Strategy Selection to Enhance Customer Data Quality using AHP: Case Study of General Insurance Company (PT XYZ)

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Abstrak

Penelitian ini mengkaji strategi peningkatan kualitas data pelanggan di PT XYZ, perusahaan asuransi umum, yang berpengaruh pada pengambilan keputusan strategis dan peningkatan pendapatan. Metode Proses Hierarki Analitik (AHP) digunakan untuk memilih strategi optimal dari alternatif yang tersedia. Penelitian dimulai dengan penetapan kriteria dan identifikasi strategi, lalu melibatkan empat ahli untuk evaluasi berdasarkan biaya, waktu, keamanan, dan ketersediaan. Hasil menunjukkan bahwa strategi *Memperkuat Kolaborasi Antar Departemen*, dengan nilai 0.455, adalah yang paling efektif, menekankan pentingnya kerjasama antar departemen untuk meningkatkan kualitas data. Temuan ini menyoroti manfaat jangka panjang pada efisiensi operasional dan kepuasan pelanggan, serta aplikasi praktis AHP dalam organisasi.

Kata kunci— *Kualitas Data Pelanggan, AHP, Kolaborasi Departemen, Efisiensi Operasional, Kepuasan Pelanggan*

Abstract

This study explores strategies to enhance customer data quality at PT XYZ, a general insurance company, to support strategic decision-making and revenue growth. Using the Analytical Hierarchy Process (AHP), the study establishes criteria—cost, time, security, and availability—and evaluates alternative strategies. Four experts with relevant technological and organizational expertise, including senior IT and digital division heads, contribute to the analysis. Findings show that *Strengthening Collaboration Across Departments* (score 0.455) is the most effective strategy, emphasizing interdepartmental cooperation to improve data quality. The results highlight the long-term benefits for operational efficiency and customer satisfaction, illustrating AHP's practical value in organizations.

Keywords— *Customer Data Quality, Analytical Hierarchy Process (AHP), Interdepartmental Collaboration, Operational Efficiency, Customer Satisfaction*

1. INTRODUCTION

Customer data quality is critical in the information-driven business era, where strategic decisions increasingly rely on accurate and reliable data analysis. Recent studies highlight the increasing reliance on accurate customer data to drive business outcomes, with poor data management contributing to significant financial and operational setbacks for organizations [1,2]. According to a recent survey, over 80% of companies acknowledge that poor customer data quality results in financial losses and harms the company's reputation [3]. The role of advanced data management techniques, particularly machine learning and artificial intelligence, has been emphasized as essential to improving data quality by reshaping how businesses handle customer data, allowing them to anticipate and rectify issues more efficiently [4].

In the insurance industry, accurate customer data is even more crucial because it directly affects risk assessment, pricing strategies, and claims management [5]. Inaccurate data can lead to poor risk evaluation, mispricing of premiums, and inefficient handling of claims, resulting in dissatisfied customers and financial losses for insurance providers [6]. PT XYZ, a leading general insurance company, is no exception to these challenges, as it faces issues related to inconsistent and incomplete customer data that hinder its operational efficiency and revenue growth. According to POJK No. 71 of 2016, a general insurance company is defined as a business that provides risk insurance services, offering compensation to the insured for losses, damages, incurred expenses, lost profits, or legal liabilities to third parties. These losses or liabilities may result from uncertain events.

In the context of insurance companies (PT XYZ), inaccurate customer data can significantly impact risk management, premium pricing, customer service, and even the claims process due to incorrect incident information or incomplete claims history. Therefore, maintaining customer data quality is essential for enhancing operational efficiency and minimizing the risk of financial loss [7]. Improving customer data quality also has a positive impact on company revenue. High-quality customer data provides a strong foundation for personalized services, more effective marketing, and more accurate decision-making [8].

Improving customer data quality presents challenges despite its benefits, as costs and time constraints can limit efforts; however, long-term gains in decision-making and customer satisfaction often justify initial investments [9]. The use of the Analytic Hierarchy Process (AHP) for this purpose is increasingly popular, facilitating complex decision-making across fields such as IT, hospitality, IoT, and finance [10-16].

While prior studies on data quality enhancement exist, few address customer data quality specifically in the general insurance sector. Most literature focuses on general frameworks rather than on the application of AHP to select strategies for customer data quality in companies like PT XYZ [17,18]. This research addresses two questions: (1) Which criteria are most critical in evaluating strategies for customer data quality at PT XYZ? (2) Which strategy is optimal for PT XYZ's implementation?.

The study's objective is to identify strategies that improve data accuracy and consistency at PT XYZ, supporting operational efficiency and growth. By addressing gaps in the literature and PT XYZ's needs, this study suggests practical alternatives for the company. As AHP has seldom been applied in insurance for data quality management, this research contributes both theoretical and practical insights, applying AHP to identify the best strategy and evaluating alternatives comprehensively [19,20]. Practically, the research recommends enhanced interdepartmental collaboration as a key strategy, with broader implications for operational efficiency and customer satisfaction, serving as a model for similar companies [21].
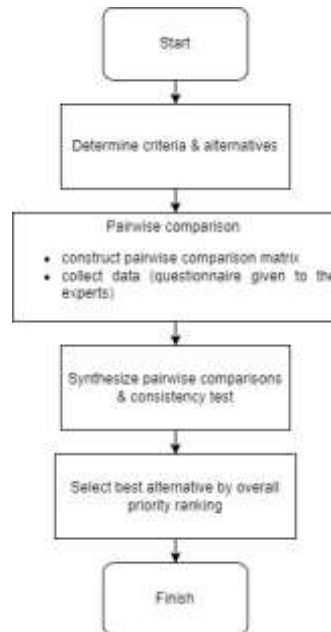
2. METHODS

Figure 1 Research Flow Chart

The research stages in Figure 1 outline a structured decision-making process using the Analytical Hierarchy Process (AHP) to select strategies for enhancing customer data quality at PT XYZ, a leading general insurance company. The study defined criteria—cost, time, security, and availability—based on literature and industry relevance, assessing strategies like strengthening interdepartmental collaboration, utilizing external resources, and developing data quality dashboards using an AHP model [22].

Experts conducted pairwise comparisons to score each criterion on a scale of 1 to 9, creating a pairwise matrix that calculated criterion weights using the geometric mean. Security emerged as the top factor, with the highest weight of 0.719, highlighting its priority for data quality improvement. The consistency of expert judgments was confirmed by a consistency ratio below 0.1, ensuring reliable evaluations. The alternatives were then assessed based on these weights, deriving priority scores through a pairwise matrix for each criterion.

The dual evaluation (criteria weighting and alternative scoring) enabled a balanced assessment, ensuring the decision incorporated both theoretical importance and practical applicability [23,24,25].

Table 1 Expert Requirements

No.	Category	Description
1	Technology Proficiency	Minimum 5 years of experience with data management.
		Familiarity with data management tools & data governance concept.
2	Organizational Impact	Currently work as a PT XYZ employee as an Analyst or Management level.
		Having the authority to access, organize, and execute business requests regarding the data.

After selective approach based on the proficiency requirements in Table 1, these experts are:
1. Senior IT Business Intelligence
2. Data Analyst
3. Unit Head of IT Infrastructure & Security Department
4. Division Head of Digital

In the AHP method, selecting criteria and expert input is essential. The alternative strategies to improve data management quality in this research, based on literature, include:
1. Strengthening collaboration across departments

2. Utilization of external resources
3. Development of data quality dashboards

The AHP diagram for this research, aligned with objectives and criteria, is shown in Figure 2. [26]
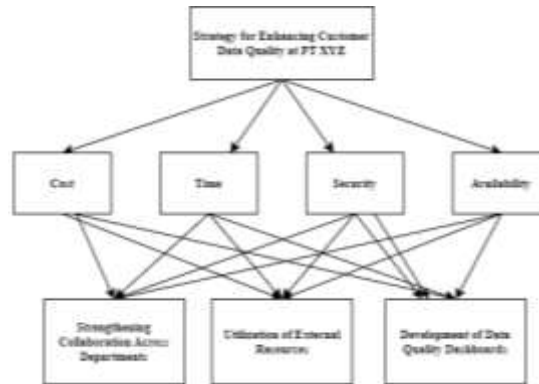

Figure 2 AHP Diagram for Selecting Strategy

The scoring scale guide given to experts is in Table 3.

Table 3 Instructions for filling in the assessment scale between criteria and alternative solutions

Comparison	Rating of Scales
Factor A is as important as Factor B	1
Factor A is slightly more important than Factor B	3
Factor B is slightly more important than Factor A	1/3
Factor A is more important than Factor B	5
Factor B is more important than Factor A	1/5
Factor A is very important than Factor B	7
Factor B is very important than Factor A	1/7
Factor A is absolutely more important than Factor B	9
Factor B is absolutely more important than Factor A	1/9
A scale value of 2,4,6,8 or 1/2, 1/4, 1/6, 1/8 is given if there is a slight difference in the comparison of the level of importance with the available benchmark	

The criteria screening guide is based on the criteria in Table 4, Table 5, Table 6, Table 7, Table 8. [27]

Table 4 Comparison of Criteria between Factor A and Factor B

		Factor B			
		Cost	Time	Security	Availability
Factor A	Cost	1	...(a)	…(b)	…(c)
	Time		1	…(d)	…(e)
	Security			1	…(f)
	Availability				1

Table 5 Comparison Priority on Cost Criteria

		Factor B		
		Strengthening Collaboration Across Departments	Utilization of External Resources	Development of Data Quality Dashboards
Factor A	Strengthening Collaboration Across Departments	1	…(g)	…(h)
	Utilization of External Resources		1	…(i)
	Development of Data Quality Dashboards			1

Table 6 Comparison Priority on Time Criteria

		Factor B		
		Strengthening Collaboration Across Departments	Utilization of External Resources	Development of Data Quality Dashboards
Factor A	Strengthening Collaboration Across Departments	1	…(j)	…(k)
	Utilization of External Resources		1	…(l)
	Development of Data Quality Dashboards			1

Table 7 Comparison Priority on Security Criteria

		Factor B		
		Strengthening Collaboration Across Departments	Utilization of External Resources	Development of Data Quality Dashboards
Factor A	Strengthening Collaboration Across Departments	1	…(m)	…(n)
	Utilization of External Resources		1	…(o)
	Development of Data Quality Dashboards			1

Table 8 Comparison Priority on Availability Criteria

		Factor B		
		Strengthening Collaboration Across Departments	Utilization of External Resources	Development of Data Quality Dashboards
Factor A	Strengthening Collaboration Across Departments	1	…(p)	…(q)
	Utilization of External Resources		1	…(r)
	Development of Data Quality Dashboards			1

3. RESULTS AND DISCUSSION

After distributing and collecting expert questionnaires, strategy selection weights were calculated using the Analytic Hierarchy Process (AHP) and the geometric mean method. First, criteria weights were established, with Security identified as the most critical factor (Table 9) [17].

Table 9 Calculation results of criteria comparison using geometric mean method

	Cost	Time	Security	Availability	Priorities (Normalized)
Cost	1	1.401	0.111	0.313	0.067
Time	0.714	1	0.111	0.258	0.054
Security	9.000	9.000	1	7.937	**0.719**
Availability	3.195	3.873	0.126	1	0.160

λmax = 4.173 CI = 0.058 CR = 0.064

Table 9 shows criteria weighting through the geometric mean in AHP, aggregating expert judgments to prioritize Cost, Time, Security, and Availability. This yielded a consistency ratio (CR) below 0.1, confirming reliable comparisons. With a weight of 0.719, Security emerged as the dominant criterion, underscoring the importance of data protection in the insurance sector, where regulatory compliance and data security are crucial to avoid breaches and reputational damage [4,21].

The next step assessed three strategy options for enhancing customer data quality: Strengthening Collaboration Across Departments (Alt. A), Utilization of External Resources (Alt. B), and Development of Data Quality Dashboards (Alt. C), based on these criteria.

1. Considering the Cost criteria, Development of Data Quality Dashboards is the selected strategy (Table 10).

Table 10 Calculation result between Cost criteria & alternative comparison

Cost (0.067)	Alt. A	Alt. B	Alt. C	Priorities (Normalized)
Alt. A	1	2.817	0.714	0.386
Alt. B	0.355	1	0.439	0.164
Alt. C	1.401	2.280	1	**0.450**

λmax = 3.034 CI = 0.017 CR = 0.029

2. Considering the Time criteria, Utilization of External Resources is the selected strategy (Table 11).

Table 11 Calculation result between Time criteria & alternative comparison

Time (0.054)	Alt. A	Alt. B	Alt. C	Priorities (Normalized)
Alt. A	1	0.333	1.000	0.172
Alt. B	3.000	1	7.454	**0.700**
Alt. C	1.000	0.134	1	0.127

λmax = 3.093 CI = 0.046 CR = 0.080

Table 11 presents with a normalized priority score of 0.700, *Utilization of External Resources* is deemed the most time-efficient, allowing PT XYZ to leverage external expertise and technology to expedite data quality improvements. This aligns with the goal of enhancing customer data management efficiency to remain competitive in a rapidly evolving industry.

3. Considering the Security criteria, Strengthening Collaboration Across Departments is the selected strategy (Table 12).

Table 12 Calculation result between Security criteria & alternative comparison

Security (0.719)	Alt. A	Alt. B	Alt. C	Priorities (Normalized)
Alt. A	1	9.000	0.811	**0.489**
Alt. B	0.111	1	0.237	0.075
Alt. C	1.233	4.213	1	0.436

λmax = 3.105 CI = 0.053 CR = 0.091

Table 12 shows the highest normalized score of 0.489, *Strengthening Collaboration Across Departments* enhances data security by establishing unified data governance across departments, crucial for regulatory compliance and risk mitigation in insurance.

The result supports the research objective of improving customer data quality by addressing critical factors such as data security. Given the high weight of the Security criterion in the overall AHP analysis (0.719), the emphasis on collaboration indicates a strategic focus on safeguarding customer information, which is essential for regulatory compliance and risk mitigation in the insurance sector.

4. Considering the Availability criteria, Strengthening Collaboration Across Departments is the selected strategy (Table 13).

Table 13 Calculation result between Availability criteria & alternative comparison

Availability (0.160)	Alt. A	Alt. B	Alt. C	Priorities (Normalized)
Alt. A	1	1.065	2.141	**0.426**
Alt. B	0.939	1	1.236	0.340
Alt. C	0.467	0.809	1	0.234

λmax = 3.026 CI = 0.013 CR = 0.023

Table 13 shows that *Strengthening Collaboration Across Departments* achieves the highest normalized priority score (0.426) under the Availability criterion, indicating it as the most effective strategy. This suggests that a collaborative approach can enhance data availability by enabling consistent data sharing across departments. When

departments collaborate, they facilitate quicker and more open data access, thereby improving overall data availability and accessibility.

Based on the overall results of the weighted calculations, the chosen alternative strategy is Alt. The overall weighted results can be seen in the table below.

Table 14 Selected Alternatives Based on Score Calculations

Alternative Selection		Priorities (Normalized)
Alt. A	Strengthening Collaboration Across Departments	**0.455**
Alt. B	Utilization of External Resources	0.157
Alt. C	Development of Data Quality Dashboards	0.388

With a top normalized priority score of 0.455, *Strengthening Collaboration Across Departments* stands out, followed by *Development of Data Quality Dashboards* (0.388) and *Utilization of External Resources* (0.157). This consistent top ranking highlights its broad applicability across various data quality dimensions, such as security, availability, and timeliness, aligning directly with the study's objective to identify a comprehensive strategy for improving customer data quality at PT XYZ.

In the general insurance industry, inter-departmental collaboration is critical for enhancing customer data quality. This unified approach facilitates seamless communication and coordination among departments (e.g., underwriting, claims, customer service, and IT), ensuring that customer data remains accurate, complete, and up-to-date. By reducing silos, the strategy helps maintain a single source of truth, minimizing data discrepancies and supporting sustained improvement across operational functions.

Enhanced interdepartmental collaboration fosters a thorough understanding of customer needs and behaviors, improving risk assessment, pricing, and personalized service. This approach mitigates knowledge gaps, enabling faster responses to market changes and better decision-making processes [28]. Research confirms that a collaborative approach in data management significantly boosts data quality and operational efficiency, especially in data-reliant industries like insurance [29,30].

Integrating efforts across departments is crucial for effective data management, aligning data governance with organizational goals [31]. Consistent practices established by departments support data quality standards and reduce errors and redundant information, ensuring compliance with regulations [32,33]. Studies highlight that organizations with robust interdepartmental communication face fewer data incidents and handle regulatory demands more efficiently [34].

Implementing interdepartmental collaboration poses challenges, particularly overcoming silos where departments maintain independent processes. Shifting to unified data management demands cultural changes, time, and resources, while training and system integration entail upfront costs that may delay benefits [35,36].

Despite these obstacles, this strategy presents significant advantages. Collaborative environments enable departments to share insights, leading to enhanced risk assessment and personalized services [37]. Consistent data-sharing reduces discrepancies, ensuring accuracy and compliance. Findings from the Analytical Hierarchy Process (AHP) suggest that while initial investments are high, the strategy yields long-term gains in data quality, security, and efficiency, making it a valuable choice for PT XYZ in the competitive insurance market [38].

This study, which prioritizes 'Strengthening Collaboration Across Departments' for enhancing customer data quality, offers key theoretical and practical implications. Theoretically, it reinforces the critical role of interdepartmental cooperation in data management and risk reduction. Practically, implementing this strategy at PT XYZ will enhance cross-departmental communication among underwriting, claims, customer service, and IT, leading to a comprehensive understanding of customer needs. This improved collaboration is expected to drive operational efficiency, customer satisfaction, and informed decision-making.

Furthermore, it supports regulatory compliance and minimizes financial risks from inaccurate or incomplete data. This proactive approach aligns with long-term goals like risk mitigation and customer-focused service improvements, establishing a foundation for sustained strategic advantages and strengthening the company's competitive stance in the insurance market.

4. CONCLUSIONS

This study aimed to select a strategy for enhancing customer data quality at PT XYZ using the Analytical Hierarchy Process (AHP), considering four criteria: Cost, Time, Security, and Availability. Through expert assessments, three alternatives were evaluated: Strengthening Collaboration Across Departments, Utilization of External Resources, and Development of Data Quality Dashboards. The analysis found that Strengthening Collaboration Across Departments was the most effective strategy, offering improvements in data accuracy, security, and interdepartmental communication. The research contributes to the field by applying AHP to strategy selection in the general insurance industry, providing a structured approach for decision-making. Practically, this strategy is expected to enhance coordination among departments at PT XYZ, leading to better customer data quality, compliance, and operational efficiency.

However, the study's reliance on expert judgment introduces subjectivity, and its focus on a single company may limit generalizability. Future research could address these limitations by including a broader range of companies and incorporating quantitative analysis. Additionally, further studies could explore the long-term impacts of interdepartmental collaboration and the role of advanced technologies like machine learning or blockchain in enhancing data management practices. These insights would help refine and adapt the strategy to meet evolving industry needs.

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