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Enhancing Transjakarta Bus Service Quality: An Educational Perspective on Urban Development and Traffic Mitigation Using QFD Method

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ABSTRACT

This study aimed to identify ways to enhance service quality, with the expectation of providing effective handling solutions and input for related parties in the context of sustainable urban development, particularly in Transjakarta. One hundred surveys were sent to passengers utilizing Transjakarta services on the BKN-Depok route, after which the data were processed and analyzed using IPA and QFD methodologies. Based on the results of the analysis of the Importance Performance Analysis (IPA) and Quality Function Deployment (QFD) methods, here is a positive relationship between fulfillment of customer requirements identified through QFD and improved bus performance, strengthening service maintenance and repair SOPs and periodic monitoring and evaluation of the system are the main concerns and must be improved. This study provides valuable insights for educational management, particularly in developing curricula that integrate aspects of public services and urban transportation. The findings underscore the importance of enhancing students' understanding of quality management methodologies, such as IPA and QFD, to improve the management of sustainable public transportation systems.

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INTRODUCTION

Transportation is an essential element of modern life, facilitating the movement of people and goods to support social and economic activities. Its effectiveness directly impacts urban development, personal mobility, and access to opportunities (Stojanovski, 2020). In metropolitan areas such as Jakarta, the growth in transportation needs is critical for improving quality of life, supporting economic productivity, and mitigating congestion (Firdaus et al., 2021). The introduction of the Bus Rapid Transit (BRT) system, Transjakarta, reflects efforts

to improve public transportation and reduce reliance on private vehicles, contributing to a more sustainable and accessible urban environment (Sianturi & Isradi, 2024). However, despite these advancements, service quality remains a critical concern, with issues like long waiting times, inadequate infrastructure, and suboptimal user comfort (Utami & Rubin, 2021). Thus, enhancing Transjakarta's service quality is vital for improving public transportation and ensuring equitable access to urban mobility.

Transjakarta, as one of the world's longest BRT systems, faces significant challenges in meeting the growing demands of passengers. With a continuous increase in passenger numbers, many commuters still report dissatisfaction due to the inadequacy of service facilities, such as uncomfortable buses, overcrowded buses, long wait times, and inefficient service operations (Kinasih et al., 2024). These issues hinder the effectiveness of the transportation network and diminish the overall commuting experience, highlighting a critical gap in service optimization. The focus of this study is to identify passenger needs and prioritize service improvements to optimize Transjakarta's performance, offering solutions for these persistent challenges.

Previous research has extensively examined the effectiveness of public transportation systems in urban areas. Studies have highlighted the role of service quality in customer satisfaction and urban mobility (Isradi et al., 2022; Utami & Rubin, 2021). For example, research by Rachmadina et al. (2023) revealed that Transjakarta's network has expanded significantly but still struggles with issues like congestion and service quality. While many studies have addressed BRT system performance, they often focus on broad structural aspects rather than the detailed preferences and concerns of passengers. This study positions itself within this gap, aiming to provide an in-depth analysis of passenger requirements and how service quality can be tailored to meet these demands.

While prior studies have explored general performance and satisfaction metrics, there is limited research specifically focused on the identification of passenger preferences and the integration of their needs into service improvement strategies. A detailed investigation into the passenger experience, incorporating both quantitative and qualitative feedback, is necessary to enhance service delivery. Addressing these gaps in existing literature will provide actionable insights to inform management strategies for Transjakarta and similar public transportation systems.

This study introduces a novel approach by applying the Quality Function Deployment (QFD) methodology to assess passenger satisfaction in a public transport setting. The integration of IPA (Importance-Performance Analysis) and QFD allows for a systematic prioritization of service improvements that align

with user expectations. This approach is important for providing targeted, data-driven strategies that can directly enhance service quality, ensuring that Transjakarta evolves to meet both current and future challenges in urban transportation.

The central research question is: How can Transjakarta enhance service quality to meet passenger expectations and improve overall performance? This study argues that by focusing on the specific characteristics and needs of passengers, service improvements can be strategically prioritized. The contribution of this research lies in its ability to identify actionable areas for improvement based on direct passenger feedback, using advanced analytical methods to optimize public transport service delivery in Jakarta. By addressing the identified gaps, this study will help Transjakarta refine its service offerings and improve commuter satisfaction, contributing to more sustainable urban mobility.

RESEARCH METHOD

Every study is often conducted using a 'research technique' to ensure that each step is executed as anticipated, facilitating the completion of the research at the decision-making phase (Rashid & Ghafar, 2020). Data gathering methods include direct observation, interviews, and the distribution of questionnaires to get primary data, and secondary data is sourced from Trans Jakarta bus management operators (Andriyani et al., 2021; Permana & Pontan, 2021).

The House of Quality is a tool used from the Quality Function Deployment (QFD) process that presents a planning matrix that links customer desires with how the company performs technical responses to fulfill customer desires (Sukwadi et al., 2021; Ubaidillah et al., 2022).

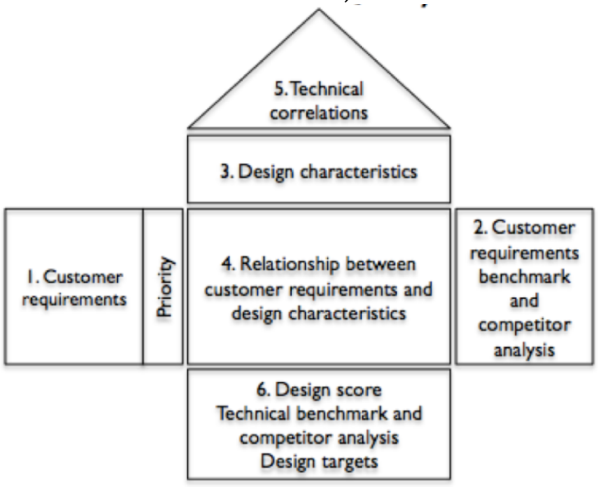


Figure 1. Metode House of Quality (QFD) (Rouf et al., 2019).

This study utilizes a combination of questionnaires and direct field observations for data collection and analysis (Rasydi & Prasetyanto, 2023). The focus of this work is to assess the performance and service quality of Transjakarta buses in alignment with the Department of Land Transportation Standards for bus fleet services. The data collection process includes several stages, as outlined by Neva and Assa (2025).

Direct data collection was performed to assess factors such as load factor, journey speed, time headway, travel time, service time, vehicle frequency, and the number of operating vehicles. Questionnaires were distributed using Google Forms and physical distribution in the field, with the sample size determined using the Slovin formula, resulting in 100 respondents. The questionnaire data were processed statistically to verify the validity, reliability, and normality, followed by analysis using the Quality Function Deployment (QFD) method. The survey was conducted over a period of 3 days, with data collection taking place during the morning, afternoon, and evening to capture a broad range of commuter experiences.

The study focuses on three key variables: customer needs, technical solutions, and performance variables. These variables are crucial in determining the areas that require improvement and the technical solutions that will best address the identified needs, ensuring a comprehensive analysis of Transjakarta's service quality.

Questionnaire data is processed using the SEM-PLS statistical method. The location of this research is at Depok Bus Station - BKN. This research was conducted 3 (three) days during one week to get comparative data, namely Monday, Wednesday, and Sunday, while the research location can be seen in the following Figure 2.

Figure 2. Metode House of Quality (QFD)

RESULT AND DISCUSSION

The further processing of bus performance data is conducted based on the acquired information.

1. The average load factor of Transjakarta buses in category B (80-100%) is 83.1%.
2. The average headway time derived from the examination of all routes is 7.3 minutes for category A (6 vehicles per hour).
3. The examination of all routes indicates an average vehicle frequency of 7.56 vehicles per hour in category A (more than 6 vehicles per hour).
4. The examination of all routes indicates an average travel time of 2.38 minutes per kilometer for category A (15 hours per day).
5. The Transjakarta bus service duration on the Depok-BKN Cawang route is 16 hours, categorizing it as A (>15 hours/day).
6. The study results indicate an average travel speed of 31.6 kilometers per hour across all routes, categorizing it as A (>10 kilometers per hour).
7. The operational vehicle count is at 100%, categorizing it as A (>100%).

All criteria regarding load factor, headway, vehicle frequency, travel duration, service time, travel speed, and the number of vehicles are in line with the Standard Decree of the Director General of Land Transportation Number SK: SK.687/AJ.206/DRJD/2002.

Table 1. Overall Results of Transjakarta Operational Performance

No.	Indikator	Kategori	Bobot
1	Load Factor	B	2
2	Headway	A	3
3	Frequency	A	3
4	Travel Time	A	3
5	Service Duration	A	3
6	Travel Speed	A	3
7	Ooerational Vehicle Count	A	3
	Total		**20**
	Operational Performance Assessment		**Good**

Respondent Character Analysis

Respondents in this study were Transjakarta Bus users on the Depok-BKN Cawang route, with a total of 100 respondents. Then, from the results of data collection and processing through distributing questionnaires to these respondents, it can be seen from the following table.2 and 3 of respondent characteristics:

Table 2. Gender of respondent

Categories	Frequency	Percentage
Male	61	61%
Female	39	39%
Total	100	100%

Table 3. Categories by age

Categories	Frequency	Percentage
≤ 16 years old	1	1%
17 - 24 years old	51	51%
25 - 34 years old	35	35%
35 - 44 years old	12	12%
≥ 45 years old	1	1%
Total	100	100%

Importance Performance Analysis (IPA)

The Importance Performance Analysis (IPA) method is a descriptive analysis method to identify satisfaction factors that must be prioritized by an agency to meet consumer needs and satisfaction in the provision of services provided. This method has four quadrants that can be used as a consideration for the assessment of consumer interest indicators.

Table 4. Analysis Importance Performance Analysis (IPA)

Indicator	Total Performance Score	Total Satisfaction Score	Average Performance	Average Satisfaction	GAP
Rea.1	327	311	3,27	3,11	0,16
Rea.2	322	314	3,22	3,14	0,08
Rea.3	336	325	3,36	3,25	0,11
Res.1	335	320	3,35	3,2	0,15
Res.2	344	329	3,44	3,29	0,15
Res.3	348	337	3,48	3,37	0,11
Ass.1	350	330	3,5	3,3	0,2
Ass.2	358	341	3,58	3,41	0,17
Ass.3	352	338	3,52	3,38	0,14
Emp.1	349	333	3,49	3,33	0,16
Emp.2	351	344	3,51	3,44	0,07
Emp.3	349	332	3,49	3,32	0,17
Tan.1	347	329	3,47	3,29	0,18
Tan.2	347	336	3,47	3,36	0,11
Tan.3	354	337	3,54	3,37	0,17
		min =	3,22	3,11	
		max =	3,58	3,44	

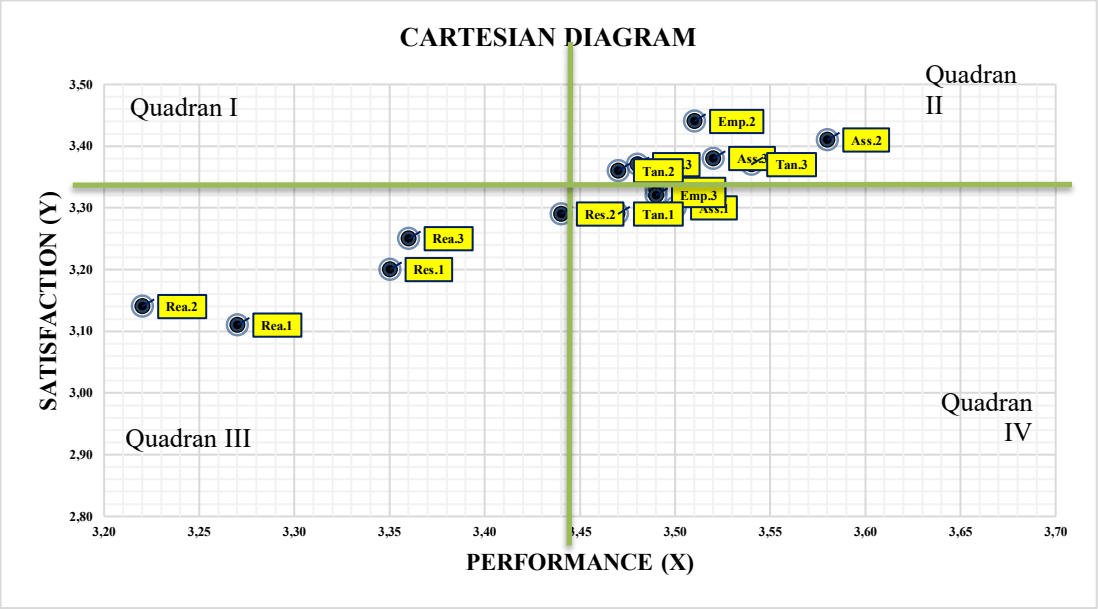


Figure 3. Cartesian Diagram (IPA)

Quality Function Deployment (QFD) Analysis

The first step in Quality Function Deployment (QFD) analysis isknowing the Voice of Customer (VOC), or perceptions of Trans Jakarta passengers or customers. After that, proceed with the creation of a House of Quality (HOQ), or quality house (Pratama et al., 2024).

1. Voice of Customer

The voice of the customer in this study is the desire of passengers for the level of TransJakarta service that has not met expectations and is in quadrant III in IPA.

Table 5. Voice of customer Transjakarta

No. Atribute	Voice of Customer	Performance Level (X)	Satisfaction Level (Y)	GAP
Rea.2		3,22	3,14	0,08
Rea.3		3,36	3,25	0,11
Res.1		3,35	3,2	0,15
Res.2		3,44	3,29	0,15
Rea.1		3,27	3,11	0,16

The second stage in developing the House of Quality (HOQ) is to determine the planning matrix. The planning matrix includes, among others, the importance of the customer, customer satisfaction, performance goal, improvement ratio, raw weight, and normalized raw weight.

2. Importance of Customer (IoC)

Table 6. IoC Transjakarta

No. Atribute	Voice of Customer	GOAL	IoC
Rea.2		3,87	0,1970
Rea.3		3,93	0,2001
Res.1		3,97	0,2021
Res.2		3,97	0,2021
Rea.1		3,9	0,1986
Total Goal		19,64	

3. Improvement Ratio (IR)

IR is a measure of efforts to change the level of satisfaction of Trans Jakarta users in existing conditions with service attributes. IR is obtained by dividing the goal value by the CSP value.

Table 7. Improvement Value of Trans Jakarta Service Satisfaction Ratio

No. Atribue	Voice of Customer	Goal	CSP	IR
Rea.2		3,14	3,22	0,98
Rea.3		3,25	3,36	0,97
Res.1		3,2	3,35	0,96
Res.2		3,29	3,44	0,96
Rea.1		3,11	3,27	0,95

4. Raw Weight (RW)

Based on the results of the RW calculation at Table.7, it is known that the attribute of strengthening the SOP for maintenance and repair services is the attribute with the highest Raw Weight value, namely with a value of 3.062; it shows that the attribute has the highest overall importance value compared to other service attributes.

Table 8. RW Value of Transjakarta service satisfaction

No. Atribute	Voice of Customer	Goal	IR	RW
Rea.2		3,14	0,98	3,062
Rea.3		3,25	0,97	3,144
Res.1		3,2	0,96	3,057
Res.2		3,29	0,96	3,147
Rea.1		3,11	0,95	2,958
Total				15,367

5. Technical Response

Technical response is part of the House of Quality (HOQ), which contains answers from Voice of Customer (VOC). There are seven technical responses obtained from the unfulfilled expectations of TransJakarta passengers related to operational satisfaction and service satisfaction whose satisfaction value is still below the value of user expectations..

Table 9. Technical response satisfaction and transjakarta services

RT	Respon Teknis
RT-1	Strengthening Service Maintenance and Repair SOPs
RT-2	Periodic Monitoring and Evaluation of the System
RT-3	Improved HR Training
RT-4	Addition of Quick Response Channels (e.g. chatbot, 24-hour hotline)
RT-5	Implementation of Internal Reliability Evaluation System

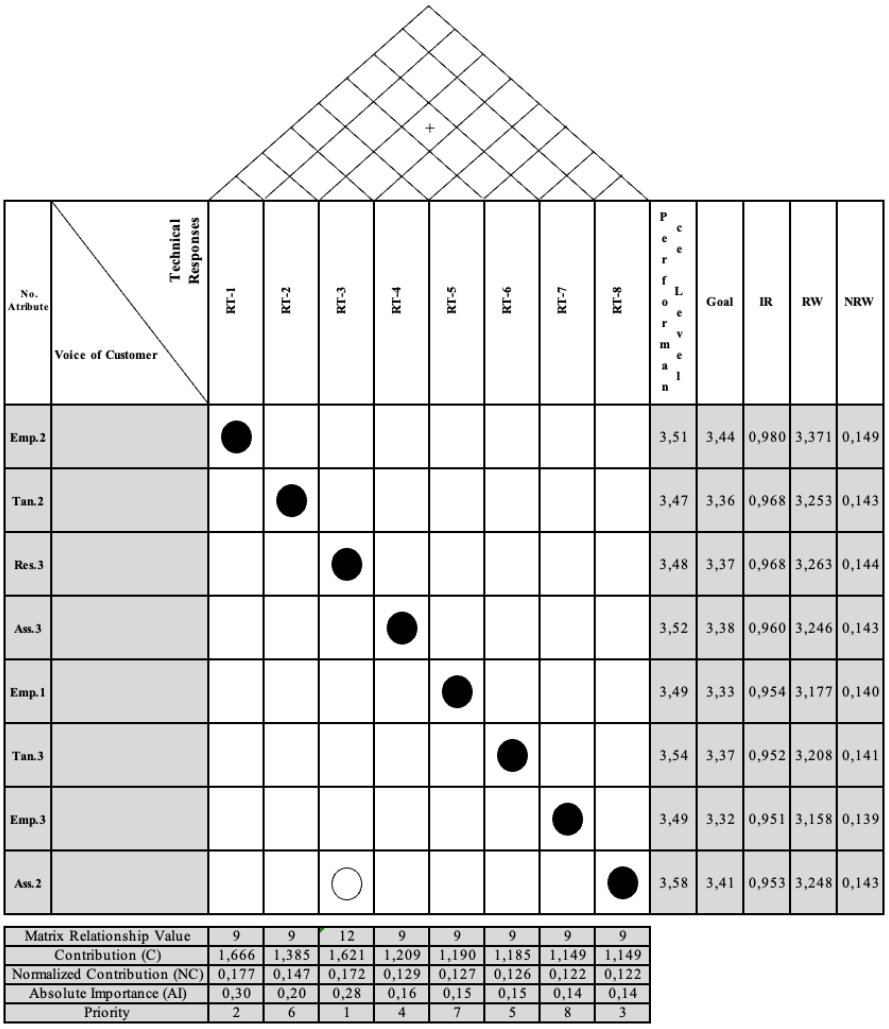
6. Absolute Importance (AI)

Absolute importance is the importance value of the technical response obtained from the sum of the results of multiplying the level of importance in each service attribute with the relationship value of the service attribute to the technical response.

From Table 9, it is known that the three highest technical responses are technical responses: RT-1: Strengthening Service Maintenance and Repair SOPs Aims to improve service system reliability (Reliability). Answer the needs of Rea.2 (Reliability). RT-2: Periodic Monitoring and Evaluation of the System To ensure consistent system performance. Supports Rea.2 and Rea.3 (Reliability). RT-3: Increased Frontliner HR Training to Improve Responsiveness in Service. Directly related to Res.1 (Responsiveness). RT-4: Addition of Quick Response Channels (e.g., chatbot, 24-hour hotline) Improve the ability to respond quickly to customer complaints. Supports Res.2 (Responsiveness). RT-5: Implementation of Internal Reliability Evaluation System Evaluate system performance on service reliability. Related to Rea.1 (Reliability).

Table 10. AI Calculation of transjakarta service satisfaction

RT	Relationship Values	Goal	AI	Priority
RT-1	9	3,14	28,26	4
RT-2	9	3,25	29,25	2
RT-3	9	3,2	28,80	3
RT-4	9	3,29	29,61	1
RT-5	9	3,11	27,99	5



No. Atribute	Voice of Customer \ Technical Responses	RT-1	RT-2	RT-3	RT-4	RT-5	RT-6	RT-7	RT-8	Performan Level	Goal	IR	RW	NRW
Emp.2		●								3,51	3,44	0,980	3,371	0,149
Tan.2			●							3,47	3,36	0,968	3,253	0,143
Res.3				●						3,48	3,37	0,968	3,263	0,144
Ass.3					●					3,52	3,38	0,960	3,246	0,143
Emp.1						●				3,49	3,33	0,954	3,177	0,140
Tan.3							●			3,54	3,37	0,952	3,208	0,141
Emp.3								●		3,49	3,32	0,951	3,158	0,139
Ass.2				○					●	3,58	3,41	0,953	3,248	0,143
Matrix Relationship Value		9	9	12	9	9	9	9	9					
Contribution (C)		1,666	1,385	1,621	1,209	1,190	1,185	1,149	1,149					
Normalized Contribution (NC)		0,177	0,147	0,172	0,129	0,127	0,126	0,122	0,122					
Absolute Importance (AI)		0,30	0,20	0,28	0,16	0,15	0,15	0,14	0,14					
Priority		2	6	1	4	7	5	8	3					

Figure 2 : House of quality transjakarta service satisfaction

Discussion

The findings of this study align with the existing literature on public transportation service quality, particularly in urban areas with high passenger volumes. Research by Utami & Rubin (2021) highlighted that dissatisfaction with public transport services, including discomfort and inefficiency, is prevalent in large metropolitan areas. Similarly, Kinasih et al. (2024) pointed out the critical factors that influence commuter satisfaction, such as long waiting times and overcrowding, which were also identified in this study. However, this research extends previous studies by incorporating specific technical solutions through the Quality Function Deployment (QFD) method to address these challenges. While previous studies have focused primarily on identifying problems, this study provides actionable insights for improving service quality by translating passenger needs into measurable performance indicators.

One of the key theoretical implications of this study is the confirmation of

the relationship between customer satisfaction and service quality variables, as suggested by the SERVQUAL model (Parasuraman et al., 1988). The QFD method used here demonstrates how passenger needs can be translated into specific performance measures, providing a systematic approach to service improvement. This approach not only validates the importance of customer-oriented service design but also adds to the theoretical framework by integrating technical solutions with user experience data. Moreover, by focusing on the specific needs of Transjakarta passengers, the study contributes to the literature on how public transport systems can better meet the expectations of users in developing cities.

From a practical perspective, the findings emphasize the necessity of continuous service evaluation and adaptation, particularly in response to the growing passenger numbers in cities like Jakarta. The identification of key performance areas such as bus comfort, timely arrivals, and frequency of service is essential for the development of targeted interventions. This study highlights the need for Transjakarta's management to focus on improving operational aspects such as vehicle maintenance, scheduling, and overall service infrastructure. These improvements are critical not only for enhancing commuter satisfaction but also for attracting more passengers to public transport, which in turn contributes to the reduction of traffic congestion in Jakarta.

In addition, the study's practical implications extend beyond Transjakarta's management to policymakers. The findings suggest that policies aimed at improving public transportation should not only focus on increasing fleet size but also on enhancing the quality of service. This involves investing in technology for real-time monitoring, upgrading bus stops, and ensuring that buses meet comfort standards. For instance, addressing issues like cleanliness and waiting time can greatly improve passengers' perceptions and make public transport a more attractive option. The study also reinforces the importance of integrating public transport improvements with broader urban development strategies to ensure sustainability.

Overall, the research underscores the importance of integrating both technical and operational aspects in the improvement of public transportation services. By employing the QFD method, this study bridges the gap between theoretical frameworks and practical application, providing a roadmap for service enhancements that are aligned with customer expectations. The insights from this study offer valuable lessons not only for Transjakarta but also for other public transportation systems worldwide, particularly in rapidly urbanizing regions. As cities continue to grow, it is essential that public transport services evolve to meet the changing demands of their populations.

CONCLUSION

Based on the results of the analysis, the average load factor in category B is 83.1%, and the average headway of 7.3 minutes is included in category A. The average vehicle frequency is 7.56 with category A, the average travel time is 2.38 minutes per km and is included in category A, and the number of vehicles operating is 100%.

The results of the analysis of the Importance Performance Analysis (IPA) and Quality Function Deployment (QFD) methods, it can be concluded that strengthening service maintenance and repair SOPs and periodic monitoring and evaluation of the system are the main concerns and must be improved. To keep the level of passenger satisfaction at satisfactory levels or to increase it to very satisfactory levels, Transjakarta needs to conduct surveys on an ongoing and regular basis to obtain more optimal results.

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