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Analysis of the Effectiveness of Host-to-Host System Usage in Resolving Multipurpose Credit Insurance Claims at PT Bank Sumut

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Abstract
The banking sector serves as a vital pillar of a country's economy, acting as an intermediary that channels public funds into various economic sectors. PT Bank Sumut, a conventional commercial bank, has introduced the Multipurpose Credit (Kredit Multi Guna/KMG) program to provide financial support to employees, including civil servants and private sector workers. To mitigate credit risks, particularly from events such as layoffs or death, Bank Sumut collaborates with PT Asuransi Bangun Askrida to offer credit insurance. In 2022, to improve the efficiency of claim processing, the bank adopted the Host-to-Host (H2H) system. This study analyzes the effectiveness of the H2H system in managing KMG insurance claims and its impact on claim resolution time and the Non-Performing Loan (NPL) ratio. A mixed-method approach was used, combining a quantitative survey of 103 system users with qualitative interviews and documentation. The analysis focused on four technological dimensions: technoware, humanware, infoware, and orgaware. Findings show that the H2H system enhances data integration, reduces manual errors, and accelerates claim submission. However, claim resolution times still exceed the agreed Service Level Agreement (SLA), potentially affecting NPL ratios. Orgaware and infoware emerged as the most influential components in system performance, highlighting the need for improved organizational processes and better information flow. The study concludes that while the H2H system offers notable benefits, its full potential has yet to be realized. It recommends strengthening technological infrastructure, enhancing human resource capabilities, and promoting inter-organizational collaboration to optimize system performance and improve service quality.

Keyword: *Host To Host; Non-Performing Loan; Claims*

1. Introduction

The banking industry is often regarded as the backbone and driving force of a nation’s economy due to its critical role as an intermediary in mobilizing and distributing public funds to support economic activities. In Indonesia, the primary function of banking is to collect and channel funds in order to support national development, improve economic equity, and enhance public welfare.

As a general bank and a financial services institution, PT Bank Sumut provides credit products such as *Kredit Multi Guna (KMG)* to employees whose salaries are disbursed through the bank. In offering credit, banks inevitably face default risks, including those arising from unforeseen events such as job termination or death of the borrower. To mitigate such risks, credit insurance is applied to cover the outstanding loan in the event the debtor becomes incapable of repayment.

In recent years, PT Bank Sumut, in collaboration with PT Asuransi Bangun Askrida, has implemented a Host-to-Host (H2H) system for insurance coverage and claims processing. This system allows direct data exchange between the bank and insurance provider, enabling real-time, automated transactions. The integration aims to enhance the efficiency, speed, and transparency of credit insurance processes.

Despite the technological advancement, the average claim settlement time from 2022 to 2024 significantly exceeded the Service

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Level Agreement (SLA) of 14 working days, averaging 153.92 days in 2022, 186.07 days in 2023, and 161.52 days in 2024. The delays in claim processing could negatively impact loan quality and increase Non-Performing Loan (NPL) ratios.

This study analyzes the effectiveness of the Host-to-Host system in expediting the claim settlement process and its impact on the NPL ratio of KMG products. It also evaluates the contribution of four technological components—Technoware, Humanware, Infoware, and Orgaware—in supporting the effectiveness of the H2H system. Although several studies have discussed the digitalization of banking operations, limited research has specifically examined how Host-to-Host integration affects the timeliness of insurance claim settlements and its correlation with non-performing loan ratios. This gap highlights the need to investigate how technological synergy influences claim efficiency and credit quality within regional banks such as Bank Sumut. The research uses quantitative methods based on data from 2022 to 2024, including monthly claim submissions, settlements, and NPL ratios. The findings are expected to provide insights for improving the implementation of Host-to-Host systems in banking insurance processes and contribute to enhancing overall operational efficiency and loan quality at PT Bank Sumut.

2. Literature Review

2.1 Fundamental Components of Technology

In every transformation process, four technological components must operate simultaneously, as no transformation can be effectively carried out without all four. These components, as defined by UNESCAP, are:

- Technoware – Technology embodied in physical objects, such as facilities used in production, including tools, equipment, machines, vehicles, and infrastructure.
- Humanware – Technology embodied in people, encompassing the knowledge, skills, experience, creativity, and wisdom required to effectively operate and manage technoware.
- Infoware – Technology embodied in documents, consisting of structured information such as procedures, methods, techniques, specifications, and theories that guide decision-making and operations.
- Orgaware – Technology embodied in institutions, including organizational structures, management practices, and institutional relationships that coordinate and integrate the other three components.

These four components are interdependent. Technoware forms the core of the transformation system but requires humanware for its operation. Humanware relies on infoware to carry out tasks and make decisions. Orgaware governs and aligns the use of technoware, humanware, and infoware to ensure that the transformation process proceeds systematically and effectively.

2.2 The Techometric Concept

The technometric approach evaluates the contributions of the four integrated technology components—technoware, humanware, infoware, and orgaware—in transforming inputs into outputs based on Ramey (2013). Technoware represents physical tools; humanware includes human skills and expertise; infoware comprises information and procedures; and orgaware refers to organizational structure and management systems. These components must function collectively and interdependently to achieve effective operations. The level of advancement or "state of the art" of each component is assessed to determine its performance. This assessment supports strategic decision-making in technology management and system optimization.

The technometric approach is used to measure the technological contribution of the four core components of technology: technoware, humanware, inforware, and orgaware. Technometric analysis has been widely applied to evaluate various aspects of technology, particularly in assessing how these components contribute to the transformation of inputs into outputs of varying complexity and sophistication.

- Technoware represents the physical tools, equipment, and facilities that form the core of the transformation process.
- Humanware refers to the human elements—skills, knowledge, and expertise—required to develop, operate, and manage technoware. Technoware cannot function productively without the involvement and capability of humanware.
- Inforware comprises the information and knowledge systems, including manuals, procedures, and scientific data, that support technological operations and decision-making.
- Orgaware involves the organizational structures, rules, and coordination mechanisms that integrate technoware, humanware, and inforware into an efficient transformation process.

The **interdependency** of these components is critical; the increasing sophistication of technoware requires enhanced capabilities from humanware. Orgaware ensures that all components work in harmony to achieve efficiency.

In technometrics, the concept of **"state of the art"** is used to represent the most advanced level of each technological component. This benchmark serves as a reference in evaluating the performance scores of technoware, humanware, inforware, and orgaware.

2.3 Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP), developed by Saaty (1980), is a structured decision-making method used to solve complex problems by breaking them down into a hierarchy of criteria and alternatives. Through pairwise comparisons and expert judgments, AHP assigns priority weights and ensures logical consistency in the decision-making process. AHP effectively integrates both qualitative and quantitative inputs, making it suitable for analyzing multi-criteria problems in a systematic and transparent manner.

The Analytical Hierarchy Process (AHP) was developed by Thomas L. Saaty to solve complex or unstructured problems, especially when statistical data and information are limited. According to Saaty (1989), AHP is a decision-making model that enables individuals or groups to structure their ideas and define problems by forming their own assumptions and deriving desired solutions. AHP differs from other decision-making models through its use of a functional hierarchy and its reliance on expert human judgment as the primary input.

AHP breaks down complex or unstructured problems into smaller, more manageable sub-problems, which are then organized into a hierarchical structure. This approach allows for the integration of both qualitative and quantitative data, leveraging expert knowledge to evaluate the issues involved.

According to E. Nur et al. (2013), AHP involves four key principles:

1. Decomposition – Breaking down a complex system into smaller, understandable elements and arranging them hierarchically.
2. Comparative Judgment – Conducting pairwise comparisons between criteria and alternatives to assess their relative importance.
3. Synthesis of Priority – Determining the overall priority or ranking among alternatives.
4. Logical Consistency – Ensuring consistency in the judgments provided.

The strength of AHP lies in its ability to guide decision-makers in refining their understanding through iterative evaluation. It combines subjective assessments with structured pairwise comparisons using a numerical scale that reflects preferences or importance levels. These comparisons are documented and tested for logical consistency.

Furthermore, AHP can be integrated with other optimization techniques, such as **multi-objective programming** or **goal programming**, for more technical applications. Overall, AHP provides a systematic and replicable approach for complex decision-making, grounded in both human perception and logical analysis.

3. Research Methodology

3.1 Technometric Model

The technometric model is a framework used to measure the effectiveness and contribution of four core technology components: technoware, humanware, infoware, and orgaware. This model consists of five main stages:

- Estimation of Sophistication Level
  Each technology component is assessed based on measurable criteria, using a score ranging from 0 (lowest) to 10 (highest). These scores are then normalized (on a 0–1 scale) to represent the current level of technological advancement for each component.
- Technology Sophistication Assessment
  Specific criteria are evaluated, and additional weights may be assigned based on their importance. The average score for each component is calculated using a normalization formula.
- Calculation of Component Contribution
  The contribution of each component is calculated using a formula that considers the minimum and maximum contribution thresholds along with the sophistication scores.
- Assessment of Contribution Intensity
  A pairwise comparison matrix is used to determine the relative importance (weight) of each component. Eigenvalue analysis is applied to generate normalized weights used in the final contribution calculation.
- Technology Contribution Coefficient (TCC)
  The overall technology contribution is calculated using the formula:

TCC = T^bt × H^bh × I^bi × O^bo

where T, H, I, and O represent the contributions of technoware, humanware, infoware, and orgaware, respectively, and bt, bh, bi, bo are their corresponding contribution intensities.

– TCC Interpretation

The resulting TCC score is categorized as follows:

a. 0.0–0.3: Traditional

b. 0.3–0.7: Semi-modern

c. 0.7–1.0: Modern

Other descriptors may include: Very Low, Low, Fair, Good, Very Good, Highly Advanced.

3.2 Analytical Hierarchy Process (AHP)

Thomas L. Saaty (1989),The Analytical Hierarchy Process (AHP) is a decision-making method used to determine priorities and support the resolution of complex problems. The method involves structuring the problem into a hierarchy, conducting pairwise comparisons among elements, and calculating their relative weights. The steps involved in AHP are as follows:

– Defining the Problem and Constructing the Hierarchy

This includes outlining the overall goal, followed by criteria and alternative options in a hierarchical structure.

– Pairwise Comparisons

Each element in the hierarchy is compared in pairs to evaluate its relative importance or preference.

– Synthesis of Results

The comparison matrix is normalized, and the average priorities for each criterion are calculated to determine weights.

– Consistency Measurement

To ensure logical judgments, a Consistency Index (CI) and Consistency Ratio (CR) are computed. If CR ≤ 0.1, the assessments are considered consistent; if CR > 0.1, the judgments should be reviewed and adjusted.

AHP facilitates a structured, rational, and consistent decision-making process, integrating both qualitative judgments and quantitative analysis.

4. Results and Discussion

This section outlines the analytical process carried out based on the required data, leading to results aligned with the focus of this study. The analysis was conducted using historical data from 2022 to 2024, as well as questionnaire responses from users of the Host-to-Host (H2H) system. The discussion focuses on the achievement of claim effectiveness, the contribution of each technology component, and the impact of claim delays on the Non-Performing Loan (NPL) ratio.

- Validity Test

Based on the validity test, it was found that 61 out of 65 distributed questionnaires were declared valid. This indicates that the majority of the items successfully measured the intended constructs.

- Reliability Test

Based on of the validity and reliability tests, it can be concluded that all questions used for each variable were capable of accurately measuring the intended concepts. Furthermore, the instruments have been proven to be valid and reliable, making all the items appropriate to be used as measurement tools in this.

4.1 Technoware Component Criteria Scores

The evaluation results for the Technoware component at PT Bank Pembangunan Daerah Sumatera Utara (Bank Sumut) are shown in the following table. Each criterion under Technoware was assessed using a scoring scale from 0 to 100, where 0 indicates the poorest condition and 10 the best. The following is an illustrative calculation of the *state-of-the-art* level for routine maintenance within the Technoware component:

Tabel 4.1Technoware Component Criteria Scores

Technoware	**Amount**	**Avarege**	***State of The Art***
IT Infrastructure	661	165,25	16,53
System Performance	734	146,80	14,68
System Security	712	178,00	17,80
Compability	499	166,33	16,63

The highest *state-of-the-art* score was found in System Security, at 17.80, while the lowest score was recorded in System Performance, with a score of 14.68.

4.2 Infoware Component Criteria Scores

The *state-of-the-art* assessment for the **Infoware** component at PT Bank Sumut reveals that the highest score was achieved in the Information Distribution aspect (17.43), while the lowest score was found in Information Accessibility (15.08).

Tabel 4.2 Infoware Component Criteria Scores

Infoware	**Amount**	**Average**	***State of The Art***
Information Accessibili	603	150,75	15,08
Data Quality	462	154,00	15,40
Data Processing	509	169,67	16,97
Information Distributio	697	174,25	17,43

From the table above, the *state-of-the-art* scores for the Infoware component at PT Bank Pembangunan Daerah Sumatera Utara (Bank Sumut) can be observed. The highest score was recorded in the Information Distribution aspect, with a score of 17.43, while the lowest score was found in the Information Accessibility aspect, with a score of 15.08.

4.3 Humanware Component Criteria Scores

The *state-of-the-art* assessment for the **Humanware** component at PT Bank Sumut indicates that the highest score was obtained in User Interaction (15.48), while the lowest score was found in Motivation and Attitude (13.98).

Tabel 4.3 Humanware Component Criteria Scores

Humanware	**Amount**	**Average**	**State of The Art**
User Competence	447	149,00	14,90
Training & Supportir	583	145,75	14,58
User Interaction	619	154,75	15,48
Motivation &Attitud	559	139,75	13,98

From the table above, the *state-of-the-art* scores for the Humanware component at PT Bank Pembangunan Daerah Sumatera Utara (Bank Sumut) can be observed. The highest score was obtained in the User Interaction aspect, with a score of 15.48, while the lowest score was found in the Motivation and Attitude aspect, with a score of 13.98.

4.4 Orgaware Component Criteria Scores

The *state-of-the-art* evaluation for the Orgaware component at PT Bank Sumut shows that the highest score was achieved in

Organizational Structure (16.33), while the lowest score was found in Policies and Procedures (15.35).

Tabel 4.4 Orgaware Component Criteria Scores

Orgaware	**Amount**	**Average**	**State of The Art**
Management Suppo	650	162,50	16,25
Organization Cultu	627	156,75	15,68
Organization Struct	653	163,25	16,33
Policies & Procedu	614	153,50	15,35

From the table above, the *state-of-the-art* scores for the Orgaware component at PT Bank Pembangunan Daerah Sumatera Utara (Bank Sumut) can be observed. The highest score was obtained in the Organizational Structure aspect, with a score of 16.33, while the lowest score was found in the Policies and Procedures aspect, with a score of 15.35.

4.5 Determining The Contribution Intensity Of Technology Component

This assessment aims to determine the weight of each technology component to be used in the technometric calculations. The data is presented in the form of a pairwise comparison matrix.

Tabel 4.5 The Contribution Intensity Of Technology Component

Unsur	**Techno ware**	**Human ware**	**Info ware**	**Orga ware**
Technoware	1,00	2,92	0,31	4,11
Infoware	3,27	4,17	1,00	6,33
Humanware	0,28	1,00	0,24	3,32
Orgaware	0,24	0,30	0,16	1,00
Total	**4,80**	**8,39**	**1,70**	**14,76**

4.6 Weighting of Technological Components

Normalized Weighting Matrix Table for All Technological Components

The weighting in this study was carried out using the Analytical Hierarchy Process (AHP) method. Based on the pairwise comparison matrix data between technological components at PT Bank Pembangunan Daerah Sumatera Utara (Bank Sumut) as shown in Table 4.14, a normalized weighting factor matrix for all technological components can be compiled, as presented in the following table:

Unsur	**Techno ware**	**Human ware**	**Info ware**	**Orga ware**
Technoware	0,2084	0,3480	0,1794	0,2782
Infoware	0,0585	0,1192	0,1408	0,2251
Humanware	0,6823	0,4969	0,5871	0,4290
Orgaware	0,0507	0,0359	0,0927	0,0677
Total	**1,0000**	**1,0000**	**1,0000**	**1,0000**

Based on Table 4.14, the normalized value between the technological component Technoware to Technoware is 0.2084, which is obtained by dividing the value of the pairwise comparison (1) by the total sum of the respective column (4.80). Each value in the column is the result of dividing the individual comparison value by the total sum of the column.

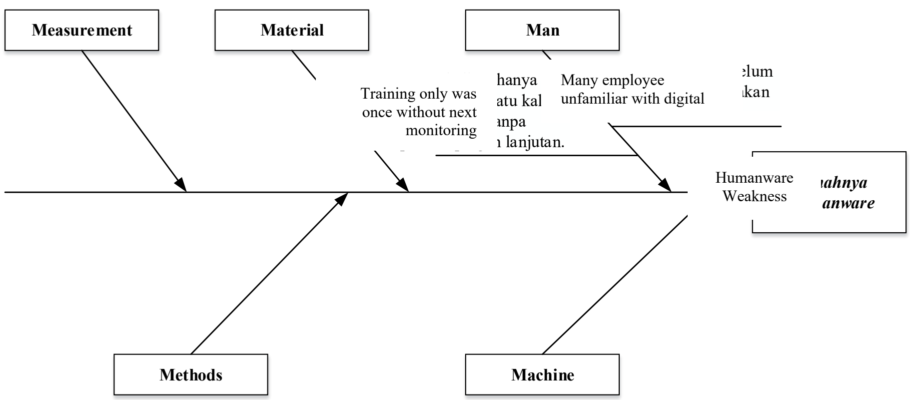
4.6 Analysis Of Technology Component at Bank Sumut

Based on the research findings, the effectiveness of implementing the Host-to-Host system in claim settlement at PT Bank Sumut (Conventional Unit) during the 2022 to 2024 period is still considered suboptimal. Although the Host-to-Host system was introduced to accelerate the insurance claim process between Bank Sumut and PT Asuransi Bangun Askrida, in reality, the claim settlement process has not shown a significant improvement in speed. The data indicates that the system has not yet been able to resolve the prolonged claim settlement time, and thus, the initial objective of its implementation has not been fully achieved.

Several factors contribute to the low level of technology, which is classified as traditional. For example, all documents are still uploaded manually and are not yet integrated with other existing systems; document status monitoring is still done manually; there are no automated notifications; the system is not accessible via mobile; the system information is still incomplete—resulting in repeated document submissions; bugs are still present in the Host-to-Host application; and the system does not yet validate the conformity of uploaded documents.

It was also found that the component with the lowest contribution score is Humanware, with a value of 0.24. Based on the analysis, this reflects a traditional level of technology, with the low quality of Humanware at PT Bank Sumut being caused by various interrelated factors. The main factor stems from human resources (man), where training is only conducted once at the beginning without continuous support, and many employees are still unfamiliar with using digital systems.

To address this issue, that PT Bank Sumut organize informal “lunch & learn” or digital coffee break sessions that cover light topics such as *“Tips & Tricks for Using the Host-to-Host System”*, and hold regular training every 3–6 months for system updates, case simulations, or sharing of best practices. A Fishbone Diagram illustrating these causes can be seen in the following figure :



The average claim settlement time during the period consistently exceeded the timeframe set in the Service Level Agreement (SLA), which is 14 working days. In 2022, the average claim settlement time was recorded at 153.92 days, increasing to 186.07 days in 2023, and rising again to 206.22 days in 2024. This situation is caused by several factors, including the fact that all documents are still uploaded manually and are not integrated with other existing systems; document status is monitored manually; there are no automated notifications; the system is not yet accessible via mobile; system information is incomplete—leading to repeated document submissions; bugs remain in the Host-to-Host application; and the system/application does not validate the compliance of uploaded documents.

The delays in claim settlement have also contributed to an increase in the Non-Performing Loan (NPL) ratio for multipurpose loans at PT Bank Sumut. Although claims have been submitted, the NPL ratio during the study period remained between 0.54% and 0.73%, showing no significant downward trend. Lengthy claim settlement processes have deteriorated loan quality, as delayed claim payments hinder the repayment of loans by borrowers facing risks such as death or termination of employment. As a result, the bank must increase its Allowance for Impairment Losses (CKPN), which in turn negatively impacts the company's profit.

Thus, this study demonstrates that delays in claim settlement have a direct impact on the increase in NPL in the Bank Sumut Multipurpose Loan product.

5. Conclusion

This chapter presents the conclusions drawn from the research findings and discussions, as well as the author's recommendations regarding the issues identified and the outcomes obtained.

The conclusions from this study are as follows: Based on the research conducted at PT Bank Sumut, it can be concluded that the Technoware index includes: IT infrastructure, system performance, system security, and compatibility. The Infoware index includes: information accessibility, data quality, data processing, and information distribution. The Humanware index includes: user capabilities, training and support, user interaction, and user motivation and attitude. Meanwhile, the Orgaware index covers: management support, organizational culture, organizational structure, and policies and procedures within PT Bank Sumut.

The Technology Contribution Coefficient (TCC) value for PT Bank Sumut was found to be 0.24. This result indicates that Bank Sumut's TCC falls below 0.30 but above 0.14, classifying the bank's technological level as traditional.

- Recommended improvements for addressing weaknesses in Technoware include upgrading the server and hardware at PT Bank Sumut, and performing periodic technical audits of the host-to-host system.
- recommended for improvements include optimizing the data pipeline for regular synchronization and utilizing dynamic templates or interactive dashboards to enhance information flow and usability.

6. Recommendations

The following suggestions may be considered based on the findings of this study:

1. Implement the research findings by adapting and re-evaluating the recommendations according to the actual conditions at PT Bank Sumut.
2. Follow up on the proposed improvements as soon as possible, where feasible, to enhance the institution’s competitive advantage—particularly in comparison to competing service providers.

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