JCITE

Journal of Computing Innovations and Emerging Technology

Volume 1 | Issue 2 | December (2025)

Published by **Novamind Press**

Journal of Computing Innovations and Emerging Technology

Application of Computational Thinking as an Effort to Optimize Business Processes in Samudera Motor Showroom Sales

Eunike Octavia Nababan[1], Nasywa Rakha Arrafi[2], Agnes Kurnia Gulo[3], Fawwaz Nabila Zulanifa[4], Karina Ghaisani[5], Adinda Nuril Ashfiya[6], Nindy Irzavika[7*]

[1,2,3,4,5,6]*Sistem Informasi, Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia*
[7]*Sains Data, Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia*
**Corresponding author: nindyirzavika@upnvj.ac.id*

Abstract* — The integration of computational thinking into the sales workflow of Samudera Motor provides significant opportunities for optimizing business processes. Through decomposition, key issues were identified clearly; pattern recognition highlighted recurring operational inefficiencies; abstraction helped isolate essential system components; and algorithm design produced structured solutions that can be implemented digitally. These findings demonstrate that computational thinking offers both a theoretical and practical framework for transforming traditional manual workflows into efficient, data-driven, and customer-oriented business processes. Implementing the proposed solutions can enhance operational accuracy, streamline decision-making, and significantly improve customer service performance at Samudera Motor. Furthermore, the application of computational thinking in the vehicle sales process provides an innovative foundation for enhancing efficiency and responsiveness to customer needs. By applying decomposition, pattern recognition, abstraction, and algorithm design, the study successfully identified major challenges in the manual sales workflow, such as difficulty in tracking sales history, lack of system integration, and a high risk of data errors. Proposed recommendations including data entry automation, the use of barcode or RFID technology, data analytics for identifying purchasing trends, and the development of an integrated centralized system are expected to improve operational efficiency, enrich customer experience, and support more adaptive sales strategies. Computational thinking serves not only as an analytical tool but also as a foundation for comprehensive business transformation, strengthening the competitiveness and long-term sustainability of Samudera Motor's showroom operations amid an increasingly dynamic market landscape.

***Keywords*—Business Process Optimization, Sales Process Improvement, Operational Efficiency, Computational Thinking**

Manuscript received 21 Nov. 2025; revised 02 Dec. 2024; accepted 05 Dec. 2025. Date of publication 15 Dec. 2025.

I. Introduction

The automotive industry, particularly the four-wheeled vehicle segment, remains a promising and rapidly evolving sector in Indonesia. According to data from the Gabungan Industri Kendaraan Bermotor Indonesia (Gaikindo), domestic wholesale vehicle sales reached 836,048 units during January–October 2023, while retail sales totaled 825,691 units over the same period [1]. This strong demand underlines the continued growth potential of Indonesia's automotive market, a trend also highlighted by the Ministry of Industry (Kemenperin), which affirms the sector as a strategically important business for the national economy [2].

Samudera Motor, a used-car showroom located in Tajur, Bogor, continues to operate with conventional sales practices. Marketing activities primarily rely on brochures and word-of-mouth communication, and potential customers must visit the showroom to obtain information about available vehicles, including brand, model, specifications, and pricing details. This traditional, on-site transaction model limits operational visibility and reduces the ability to attract, serve, and retain customers efficiently. In an era where digital transformation is rapidly reshaping business landscapes, such practices hinder competitiveness and responsiveness to fluctuating market demands.

Computational thinking is defined as a cognitive process that involves identifying problems, breaking them down into smaller parts (decomposition), recognizing patterns, abstracting, and designing algorithms to produce solutions that are understandable to both humans and computers [3], [4].

To address these challenges, the adoption of computational thinking (CT) offers a strategic approach for optimizing business processes in the automotive retail domain. Computational thinking is defined as a structured problem-solving process that involves formulating problems and designing solutions in ways that can be executed effectively by humans or machines. Its four key techniques, decomposition, pattern recognition, abstraction, and algorithm design, enable systematic analysis of complex processes, identification of inefficiencies, and the development of replicable and measurable solutions [5], [6]. Recent studies highlight the growing relevance of CT not only in computer science education but also in fields such as business management, decision-making, and process engineering [7], [8].

Applying computational thinking to the operational workflow of Samudera Motor can enhance several critical aspects of its business processes. Decomposition allows the breakdown of sales activities into manageable components, facilitating targeted improvements. Pattern recognition can reveal customer behavior trends and inventory cycles, supporting more informed decision-making. Abstraction helps identify essential variables that influence service quality, while algorithmic thinking enables the creation of structured procedures for customer inquiries, pricing decisions, promotional strategies, and inventory management. Additionally, computational thinking can support systematic evaluation of service quality dimensions, such as reliability, responsiveness, assurance, empathy, and tangibles. The goal is to enhance customer satisfaction and sales performance.

Despite the potential benefits, the application of computational thinking in optimizing business processes within small and medium-scale automotive showrooms remains understudied. Existing research focuses more on CT in education or general organizational problem-solving, leaving a gap in empirical studies that examine its practical integration in real-world sales environments, particularly in the used-car sector.

Research shows that CT is not only relevant in the computer field, but also very useful in mathematics education, science, and everyday life [9], [10]. CT helps students develop logical, creative, and structured thinking skills, as well as improve mathematical and non-mathematical problem-solving skills [11], [12]. In learning, the application of CT has been proven to improve analytical skills, data representation, and solution generalization [4], [6], [13].

Therefore, this study aims to investigate the application of computational thinking as a method to optimize business processes in the sales operations of Samudera Motor showroom. By modeling current workflows, identifying inefficiencies, and designing CT-based improvements, this research seeks to provide actionable insights and a practical framework that can enhance operational effectiveness, customer experience, and overall business performance. The findings are expected to contribute both theoretically by expanding the application scope of computational thinking and practically by offering recommendations adaptable to similar automotive retail businesses [14]-[15].

Beyond computational thinking research, studies on business process optimization and digital transformation provide relevant insights for modernizing showroom operations. Davenport's framework on process innovation emphasizes the role of structured redesign in enhancing workflow efficiency, while Harmon highlights the value of process modeling for identifying organizational bottlenecks. Research on SME digital transformation also stresses the importance of adopting centralized systems, data analytics, and automation to improve accuracy and responsiveness in retail environments. These perspectives complement the CT approach by linking analytical thinking with practical organizational improvements.

II. METHODOLOGY

The research method employed in this study is a qualitative approach integrated with computational thinking. Data were collected primarily through structured interviews, which served as the main technique for obtaining accurate and detailed information from key informants. To strengthen methodological rigor, the study clarifies the interview design. A total of four informants participated in the structured interviews: one showroom owner, two administrative staff members, and one sales representative. Participants were selected using purposive sampling, with the criteria that they (1) were directly involved in daily sales operations, (2) handled data recording or customer interaction, and (3) possessed knowledge of operational constraints. Example interview questions include: "How is the current sales process carried out?", "How are vehicle data and customer information recorded?", "What challenges occur most frequently in the sales workflow?", and "How often do data inconsistencies or delays occur?". In addition to interviews, direct observation and basic document inspection (e.g., logbooks and order forms) were conducted to ensure data triangulation. Structured interview questions were designed to yield an in-depth understanding of the operational processes and challenges encountered in the sales activities of the Samudera Motor showroom. The computational thinking approach applied in this study involves four fundamental components:

1. Decomposition, which refers to breaking down complex business processes into smaller, more manageable elements.
2. Pattern Recognition, which involves identifying recurring issues, trends, or behaviors within the sales workflow.
3. Abstraction, which focuses on determining the essential aspects of the process while filtering out irrelevant details.
4. Algorithm Design, which entails formulating step-by-step procedures to enhance workflow efficiency and decision-making.

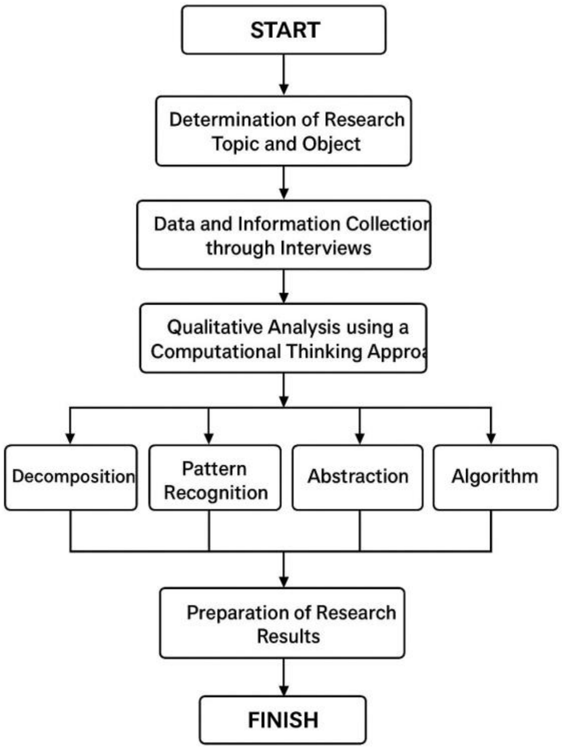

Fig. 1. Research Flow

Fig. *1* illustrates the research methodology flow used in this study, demonstrating how each stage from defining the research topic to qualitative analysis using computational thinking forms a systematic and coherent sequence. This flowchart ensures that the research process remains structured, transparent, and aligned with the study's objectives.

This research aims to provide a comprehensive overview of how computational thinking can be applied to optimize business processes in the sales operations of Samudera Motor. By combining qualitative inquiry with a structured computational thinking framework, the study not only contributes to theoretical insights but also generates practical recommendations for developing a more efficient and responsive business model. Furthermore, the findings are expected to offer actionable guidance for similar automotive businesses seeking to enhance operational effectiveness and customer service in a rapidly evolving market environment.

III. RESULT AND DISCUSSION

Empirical evidence was incorporated to enrich the analysis. Observations of sales logbooks indicate that Samudera Motor manages approximately **10–15 sales transactions per week**, recorded manually without standardized customer identifiers. Inventory records are written in notebooks without timestamps, resulting in discrepancies of **1–3 units** between recorded and actual stock. A simplified workflow diagram and examples of manual documentation were used to identify the main operational bottlenecks.

sAs the initial step of this study, an in-depth interview was conducted with representatives of the Samudera Motor showroom. The interview provided comprehensive insights into the operational workflow of their sales activities. One of the primary focuses was understanding how the sales process is conducted in the showroom.

The interview results reveal that the sales workflow is still performed manually. Customers visit the showroom directly to obtain information about available vehicles and complete the purchasing process on-site. All transactions require manual form-filling, and essential documents such as sales records, customer information, and purchase forms are recorded by hand. Consequently, sales documentation is stored in physical logbooks, and preparing sales reports requires manually tracing each entry. The showroom currently does not utilize any digital tools or specialized software to streamline data processing, reporting, or visualization of sales statistics.

This condition indicates that the showroom lacks a centralized data storage system; all information is kept only in physical books located at the office. As a result, data retrieval becomes difficult, time-consuming, and prone to inconsistencies. The manual nature of the workflow poses significant limitations, making it a critical point of discussion for recommending computational thinking based solutions to enhance efficiency and accessibility.

Based on the interview results, a deeper analysis of the business processes in Samudera Motor's showroom sales was conducted. Below are the research findings and recommended improvements using the four main stages of computational thinking: Decomposition, Pattern Recognition, Abstraction, and Algorithm Design. These stages are employed to optimize the sales workflow by proposing structured and scalable solutions.

A. Decomposition

Decomposition involves breaking down a complex issue into smaller, manageable components. In this study, decomposition provides a clearer understanding of the major challenges in the current sales workflow, particularly the absence of a proper sales database due to fully manual procedures. If this manual system continues, long-term inefficiencies will increase. The decomposition results are as follows:

1. Manual data collection

   All daily transactions are recorded manually in logbooks, accessible only to employees. The owner receives only the final sales reports, limiting transparency and real-time monitoring.

2. Absence of an integrated database system

   There is no digital system to store, organize, or process sales data. This highlights the need for database requirements analysis and the design of a system architecture aligned with the showroom's business processes.

3. High risk of errors and data inaccuracies

   Manual recording increases the likelihood of errors such as duplicate entries or missing information. Quality control mechanisms are needed to reduce data inconsistencies and speed up verification processes.

4. Inability to track sales history and customer preferences

   The absence of customer records prevents the showroom from implementing customer relationship management (CRM). Additionally, identifying frequently purchased vehicles is difficult due to the lack of consolidated data, making it impossible to generate trend graphs or conduct sales forecasting.

B. Pattern Recognition

Pattern recognition is used to identify recurring events, trends, or issues in the showroom's sales workflow. From the interview results, several patterns indicate inefficiencies in the existing system:

1. Duplicate data entries due to repeated manual recording
2. Inaccurate stock information, often outdated or inconsistent
3. Customer complaints regarding slow or delayed service

Based on these observed patterns, the following solutions are proposed:

1. Automated Data Entry: Introducing automated input systems to reduce human error and eliminate data duplication.
2. Barcode or RFID-based Inventory Tracking: Assigning digital identifiers to each vehicle to ensure real-time and accurate stock updates.
3. Data Analytics for Purchasing Trends: Implementing analytical tools to identify customer purchasing patterns, enabling informed stock management decisions, and preventing overstock or stock shortages.

C. Abstraction

Abstraction simplifies complex processes by focusing only on essential elements. In the context of Samudera Motor, abstraction helps prioritize core system components needed to build an efficient, integrated solution:

1. Centralized System Integration: Consolidating order management, stock management, and payment processing into a single platform to minimize errors and accelerate workflow execution.
2. Intuitive Customer Interface: Designing a user-friendly platform that enables customers to view stock information, submit orders, and complete transactions conveniently.
3. Data Analytics Algorithms: Utilizing analytical algorithms to extract actionable insights from sales data, enabling data-driven decision-making for optimizing sales strategies and improving customer satisfaction.

D. Algorithm Design

Algorithm design transforms conceptual solutions into structured, replicable procedures. Based on the abstraction stage, three main algorithm designs are proposed:

1. Centralized System Integration Algorithm: This algorithm manages order processing, stock updates, payment verification, and data storage within a centralized database.

```
Procedure ProcessSalesOrder(OrderData,
StockInformation, PaymentTransaction):
// Step 1: Receive order data from the
order interface
NewOrder = ReceiveOrder(OrderData)

// Step 2: Update stock information based
on the order
If CheckStockAvailability(NewOrder,
StockInformation):
UpdateStock(NewOrder, StockInformation)
Else:
DisplayMessage("Sorry, there is
insufficient stock for this order.")

// Step 3: Verify and process the payment
transaction
If VerifyPayment(PaymentTransaction):
ProcessPayment(PaymentTransaction)
DisplayMessage("Payment transaction
successful.")
Else:
DisplayMessage("Payment verification
failed. Please try again.")

// Step 4: Save order data, stock
information, and transactions to a
centralized database
SaveDataToDatabase(NewOrder,
StockInformation, PaymentTransaction)

End Procedure
```

2. Purchasing Trend Analysis Algorithm: A machine learning–based approach (e.g., Random Forest) is proposed to predict future stock needs and identify purchasing trends.

```
Function
IdentifyPurchasingTrends(SalesData):
// Implement a purchasing trend
identification algorithm using regression
or clustering to identify purchasing
patterns

Function
CreatePredictionModel(PurchaseTrends):
// Implement a prediction model using
machine learning with Random Forest to
train the prediction model

Function SetOptimalStock(PredictionModel,
SalesData, CurrentStock):
// Calculate future stock requirements
based on the prediction model
StockRequirements =
PredictedStockRequirements(PredictionMode
l)

// Compare stock requirements with current
stock
If StockRequirements > CurrentStock:
OptimalStock = StockRequirements +
OptimizationThreshold // Add a buffer
Else:
OptimalStock = CurrentStock

// Output: Optimized stock strategy
Return OptimalStock
End Function

Procedure AnalyzeSalesData(SalesData,
CustomerPreferences, CurrentStock):
// Step 1: Apply the data analysis
algorithm to identify purchasing trends
```

```
PurchaseTrends =
IdentifyPurchasingTrend(SalesData)

// Step 2: Create a prediction model to
estimate future stock requirements
PredictionModel =
CreatePredictionModel(PurchaseTrend)

// Step 3: Adjust stock based on the
analysis results to avoid understocking or
overstocking
OptimalStock =
AdjustOptimalStock(PredictionModel,
SalesData, CurrentStock)

// Output: Optimized stock strategy
        DisplayMessage("Optimized stock
        strategy: " + OptimalStock)
End Procedure.
```

3. Intuitive User Interface Algorithm: The algorithm focuses on designing a user-friendly interface that displays stock information, simplifies ordering, and presents clear payment options.

```
Procedure
CreateIntuitiveUserInterface(customerRequ
est, productData):
// Step 1: Design a user interface with
clear navigation
        interface = InterfaceDesign()

// Step 2: Display real-time product stock
information
productStock =
GetStockInformation(productData)
interface.ShowStockInformation(productSto
ck)

// Step 3: Facilitate the ordering process
with intuitive steps
If customerRequest == 'Order Product':
productOrdered = ProductOrder(interface,
productData)
interface.ShowOrderConfirmation(productOr
dered)
Else:
interface.ShowMainMenu()

// Step 4: Provide convenient and
transparent payment options
paymentOptions = GetPaymentOptions()
interface.ShowPaymentOptions(paymentOptio
ns)

End Procedure
```

A feasibility assessment was conducted through scenario-based validation, evaluating the algorithms on three operational scenarios: stock updates during a vehicle sale, payment verification, and simple demand forecasting using historical records. Results show that the stock update algorithm can accurately prevent negative inventory, while the forecasting logic identified the need for a minimum buffer of 2 units for fast-moving models. Although preliminary, these findings demonstrate that the algorithms are implementable and aligned with real operational requirements.

IV. CONCLUSION

The integration of computational thinking into the sales workflow of Samudera Motor provides significant opportunities for optimizing business processes. Through decomposition, key issues were identified clearly; pattern recognition highlighted recurring operational inefficiencies; abstraction helped isolate essential system components; and algorithm design produced structured solutions that can be implemented digitally.

These findings demonstrate that computational thinking offers both a theoretical and practical framework for transforming traditional manual workflows into efficient, data-driven, and customer-oriented business processes. Implementing the proposed solutions can enhance operational accuracy, streamline decision-making, and significantly improve customer service performance at Samudera Motor.

Furthermore, the application of computational thinking in the vehicle sales process provides an innovative foundation for enhancing efficiency and responsiveness to customer needs. By applying decomposition, pattern recognition, abstraction, and algorithm design, the study successfully identified major challenges in the manual sales workflow, such as difficulty in tracking sales history, lack of system integration, and a high risk of data errors. Proposed recommendations including data entry automation, the use of barcode or RFID technology, data analytics for identifying purchasing trends, and the development of an integrated centralized system are expected to improve operational efficiency, enrich customer experience, and support more adaptive sales strategies.

Computational thinking serves not only as an analytical tool but also as a foundation for comprehensive business transformation, strengthening the competitiveness and long-term sustainability of Samudera Motor's showroom operations amid an increasingly dynamic market landscape.

REFERENCES

[1] Kahfi, “Penjualan Mobil Lampaui 1 Juta Unit, Minimal Pertumbuhan Ekonomi 7% Artikel ini telah tayang di Bisnis.com dengan judul "Penjualan Mobil Lampaui 1 Juta Unit, Minimal Pertumbuhan Ekonomi 7%.” Accessed: Dec. 21, 2023. [Online]. Available: https://otomotif.bisnis.com/read/20231122/46/1716761/penjualan-mobil-lampaui-1-juta-unit-minimal-pertumbuhan-ekonomi-7#goog_rewarded

[2] R. Kurniawan and A. Ferdian, “Industri Otomotif Nasional Masih Jadi Bisnis yang Menjanjikan.” Accessed: Dec. 21, 2023. [Online]. Available: https://otomotif.kompas.com/read/2023/11/29/180100915/industri-otomotif-nasional-masih-jadi-bisnis-yang-menjanjikan

[3] T.-T. Wu, A. Asmara, Y.-M. Huang, and I. Permata Hapsari, “Identification of Problem-Solving Techniques in Computational Thinking Studies: Systematic Literature Review,” *Sage Open*, vol. 14, no. 2, Apr. 2024, doi: 10.1177/21582440241249897.

[4] Y. Zhang (张艺美) and A. Savard, “Defining Computational Thinking as an Evident Tool in Problem-Solving: Comparative Research on Chinese and Canadian Mathematics Textbooks,” *ECNU Review of Education*, vol. 6, no. 4, pp. 677–699, Nov. 2023, doi: 10.1177/20965311231158393.

[5] R. Andrian and R. Hikmawan, “The Importance of Computational Thinking to Train Structured Thinking in Problem Solving,” *Jurnal Online Informatika*, vol. 6, no. 1, pp. 113–117, Jun. 2021, doi: 10.15575/join.v6i1.677.

[6] Y. A. Rodríguez del Rey, I. N. Cawanga Cambinda, C. Deco, C. Bender, R. Avello-Martínez, and K. O. Villalba-Condori, “Developing computational thinking with a module of solved problems,” *Computer Applications in Engineering Education*, vol. 29, no. 3, pp. 506–516, May 2021, doi: 10.1002/cae.22214.

[7] T. H. Lehmann, “Examining the interaction of computational thinking skills and heuristics in mathematical problem solving,”

Research in Mathematics Education, vol. 27, no. 2, pp. 269–290, May 2025, doi: 10.1080/14794802.2025.2460460.

[8] L.-C. Chang and W.-C. Lin, "Improving Computational Thinking and Teamwork by Applying Balanced Scorecard for Sustainable Development," *Sustainability*, vol. 14, no. 18, p. 11723, Sep. 2022, doi: 10.3390/su141811723.

[9] S. Maharani, M. N. Kholid, L. N. Pradana, and T. Nusantara, "PROBLEM SOLVING IN THE CONTEXT OF COMPUTATIONAL THINKING," *Infinity Journal*, vol. 8, no. 2, p. 109, Sep. 2019, doi: 10.22460/infinity.v8i2.p109-116.

[10] S. R. N. Christi and W. Rajiman, "Pentingnya Berpikir Komputasional dalam Pembelajaran Matematika," *Journal on Education*, vol. 5, no. 4, pp. 12590–12598, Mar. 2023, doi: 10.31004/joe.v5i4.2246.

[11] H. Ma, M. Zhao, H. Wang, X. Wan, T. W. Cavanaugh, and J. Liu, "Promoting pupils' computational thinking skills and self-efficacy: a problem-solving instructional approach," *Educational Technology Research and Development*, vol. 69, no. 3, pp. 1599–1616, Jun. 2021, doi: 10.1007/s11423-021-10016-5.

[12] N. O. Ezeamuzie, J. S. C. Leung, R. C. C. Garcia, and F. S. T. Ting, "Discovering computational thinking in everyday problem solving: A multiple case study of route planning," *J Comput Assist Learn*, vol. 38, no. 6, pp. 1779–1796, Dec. 2022, doi: 10.1111/jcal.12720.

[13] A. N. A. Nuar, M. Z. A. Rozan, and M. Bahari, "Computational Thinking Work System Method: A problem-solving method for small and medium enterprises," in *2021 International Congress of Advanced Technology and Engineering (ICOTEN)*, IEEE, Jul. 2021, pp. 1–8. doi: 10.1109/ICOTEN52080.2021.9493465.

[14] L.-C. Chang and W.-C. Lin, "Improving Computational Thinking and Teamwork by Applying Balanced Scorecard for Sustainable Development," *Sustainability*, vol. 14, no. 18, p. 11723, Sep. 2022, doi: 10.3390/su141811723.

[15] L. W. Wardana, A. Ahmad, R. Hidayat, and F. I. Maula, "Entrepreneurship education, digital literacy and computational thinking insights for business sustainability among housewives," *Perspectives of Science and Education*, vol. 68, no. 2, pp. 312–325, May 2024, doi: 10.32744/pse.2024.2.19.