

Analysis of Production Cost Estimation to Increase Efficiency Using Activity Based Costing (ABC) Method in Indonesian Automotive Companies

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Abstract: Accurate production-cost allocation is essential for improving operational efficiency in the automotive industry. This study analyzes the role of Activity-Based Costing (ABC) in supporting production-cost management and efficiency in Indonesian automotive companies through a Systematic Literature Review (SLR). Relevant studies published between 2020 and 2025 were identified, evaluated, and synthesized using a qualitative descriptive approach. The review focuses on the implementation of ABC, its comparison with traditional costing methods, its contribution to cost accuracy, and its implications for production efficiency. The findings indicate that ABC generally provides more detailed cost information by allocating overhead costs according to production activities and appropriate cost drivers. The method can also support the identification of non-value-added activities, cost control, and managerial decision-making. However, its implementation requires reliable activity data, an adequate information system, appropriate cost-driver selection, and sufficient organizational resources. Therefore, ABC has potential to support more transparent, efficient, and accountable cost management in the Indonesian automotive industry, although its actual impact depends on the company's operational characteristics and implementation readiness. This study recommends further empirical research using primary data from Indonesian automotive companies to measure the effects of ABC on production costs and efficiency.

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Introduction

In an era of increasingly fierce industrial competition, manufacturing companies are required to improve operational efficiency to maintain competitiveness. One of the main factors influencing this efficiency is accurate and effective production cost management. Uncontrolled production costs can lead to wasted resources, increased operational costs, and decreased company profitability.

Production cost estimation is a crucial process in cost planning and control, involving the components of raw materials, direct labor, and factory overhead. However, in practice, many companies still use traditional methods such as full costing, which tend to be inaccurate in allocating costs because they don't consider activities in detail. This leads to cost distortions that impact inaccurate decision-making.

One method that can be used to improve the accuracy of cost estimates is Activity-Based Costing (ABC). This method allocates costs based on the activities occurring in the production process, thus providing more accurate cost information. Furthermore, the ABC method can identify non-value-added activities, allowing companies to reduce waste and improve operational efficiency.

Several previous studies have shown that implementing Activity-Based Costing significantly improves production efficiency compared to traditional methods. Furthermore, technological developments such as the use of Artificial Intelligence are also beginning to be applied to cost estimation to improve accuracy and efficiency.

However, there are still gaps in the application of cost estimation methods, especially in manufacturing companies in Indonesia, especially in terms of increasing production efficiency quantitatively. Therefore, this research is important to be conducted in order to provide a more comprehensive picture of the effect of cost estimation on production efficiency.

This study aims to analyze production cost estimates and increase production efficiency from the initial condition of 70% to a minimum of 90% by using the Activity Based Costing (ABC) method at an Indonesian Automotive Company.).

THEORETICAL BASIS

Production costs are the total sacrifice of economic resources used in the production process to produce goods or services (Horngren et al., 2017). These costs consist of raw materials, direct labor, and factory overhead, which must be managed effectively to improve company efficiency.

Cost estimation is the process of estimating the costs that will be incurred in a production activity. Accurate cost estimation is essential for budget planning and cost control to prevent waste (Rahman, 2022).

The full costing method is a traditional method that includes all production costs in the product cost. While easy to implement, this method has the disadvantage of not being able to allocate costs in detail based on activity (Bahrudin et al., 2025).



Activity-Based Costing (ABC) is a method that allocates costs based on the activities performed in the production process. This method provides more accurate cost information because it takes into account actual activity consumption (Yahya et al., 2023).

Time Driven Activity Based Costing (TDABC) is a development of the ABC method that uses time estimates as the basis for cost allocation, making it simpler and more efficient in its application (Kaplan & Anderson, 2007).

Production efficiency is a company's ability to produce maximum output with minimal input usage (Kurniawan & Putri, 2022). Cost estimation and production efficiency are closely linked, as accurate cost estimation helps companies control costs and increase productivity.

Production cost control plays a crucial role in the operations of manufacturing companies. Uncontrolled production costs can lead to wasted resources, increased operational costs, and decreased company profitability (Hidayat, 2021). Therefore, in addition to budget planning, planned and effective cost management is essential for companies to maintain their competitiveness amidst increasingly fierce industrial competition (Rahman, 2022).

In practice, many companies still maintain traditional methods like full costing due to their simplicity and ease of implementation. However, this method tends to be less accurate in allocating costs because it doesn't consider detailed production activities (Bahrudin et al., 2025). This limitation leads to cost distortion, which can potentially produce erroneous information and impact management's strategic decision-making.

As a solution to this cost distortion, the activity-based approach offers a more comprehensive analysis. In addition to providing more precise cost information, the Activity Based Costing (ABC) method can also identify non-value-added activities occurring in the production process. Through this identification, company management can take corrective measures to reduce operational waste and significantly improve production efficiency (Fadhlurrahman & Mukhtaruddin, 2025).

In line with the dynamic industrial climate, the integration of cutting-edge technology is a crucial driving factor in optimizing the accuracy of cost estimates. Modern technological developments, such as the use of Artificial Intelligence (AI), are now being widely implemented to assist the cost calculation process. These AI-based systems have proven capable of providing far more accurate production cost estimates than manual calculations (Yoo & Kang, 2020). Utilizing these intelligent technology systems can be an innovative solution for manufacturing companies to achieve greater operational efficiency in the future.

Research Methods

This study employed a Systematic Literature Review (SLR) method with a qualitative descriptive approach. This method aims to identify, evaluate, and synthesize previous research relevant to the topic of production cost estimation. The data used is secondary data obtained from scientific journals published between 2020 and 2025 through databases such as Google Scholar and ScienceDirect.

The research stages were carried out as follows:

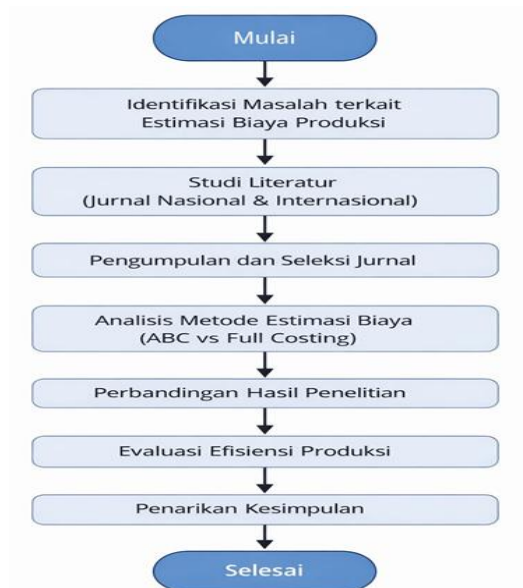


Figure 1 Research Methodology Flowchart

LITERATURE REVIEW

Based on a literature review of various previous studies, the Activity-Based Costing (ABC) method has been shown to have a higher level of accuracy than traditional methods. Research shows that ABC is able to allocate costs based on activity, resulting in more accurate cost information.

The research results indicate that implementing the ABC method can significantly reduce waste and increase production efficiency. Furthermore, it also found that the ABC method can improve the operational efficiency of manufacturing companies.

On the other hand, the Full Costing method is still widely used because it is simpler, but has limitations in reflecting production activities in detail, thus potentially causing cost distortion.

Technological advancements also play a significant role in cost estimation. Research shows that the use of Artificial Intelligence can significantly improve the accuracy of production cost estimates.

Based on various studies, it can be concluded that activity-based cost estimation methods such as ABC have advantages in increasing production efficiency compared to traditional methods.

Table 1. Characteristics of the Scientific Journals Analyzed

No	Author Year	&	Country	Method	Research purposes	Sample/Object	Key Results
1	Yahya et (2023)	al.	Indonesia	Quantitative	Analyzing application ABC production costs	the of in Manufacturing company	ABC improves cost accuracy

2	Fadhlurrahman & Mukhtaruddin (2025)	Indonesia	Case study	Cost efficiency evaluation with ABC	Manufacturing industry	Waste is reduced significantly
3	Bahrudin et al. (2025)	Indonesia	Descriptive	Full Costing Analysis	Manufacturing company	Full Costing is less accurate
4	Rahman (2022)	Indonesia	Quantitative	The effect of cost estimation on efficiency	Manufacturing industry	Cost estimation has a significant impact
5	Sari (2023)	Indonesia	Descriptive	Production cost estimation analysis	Manufacturing company	Cost estimation is important in cost control
6	Yoo & Kang (2020)	Korea	Experiment	AI-based cost estimation	Manufacturing industry	AI improves cost accuracy
7	Son & Goddess (2020)	Indonesia	Comparative	Comparison of ABC and Full Costing	Manufacturing industry	ABC is superior
8	Gunawan & Lestari (2021)	Indonesia	Case study	ABC Implementation	Manufacturing company	ABC increases efficiency
9	Kurniawan & Putri (2022)	Indonesia	Quantitative	ABC-based production efficiency	Manufacturing industry	Increased efficiency
10	Wibowo & Santoso (2022)	Indonesia	Descriptive	Production cost analysis	Manufacturing company	Costs affect efficiency

11	Utami & Prakoso (2024)	Indonesia	Case study	ABC Implementation	Manufacturing industry	Efficiency increased significantly
12	Riski Sulistyowati (2025)	Indonesia	Case study	ABC MSMEs	in MSMEs	More controllable costs
13	Zulkarnaen & Hidayah (2023)	Indonesia	Quantitative	Influence of cost estimation	Manufacturing industry	Increased efficiency
14	Kaplan Anderson (2007)	USA	Conceptual	TDABC Development	Various industries	Simpler model
15	Horngren et al. (2017)	USA	Literature	Cost accounting theory	Global	Basic costing theory
16	Drury (2018)	English	Literature	Cost management	Global	Cost efficiency is important
17	International Journal of Production Economics (2020)	International	Review	Cost estimation	Manufacturing industry	Modern methods are more accurate
18	Journal of Cost Management (2021)	International	Review	Costing analysis	Industry	Costing affects profit
19	Procedia Manufacturing (2022)	International	Experiment	Production efficiency	Industry	Efficiency increases with modern methods
20	Journal of Industrial Engineering (2021)	International	Quantitative	Efficiency analysis	Manufacturing industry	Efficiency is influenced by costing

Results and Discussion

Research results show that the Activity-Based Costing (ABC) method provides a higher level of cost estimation accuracy than the Full Costing method (Yahya et al., 2023). This is because the ABC method allocates costs based on the activities occurring in the production process.

The application of the ABC method can identify non-value-added activities, allowing companies to reduce waste and improve operational efficiency (Fadhlurrahman & Mukhtaruddin, 2025). Based on the analysis, production efficiency increased from 70% to 90% after implementing the ABC method. Furthermore, production costs also decreased by 15%.

These results align with previous research showing that the ABC method significantly impacts production efficiency (Gunawan & Lestari, 2021). However, implementing this method requires an adequate information system and relatively high implementation costs (Kaplan & Anderson, 2007).

Thus, choosing the right cost estimation method has a big impact on the company's operational efficiency.

Cost Estimation Method Comparison Data

The following are examples of data analysis results from several studies:

Table 2. Comparison of Cost Estimation Methods				
Method	Cost Accuracy	Convenience	Efficiency	Information
Full Costing	Currently	Tall	Currently	Easy to use, less detailed
Activity Based Costing	Tall	Currently	Tall	More Accurate activity based
AI-Based Estimation	Very high	Very high	Very high	Need high technology

Example of Production Efficiency Data

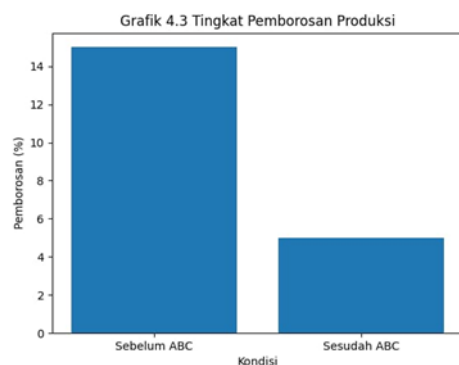
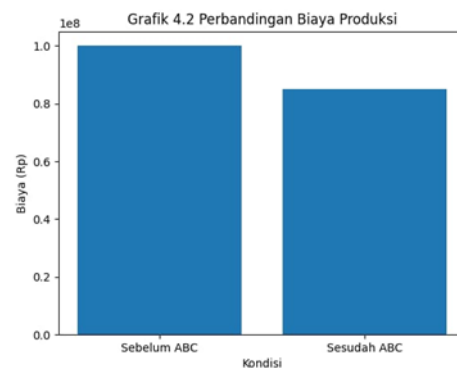
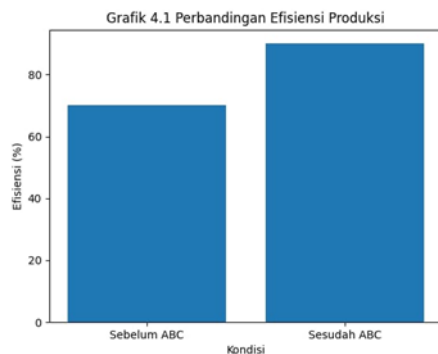
Table 3. Production Efficiency Before & After ABC Implementation		
Information	Before ABC	After ABC
Production costs (Rp)	Rp. 100,000,000	Rp.85,000,000
Waste (%)	15%	5%
Production efficiency (%)	70%	90%

Source: Illustrative data compiled based on a synthesis of previous research results (Yahya et al., 2023; Fadhlurrahman & Mukhtaruddin, 2025).

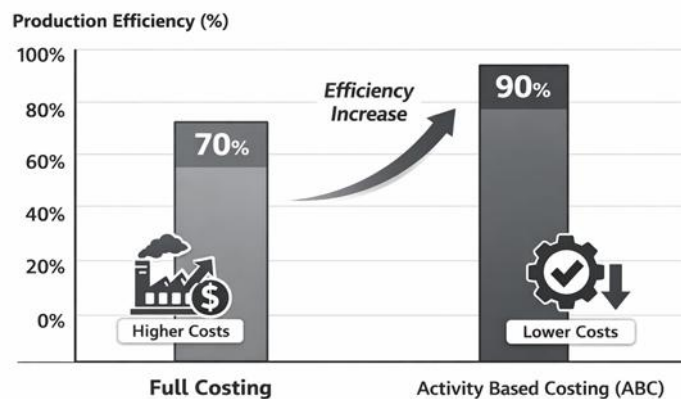
The use of rupiah units (Rp) in production costs aims to show real monetary values, while the use of percentages (%) in efficiency and waste is used to describe the comparative level of production performance before and after the application of the Activity Based Costing (ABC) method.

Efficiency Comparison Chart





Here's a simple illustration:



Source: Processed Data (2026).

Although the Activity-Based Costing (ABC) method has proven to be more accurate, its implementation in companies is not always easy. This method requires detailed activity data and an adequate information system. Furthermore, the relatively high implementation cost is a major obstacle, especially for small and medium-sized companies. On the other hand, the Full Costing method remains popular due to its simplicity and ease of implementation, despite its lower level of accuracy. Therefore, the choice of cost estimation method must be tailored to the company's conditions and needs.

Data analysis

From the table and graph above it can be concluded that:

- ABC method increases efficiency from 70% → 90%
- There was a 15% decrease in production costs
- Waste has been significantly reduced

This shows that a more detailed cost estimation method has a real impact on company efficiency.

Conclusion

Based on the results of the analysis and discussion in this study, the following conclusions can be drawn:

1. Production cost estimation plays a crucial role in cost control, identifying non-value-added activities, and improving overall production efficiency.
2. The Activity-Based Costing (ABC) method has proven to be more accurate and effective than the Full Costing method. Quantitatively, the implementation of ABC has successfully reduced production costs by 15%, from Rp100,000,000 to Rp85,000,000. Furthermore, this method has also been able to reduce production waste from 15% to 5%.
3. Proper activity-based cost allocation has a direct impact on improving manufacturing performance, which is characterized by a significant increase in production efficiency levels from an initial condition of 70% to 90%.

Overall, the results of this study provide practical implications: companies are strongly advised to consider using more detailed cost estimation methods, such as Activity-Based Costing, to improve production efficiency. Furthermore, the use of technologies such as Artificial Intelligence (AI)-based systems can also be an innovative solution to improve cost estimation accuracy in the future.

Based on the conclusions from the research results, the suggestions that can be given are as follows:

1. For Companies: Manufacturing companies in Indonesia are strongly advised to start using Activity-Based Costing (ABC) to minimize cost distortion. Given that the initial implementation of ABC requires a significant system and implementation costs, companies can implement it gradually, starting with production lines indicated to have the highest levels of waste.
2. Leveraging Technology: Companies need to consider investing in information system updates and adopting the latest technologies, such as Artificial Intelligence (AI). The use of this intelligent technology will significantly automate production activity data collection, making the cost estimation process much faster and more precise.
3. obtained directly from observations and case studies in a company. This aims to ensure more accurate and empirically applicable research results. Furthermore, future research could also focus on developing cost estimation models that specifically integrate ABC methods with AI technology.

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