been widely applied to service processes or activities involving direct customer interaction, particularly in customer complaint management. Furthermore, existing failure analysis concerns are on identifying, assessing, and mitigating failures. Meanwhile, the service process requires the involvement of other elements of the company. It is essential to consider the crucial role of stakeholder engagement in ensuring transparency,

* Corresponding author. Email
rahman.dwi.wahyudi@staff.ubaya.ac.id
Published online at http://Jemis.ub.ac.id

Cite this Article As Wahyudi, Dwi Rahman and hadiyat, Mochammad Arbi (2026). Designing ISO-Based Failure Management Framework To Enhance Complaint Management. Journal of Engineering and Management in Industrial System, 14(1), p1-11
Paper Accepted : Aprl, 27th 2026
Paper Published : May, 24th 2026

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

accountability, relevance, and overall process quality. By actively involving stakeholders, companies can anticipate potential failures and provide timely support. Therefore, the research gap addressed in this study lies in the lack of a comprehensive, process-based framework for failure management. This study employs the term 'failure management' because the scope of failure analysis has expanded to encompass not only the identification and evaluation of failures but also preventive measures, continuous improvement, and stakeholder engagement. Thus, the term 'failure analysis' no longer accurately captures the comprehensive nature of the approach. In this study, establishing a framework for planning potential failure management begins with the communication stage, which involves relevant stakeholders. This is followed by the failure assessment stage, in which failure priorities are determined to analyze failure causes. Then, the prevention stage involves planning to handle failures and efforts toward continuous improvement. The framework that is initiated must be systematic, robust, applicable, and widely accepted, so that its development is carried out in accordance with global standards, such as ISO standards. ISO (International Organization for Standardization) has advantages over other global standards because it is neutral, grounded in international consensus, and widely recognized across industrial sectors. The effectiveness of several ISO standards has also been empirically demonstrated in previous studies [13], [14], [15], [16]. ISO provides a comprehensive framework to ensure the safe, reliable, and high-quality production of products and services in the global market.

Given the research urgency described above, the objective of this scientific study is to develop an ISO-based framework for failure management to improve complaint management. ISO used in this research is ISO 31000:2018. Unlike ISO 31000, which provides a general risk management guideline, this study explicitly operationalizes risk principles into a failure management framework tailored for complaint management processes. The novelty lies in integrating stakeholder-driven failure anticipation, preventive planning, and complaint handling into a unified process-based model. The proposed framework offers practical guidance for companies seeking to enhance service quality, improve customer satisfaction, and strengthen business relationships by integrating stakeholder involvement and proactive measures to mitigate failures. The results of this article provide references on the development of complaint management by expanding the conceptual understanding of failure management beyond existing failure analysis.

Based on the identified research gaps, this research was conducted to contribute to the existing body of knowledge in several significant ways. The first contribution aims to extend the concept of failure analysis into a broader failure management perspective by incorporating preventive actions, stakeholder engagement, and continuous improvement. The second contribution aims to integrate risk management into complaint management within the ISO 31000:2018 framework, which provides a structured and globally recognized approach. The third contribution aims to offer a process-based framework applicable to service systems with high customer interaction, addressing the limitations of existing product-oriented failure analysis methods. In addition, this study does not aim for statistical generalization but for analytical generalization.

2. Methods

The research conducted in this article adopts a qualitative conceptual framework development approach complemented by an illustrative case study. Thus, the purpose of this case study is to demonstrate the applicability and logical consistency of the proposed framework in a real-world context. Effective complaint handling can start with efforts to prevent and manage process failures. Failure management should focus on enhancing complaint management. Hence, its development must be grounded in the evaluation of existing complaint management practices. The implications of this research align with service recovery theory, which emphasizes the importance of timely and effective responses to service failures in restoring customer satisfaction. The proposed framework not only addresses complaints as a risk but also enhances customer satisfaction outcomes. Thus, the proposed framework aligns with quality management principles that concern continuous improvement and process control as key drivers of performance. The actions used to address the aims in this article are illustrated in Figure 1. The research was conducted in 3

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

stages. Stage 1 involves studying and evaluating the current complaint management framework by doing a structured literature review. An exploration of prior research, as a knowledge source, is necessary to understand the causes of complaints and their characteristics, thereby enabling complaint control through preventive or corrective actions. Furthermore, a structured literature review also aimed to explore the definition and characteristics of failure as a cause of complaints. Understanding failure is essential to exploring effective and efficient methods for controlling it. Furthermore, this idea is the forerunner to the development of the failure management framework. In addition to the literature review, a review of the current complaint-handling mechanism is conducted to identify opportunities for improvement. The results of Stage 1 will inform the development of a comprehensive, effective, robust, and resilient failure management framework in Stage 2, which can close gaps in existing complaint management. The development of the failure management framework systematically adapts the principles, framework, and processes of ISO standards, which are widely accepted by companies worldwide. The framework that was initiated is also general and flexible, making it suitable for every unique organization. In detail, a conceptual mapping approach is used to align risk management components with failure management activities, ensuring integration of preventive actions, stakeholder engagement, and continuous improvement mechanisms. Furthermore, the results of developing the failure management framework are applied in an illustrative case study in Stage 3. The chosen illustrative case study is a company that offers product and service integration as its core offerings. The rationale for selecting this case is that failure management will be oriented towards activities involving direct customer interaction, from product sales to after-sales activities, unlike traditional failure analysis. The data for the case study were obtained from a customer survey on the company's actual performance. A review of internal documents and interviews with company management representatives was also conducted to validate the types and severity of failures in the product and service delivery process.

Furthermore, the validation process is critical in framework development. In this study, the proposed framework is validated theoretically by examining the conformity of its steps with the principles of ISO 31000:2018, which served as the foundation for its design. Globally, the effectiveness of ISO 31000:2018 implementation has been recognized by many organizations across diverse fields [15]. This indicates that the principles and framework of ISO 31000:2018 are empirically valid. In addition, the framework's validity is demonstrated by its ability to address the identified limitations in existing complaint management approaches, particularly through the incorporation of preventive actions, stakeholder engagement, and continuous improvement. These methods work well for conceptual framework studies where the goal is to provide structured and generalizable suggestions, rather than to draw statistical conclusions.

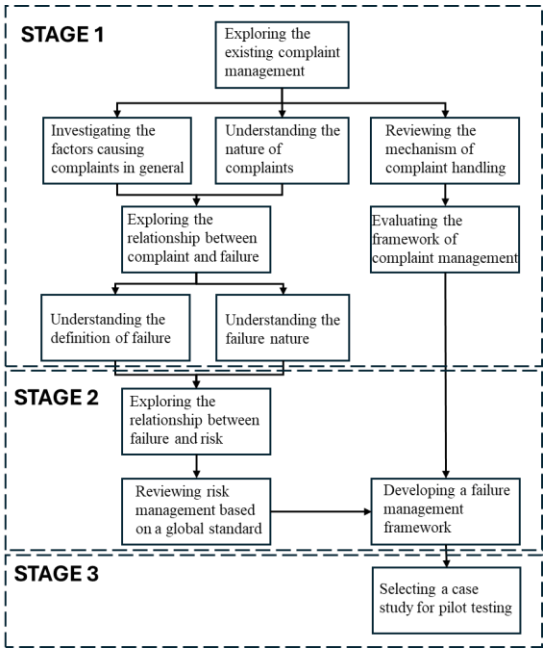

Fig. 1 Research Methodology

3. Result and Discussion

A complaint is defined as a customer's negative expression of dissatisfaction with a product, process, or the company's actions [17]. The company must detect and address the expression immediately to restore the relationship with the customer and prevent excessive disappointment. The disappointment indicates the company's failure to meet customer expectations. In the long term, the impact of proper complaint handling is increased customer loyalty and a positive company image [18]. Previous studies have explored the processes and

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

procedures companies can employ to handle complaints systematically, effectively, and efficiently. These processes and procedures are collectively referred to as complaint management. The existing complaint management framework, as discussed in previous studies, generally encompasses receiving, registering, finding solutions for, and resolving complaints [19], [20]. Figure 2 illustrates the existing complaint management framework.

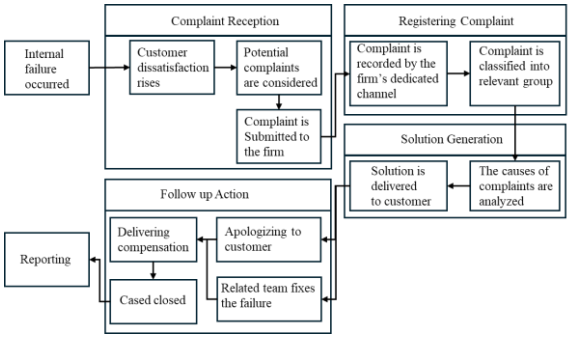

Fig 2 The Existing Complaint Management Framework

The existing framework requires companies to establish dedicated channels for handling complaints in response to efforts to address customer dissatisfaction. The existence of a reporting process also indicates knowledge management, facilitating the handling of similar complaints in the future. However, the framework still has gaps in planning preventive actions, reducing the probability of complaints, and increasing participation among relevant stakeholders, so that the existing complaint management framework is more oriented towards corrective actions. In contrast, corrective actions will be much more detrimental than preventive actions. Based on this gap, the article argues that complaint management can be improved by planning preventive actions to address potential failures that could still lead to complaints.

Failure may not occur if preventive measures are taken as early as possible. Therefore, failure management will support complaint management. Furthermore, preparing a failure management framework should begin with understanding the concept of failure. Failure is defined as a potential event that can disrupt a component's function. Understanding the meaning of failure reveals that it is part of risk that can be managed comprehensively. Risk can be defined as uncertainty regarding costs, loss, or damage [21]. Failure management can be effectively implemented using a risk management framework, as failure is inherently a risk. A comprehensive risk management framework is necessary to ensure that implementation is more systematic, integrated, and effective. This will influence the risk information that is managed, and in turn, this risk information will lead to the decisions made [22]. The aforementioned decisions would include preventive and corrective actions to manage complaints.

The implication is that preventive action planning helps companies understand the importance of continuous improvement in controlling failures, which in turn enhances complaint management. The concept of continuous improvement in complaint management has not been discussed in previous studies. This is the other discussion material in this article. Developing a comprehensive failure management framework for effective complaint management can be based on ISO 31000:2018. ISO 31000:2018 is a standard guide to implementing risk management, which contains the principles or philosophy of risk management, a framework for managing risk management systems in a structured and systematic manner, and sequential and interrelated risk management processes. With a comprehensive framework, the role of company elements and stakeholders can be maximized in managing failure. Apart from that, the failure analysis stops at the analysis stage and can be followed up by applying the principle of continuous improvement.

Risk management design and implementation in research in several fields has increased in recent years [23]. This is supported by ISO's publication of a risk-based management system in 2015, which includes quality and environmental management systems. Every organization is required to update its management system version in 2018 [24]. On a risk basis, company management can be integrated [25]. Therefore, in carrying out risk management, a guide is needed that complies with global standards and is systematic, comprehensive, and robust. To address this interest, ISO 31000, concerning risk management, was first published as a standard in 2009. ISO 31000 provides risk management standards through principles, frameworks, concepts, and terminology. However, this standard is not to be certified. This guide is

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

general, covering all fields and all types of organizations [23]. The effectiveness of the ISO 31000 guide has been proven through empirical studies [15]. ISO 31000:2018 consists of 6 clauses: Scope, Normative Reference, Terms and Definitions, Principles, Framework, and Process[26]. Based on this clause, the risk management process encompasses several key elements, as illustrated in Figure 3.

Figure 3 shows that the risk management process consists of communication and consultation; determining scope, context, and criteria; and risk assessment, risk management, monitoring, review, and documentation. Communication and consultation: In risk management planning, communication aims to increase awareness and understanding of risks, while consultation seeks to involve relevant stakeholders in the process. This involvement can take the form of providing feedback and information to make decisions. Through the involvement of relevant stakeholders, good relationships and effective coordination will be established to manage risks effectively. Furthermore, the company's main goals can be achieved more easily. Communication and consultation with relevant stakeholders, both external and internal, must be conducted at all stages of the risk management process. Scope, context, and criteria: The purpose of determining scope is to limit the risk management process according to the application level and relevant objectives. Therefore, the company must define the relevant activities. The context must also be determined by considering the external and internal environments relevant to implementing risk management. Based on these two factors, the company can determine which risks are relevant and likely to occur. This can be considered when defining criteria to evaluate the significance of potential risks. These criteria must remain appropriate to the objectives and scope of the activity under consideration. Criteria will benchmark an organization's values, goals, resources, and consistency**.** Risk Assessment: Risk assessments must be conducted systematically, taking into account the knowledge and perspectives of relevant stakeholders. Complete and accurate information must be used as input for further investigations. This is critical because the risk assessment results will be used to prioritize risks. Risk Treatments: This section outlines strategies to mitigate risks. Many ways may be appropriate for addressing the risk. When selecting a method, an analysis of the potential benefits and costs can be carried out. Monitoring and Review: Monitoring and review can be used to control and improve the quality and effectiveness of process design, implementation, and results. Continuous monitoring and regular reviews must be a planned part of the risk management process. Monitoring and review must be carried out at all stages of the process, which includes planning, collecting and analyzing information, recording results, and providing feedback. The results must also be considered in all management activities, including the measurement and reporting of company performance. Documentation and Recording: The risk management process must be documented and reported through appropriate mechanisms to convey risk management activities and results with clear accountability and responsibility, provide information for informed decision-making, enhance risk management activities, and foster effective and beneficial relationships with stakeholders.

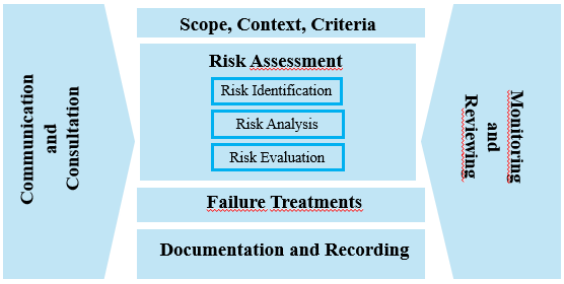

Fig. 3 ISO 31000:2018 Risk Management Process Framework

The framework outlined in Figure 3 must be followed in the development of failure management to achieve the same benefits as those outlined in ISO 31000:2018. Certain outputs from failure management activities can be utilized as resources to enhance the existing complaint management. Figure 4 shows the ISO-based failure management framework that enhances complaint management, as proposed in this study. The advantages of the proposed framework are the active role of stakeholders in controlling failure as a cause of complaints as indicated by the communication and consultation process, the problem analysis process that focuses on relevant context as indicated by the scope, context and criteria review process so that problem solving efforts become effective and efficient, the failure

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

assessment to prioritize failure repair, the planning of preventive and recovery failure treatments so that it can help accelerate the search for solutions when complaints occur, the continuous improvement process as indicated by the monitoring and reviewing process, the support for knowledge management as indicated by documentation and recording. Thus, the framework is comprehensive, effective, and efficient. The results of failure assessment and treatment, which in turn support effective complaint management, underscore the relationship between failure management and complaint management. The framework depicted in Figure 4 shows that failure assessment results can provide quick information on the relationship between failure and a process's function, enabling prediction of complaints that might result from the failure. This prediction can be made immediately after the failure occurs and in parallel with the customer's complaint submission. In addition, the urgency of the failure's impact can be determined from the failure assessment, allowing solutions and compensation to be selected accordingly. Solutions and compensation can also be selected from the preventive and recovery action plan in the failure treatments section. Furthermore, failure management can disrupt the flow of the existing complaint management process. Efficiency is achieved by eliminating the complaint-grouping process, as it is already incorporated into the periodic review of scope, context, and criteria. Additionally, efficiency is improved by eliminating the solution-search process in the failure-treatment section.

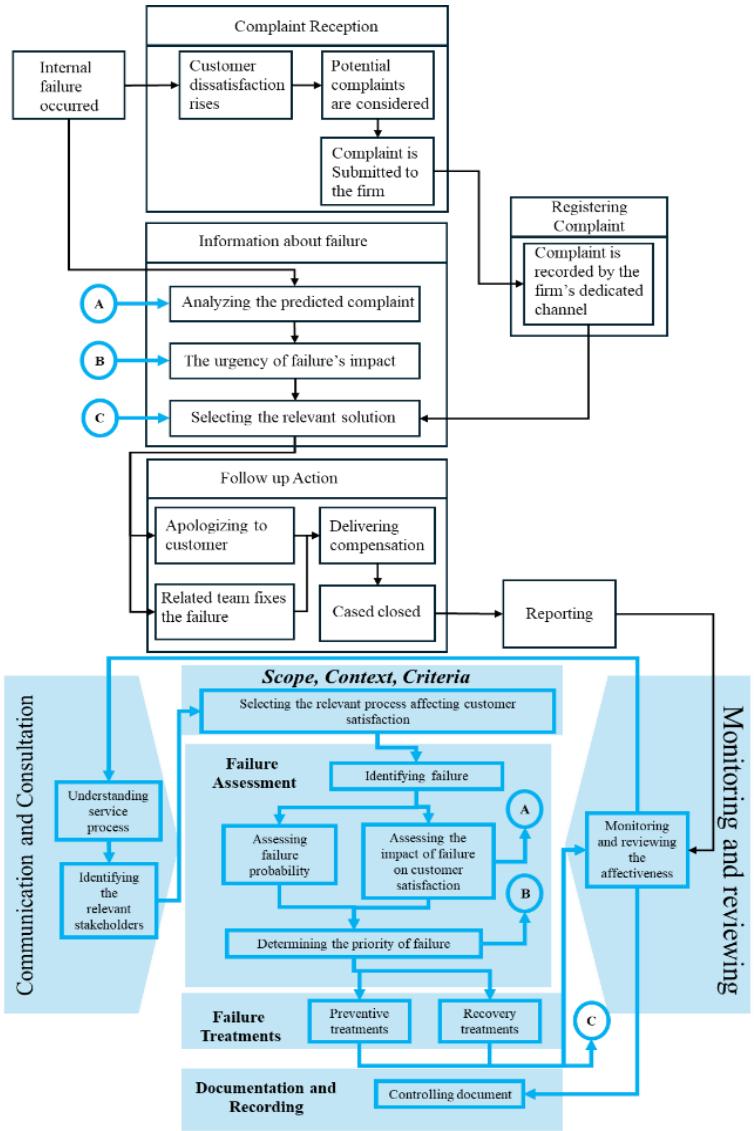

Fig 4 ISO-Based Failure Management Framework Enhancing Complaint Management

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

Based on Figures 2 and 4, the proposed framework can significantly improve complaint management. Table 1 compares existing complaint management with the proposed framework.

Table 1. The Comparison of Existing and Proposed Complaint Management Framework

Aspect	Existing Complaint Management	Proposed Framework
Approach	Reactive	Preventive and proactive
Stakeholder	Limited	Integrated
Risk	Not explicit	Explicit

As an example of implementation, this study is limited to a single illustrative case. The framework idea in Figure 4 is applied to one of the car dealers in Indonesia. The process flow and the stakeholders involved are presented in Figure **5**. In Figure 5, the company communicates with stakeholders to build awareness and understanding of the ideal process design customers should follow. Next, stakeholder feedback relevant to the process is collected to identify potential failures. This is important to do to anticipate potential failure. The potential failure identification process can be consistently limited to narrow the company's attention. This stage includes determining scope, context, and criteria. Narrowing the company's attention is also intended to improve the effectiveness and efficiency of complaint management.

The service processes in Figure 5 are not all the discussion points in failure management. Service process selection is based on scope, context, and criteria. Failure management in this article is used to enhance complaint management, ensuring that the scope, context, and criteria used align with the main service processes that directly relate to customers, where there is a significant opportunity for complaints to arise. The service processes in question are negotiating, closing the order, delivering the order, registering maintenance, and closing the maintenance process. Next, the failure assessment stage involves identifying potential failures, evaluating their severity, and assessing the impact on satisfaction if the process fails. Data on failure levels and the impact of customer satisfaction can be used to obtain potential failure priorities. Failure assessment encompasses the entire process of failure identification, analysis, and evaluation. This failure assessment should be carried out systematically, periodically, and collaboratively. Failure identification aims to find, recognize, and describe failures that may occur in components. The failure assessment stage is presented in Table 2.

Risk components refer to the likelihood of an event occurring and the potential impact resulting from that event [27]. Thus, potential failures identified in the selected processes are assessed, including the likelihood of their occurrence and their impact on customer satisfaction. If a potential failure is highly likely, the company must pay closer attention to prevent it. Next, it is necessary to assess the impact of customer satisfaction on potential failure. Companies should pay more attention to potential failures that strongly impact customer satisfaction. Failure priorities are selected based on strong impacts and high failure rates.

The potential failure that raises concern is the salesperson's inability to establish common ground between the company's interests and the customer's expectations. Next, a treatment plan for failure is developed, which includes preventive and recovery measures. Preventive action can be taken by controlling the failure rate and improving the company's customer treatment. Meanwhile, recovery actions refer to the company's responses to a failure. Recovery efforts must be planned to ensure a faster response time in the event of a failure. Recovery management significantly influences customer evaluations because customers are more emotionally invested and pay closer attention to recovery efforts than to routine service [28]. If recovery efforts are successful, customer satisfaction will be higher than with routine service, and these customers have the potential to become loyal [18].

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

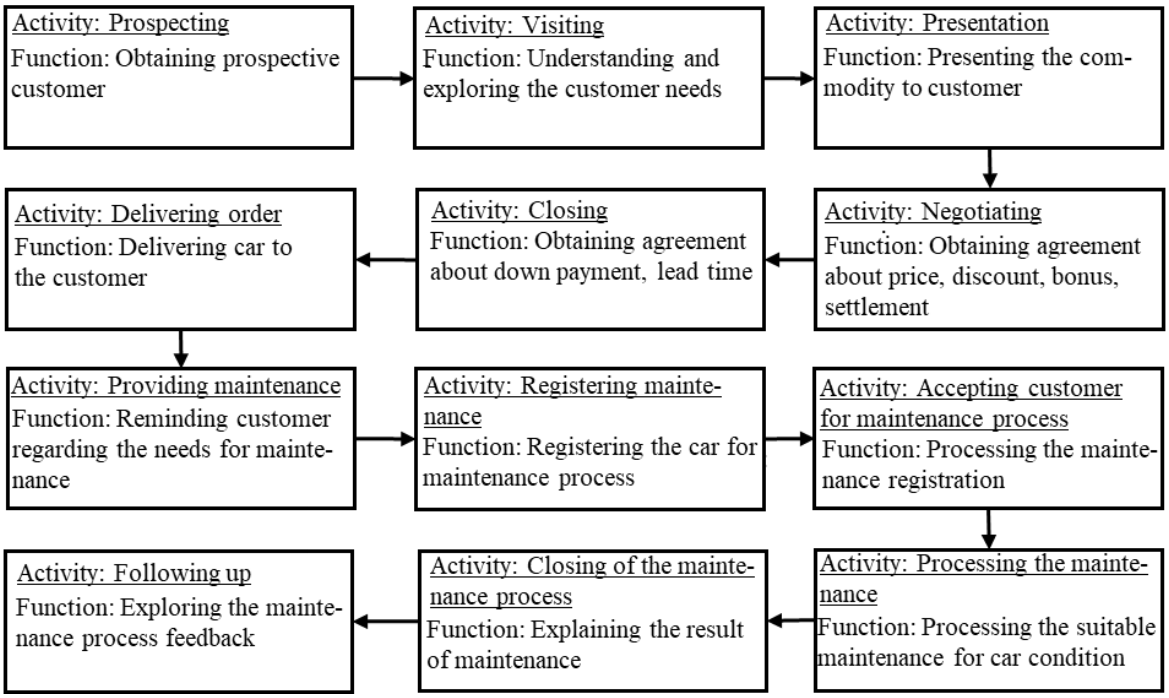

Fig. 5 Car Dealer Service Process Flow

Table 2. Failure Assessment Stage in Failure Management

Process	Potential failure causing customer complaint	Failure rate	Impact of satisfaction
Negotiating	Salespersons do not find common ground between company interests and customer expectations	0.2	Strong
	Miscommunication occurred between the salesperson and the third party	0.1	Strong
	Salespeople fail to offer attractive services to customers	0.2	Currently
Closing	Salespersons do not find common ground between company interests and customer expectations	0.1	Strong
	Miscommunication occurred between the salesperson and the third party	0.1	Strong
Delivering the order	There is a discrepancy between the units promised and those received by the customer	0.1	Strong
	A delivery error occurred	0.1	Strong
Registering maintenance	A registration error occurred	0.05	Strong
	There was damage to the registration system	0.02	Strong
Closing of the maintenance process	Miscommunication occurred in the explanation of treatment results	0.01	Strong

Meanwhile, recovery actions can be planned by preparing a service failure Standard Operating Procedure (SOP) and determining the service level, response time, and compensation that can be provided.

The next stage of failure management is monitoring and reviewing effectiveness. Ongoing monitoring and reviews are conducted regularly in all sections. Monitoring and review are part of designing a comprehensive failure analysis. In the failure assessment section, companies can monitor the reduction in failure levels after the failure treatment plan is implemented effectively and consistently. If there is a shift in values, the company can evaluate the causes of the change. Shifting priority levels based on failure rates can serve as company feedback on technical methods for managing failures. Shifting priority levels based on the importance of activities can serve as a

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

company's feedback on activity innovations that deliver surprises and essential elements for customers. Therefore, improvement planning will align with Customer Relationship Management (CRM) activities and can enhance the established complaint management process. The failure management framework is documentation and recording. Documentation and recording can be done by maintaining records of the creation of flowcharts and forms for each part of the failure management process. In simple terms, the managerial implications steps can be carried out sequentially as follows: identify key processes, conduct stakeholder mapping, perform failure assessment, develop preventive and recovery plans, and finally integrate with the complaint system.

The proposed framework demonstrates its validity. Systematically, it follows the principles and framework of ISO 31000:2018 in complaint management, treating complaints as risks. The proposed framework includes preventive planning, stakeholder engagement, and mechanisms for continual improvement, which are not typically found in traditional complaint management frameworks that focus solely on fixing problems. The framework also ensures consistency by linking the processes for finding, evaluating, and fixing problems to those for handling complaints. This integration makes it possible to respond faster, make better decisions, and give better service. The case study illustrates the framework's practical applicability and provides evidence of its usefulness in real-world service processes. This study does not aim to generalize statistically. Nevertheless, the conceptual solidity and logical consistency of the framework suggest its potential relevance across various service-oriented sectors. However, future research may focus on empirical validation across multiple industries to quantitatively assess the effectiveness of the proposed framework.

5. Conclusion

Customer complaints are an indicator of process failure. Complaint management has been structured to provide clear channels for receiving and handling complaints. The complaint management design can be strengthened by efforts to mitigate potential failures during the process. The scope of failure management encompasses a series of efforts to mitigate potential failures. Therefore, the preparation of a failure management framework should be based on globally recognized, comprehensive, and robust standards. The standard that meets these criteria is ISO 31000: 2018. By using ISO 31000: 2018, failure management in complaint management provides strengthening in terms of stakeholder involvement discussed in communication and consultation; the effectiveness and efficiency of potential failure management efforts discussed in scope, context, and criteria; failure assessment considering the level of potential failure and the impact on customer satisfaction; failure treatments suggesting developing a preventive and recovery action plan for potential failure leading the complaint; monitoring and review emphasizing a continuous improvement process; documentation and recording reminding the need for knowledge management. Although empirical validation is not the primary objective of this conceptual study, the illustrative case and comparative analysis provide initial evidence of the framework's applicability and potential effectiveness

References

[1] M. H. Yip, R. Phaal, D. R. Probert, M. Hang, R. Phaal, and D. R. P. Stakeholder, “Stakeholder Engagement in Early Stage Product- Service System Development for Healthcare Informatics,” *Engineering Management Journal*, vol. 9247, no. 26, pp. 52–62, 2015, doi: 10.1080/10429247.2014.11432020.

[2] K. Xing and D. Ness, “Transition to Product-service Systems: Principles and Business Model,” in *Procedia CIRP*, Elsevier B.V., 2016, pp. 525–530. doi: 10.1016/j.procir.2016.03.236.

[3] M. Motu’apuaka *et al.*, “Defining the benefits and challenges of stakeholder engagement in systematic reviews,” *Comparative Effectiveness Research*, p. 13, Apr. 2015, doi: 10.2147/cer.s69605.

[4] C. Fornell, “A National Customer Satisfaction Barometer: The Swedish Experience,” *J Mark*, vol. 56, no. 1, pp. 6–21, 1992, doi: 10.2307/1252129.

[5] A. Filip, “Complaint Management: A Customer Satisfaction Learning Process,” *Procedia Soc Behav Sci*, vol. 93, pp. 271–

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

275, Oct. 2013, doi: 10.1016/j.sbspro.2013.09.188.

[6] R. B. Stone, I. Y. Tumer, and M. Van Wie, "THE FUNCTION-FAILURE DESIGN METHOD," *ASME Journal of Mechanical Design*, 2003.

[7] F. Kimura, T. Hata, and N. Kobayashi, "Reliability-Centered Maintenance Planning based on Computer-Aided FMEA," *The 35th CIRP-International Seminar on Manufacturing Systems*, no. May, pp. 12–15, 2002.

[8] S. Kmenta and K. Ishii, "Scenario-based failure modes and effects analysis using expected cost," *Journal of Mechanical Design, Transactions of the ASME*, vol. 126, no. 6, pp. 1027–1035, 2004, doi: 10.1115/1.1799614.

[9] E. Felsoufi, P. Stief, J. Dantan, A. Etienne, and A. Siadat, "Proposition of a modified FMEA to improve reliability of product," *Procedia CIRP*, vol. 84, pp. 1003–1009, 2019, doi: 10.1016/j.procir.2019.04.315.

[10] K. Kimita, T. Sakao, and Y. Shimomura, "A failure analysis method for designing highly reliable product-service systems," *Res Eng Des*, vol. 29, no. 2, pp. 143–160, Apr. 2018, doi: 10.1007/s00163-017-0261-8.

[11] L. Ouyang, Y. Zhu, W. Zheng, and L. Yan, "Journal of Management Science and Engineering An information fusion FMEA method to assess the risk of healthcare waste," *Journal of Management Science and Engineering*, vol. 6, no. 1, pp. 111–124, 2021, doi: 10.1016/j.jmse.2021.01.001.

[12] R. D. Wahyudi, M. L. Singgih, and M. Suef, "Designing Activity-based Monitoring as an alternative process-based evaluation for Product-Service Systems," in *5th International Conference on Management Science and Industrial Engineering (MSIE 2023)*, 2023.

[13] J. J. Tarí, J. F. Molina-Azorín, and I. Heras, "Benefits of the ISO 9001 and ISO 14001 standards: A literature review," 2012. doi: 10.3926/jiem.488.

[14] E. Psomas and J. Antony, "The effectiveness of the ISO 9001 quality management system and its influential critical factors in Greek manufacturing companies," *Int J Prod Res*, vol. 53, no. 7, pp. 2089–2099, Apr. 2015, doi: 10.1080/00207543.2014.965353.

[15] A. Olechowski, J. Oehmen, W. Seering, and M. Ben-Daya, "The professionalization of risk management: What role can the ISO 31000 risk management principles play?," *International Journal of Project Management*, vol. 34, no. 8, pp. 1568–1578, 2016, doi: 10.1016/j.ijproman.2016.08.002.

[16] O. Boiral, L. Guillaumie, I. Heras-Saizarbitoria, and C. V. Tayo Tene, "Adoption and Outcomes of ISO 14001: A Systematic Review," *International Journal of Management Reviews*, vol. 20, no. 2, pp. 411–432, Apr. 2018, doi: 10.1111/ijmr.12139.

[17] A. Kaur, "Complaint Management: Key to customer retention in contemporary times," in *Proceedings of Yoganda International Conference on Contemporary Issues in Social Science*, K. C. Rojhe, A. Rao, and V. Negi, Eds., Eureka, 2021. [Online]. Available: https://www.researchgate.net/publication/353287615

[18] J. Wirtz and C. Lovelock, *Service Marketing: People, Technology, Strategy*, Eighth Edi., vol. 1. Hackensack, USA: World Scientific Publishing Co. Inc., 2019.

[19] A. J. C. Trappey, C. H. Lee, W. P. Chen, and C. V. Trappey, "A framework of customer complaint handling system," in *2010 7th International Conference on Service Systems and Service Management, Proceedings of ICSSSM' 10*, 2010, pp. 879–884. doi: 10.1109/ICSSSM.2010.5530119.

[20] E. Afify, H. Fatah, and M. A. K. El-Sayed, "A Model for Customer Complaint Management System using SOA," in *Recent Researches in Computer Science*, WSEAS Press, Jul. 2011, pp. 291–296.

[21] O. G. Wood, "Evolution of the Concept of Risk," *J Risk Insur*, vol. 31, no. 1, pp. 83–91, Feb. 1964, doi: 10.2307/251211.

[22] T. Zhu, S. Haugen, and Y. Liu, "Risk information in decision-making: definitions, requirements and various functions," *J Loss Prev Process Ind*, vol. 72, no. April 2020, p. 104572, 2021, doi:

e-ISSN 2477-6025
https://doi.org/10.21776/ub.jemis.2026.014.01.1

10.1016/j.jlp.2021.104572.

[23] G. H. S. Rampini, H. Takia, and F. T. Berssaneti, "Critical success factors of risk management with the advent of ISO 31000 2018 - Descriptive and content analyzes," *Procedia Manuf*, vol. 39, pp. 894–903, 2019, doi: 10.1016/j.promfg.2020.01.400.

[24] Y. Sari, E. Wibisono, R. D. Wahyudi, and Y. Lio, "From ISO 9001:2008 to ISO 9001:2015: Significant changes and their impacts to aspiring organizations," *IOP Conf Ser Mater Sci Eng*, vol. 273, p. 012021, 2017, doi: 10.1088/1757-899x/273/1/012021.

[25] E. Siahaan, M. Rosiawan, and R. Deliansyah, *SNI ISO 9001:2015*. 2017.

[26] BSI, "BSI Standards Publication Risk management," 2018.

[27] K. Srinivas, "Process of Risk Management," in *Perspectives on Risk, Assessment & Management Paradigms*, A. G. Hessami, Ed., Intechopen, 2019, pp. 0–16. doi: 10.5772/intechopen.80804.

[28] A. K. Smith, R. N. Bolton, and J. Wagner, "A Model of Customer Satisfaction with Service Encounters Involving Failure and Recovery," *Journal of Marketing Research*, vol. 36, no. 3, pp. 356–372, 1999, doi: 10.1177/002224379903600305.