




Employing a ROPMIS modeling to assess the effectiveness of railway stations in Indonesia

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ABSTRACT

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This study employs ROPMIS modeling to evaluate the effectiveness of railway stations in Indonesia. In Indonesia, railways serve as a primary mode of transportation, and improving customer satisfaction can encourage the community to utilize public transportation as a means of addressing traffic congestion. However, research studies on the determinants of Indonesian railway performance using ROPMIS (resource, outcome, process, management, image, and social responsibility) are limited. Therefore, this present study aims to explore the determinants of customer satisfaction with railway stations in Indonesia using ROPMIS modeling. The data were obtained through questionnaires directed to railway customers and further analyzed using structural equation modeling. The finding of this study confirms that the ROPMIS modeling, including resource, outcome, process, management, image, and social responsibility, has a significant effect on customer satisfaction. The findings can be used to enhance the overall performance of railways in Indonesia. This study offers a novel model of relating how passenger satisfaction can promote railway performance in Indonesia. The findings of this investigation make a robust contribution to raising scholarly discourse on satisfaction and organizational performance. From a practical perspective, the paper can serve as a valuable guide for organizations such as PT. KAI Persero, helping them to enhance customer satisfaction and optimize train station performance in Indonesia.

Contribution/Originality: This study contributes to the unique challenges faced by Indonesian railway stations, including rapid urbanization, diverse geographical constraints, and evolving consumer expectations, which raise the need for performance evaluation.

1. INTRODUCTION

Understanding the performance of railway stations will be beneficial in ensuring passenger satisfaction and the overall transportation system (Saw, Dissanayake, Ali, & Bentotage, 2020). A prior study noted that railway stations serve as critical nodes in the transportation system to become hubs of economic and social activity (Banerjee, 2023). In Indonesia, the railway serves a primary mode of transportation, facilitating community mobility and contributing to national economic development (Iridiastadi, 2021). Enhancing user satisfaction will encourage society to utilize public transportation as a solution to traffic congestion issues in various areas of Indonesia. In addition, as the Indonesian population grows, satisfactory public transportation becomes increasingly prominent (Dirgahayani & Sutanto, 2020).

To comprehend the performance of railway stations and user satisfaction, this study involved ROPMIS modeling (resource, outcome, process, management, image, and social responsibility) from [Thai \(2008\)](#). The ROPMIS provides a wide range of variables that have an impact on railway station performance and consumer satisfaction. The interaction between ROPMIS creates a complex web of factors influencing railway station performance ([Moldabekova, Beifert, & Sabden, 2019](#)). For instance, efficient processes can drive improved outcomes, which in turn can enhance the station's image. A preliminary work noted that effective management can optimize resource utilization to boost social responsibility initiatives ([Huang, Song, & Swinney, 2022](#)).

Previous studies have explored various aspects of railway station performance and consumer satisfaction. Numerous works have highlighted the matter of service quality, accessibility, and safety in determining passenger satisfaction ([Sanyal, Hisam, & Baawain, 2021](#); [Saw et al., 2020](#)). Other scholars ([Ji, Gao, Fan, Zhang, & Zhang, 2019](#)) focus on the role of amenities in influencing user experience. [Hasibuan and Mulyani \(2022\)](#) investigated the effects of recent railway expansion projects in Indonesia on urban mobility patterns. However, the aforementioned studies focused on individual aspects of station performance instead of involving ROPMIS modeling.

Despite these increasing studies in recent years, there remains a notable gap in understanding how the comprehensive ROPMIS framework applies to railway stations in Indonesia. The previous studies were primarily concerned with user experiences ([Ji et al., 2019](#)) and passenger satisfaction ([Sanyal et al., 2021](#); [Saw et al., 2020](#)). Therefore, this study aims to address these gaps by providing a comprehensive analysis of how ROPMIS factors collectively influence consumer satisfaction and overall station performance in Indonesia.

This study provides some contributions. First, this study proposes a unique concern in Indonesia. The unique challenges faced by Indonesian railway stations, including rapid urbanization, diverse geographical constraints, and evolving consumer expectations, which raise the need for performance evaluation. Second, this study offers valuable insights for both academic understanding and practical contributions to management and transportation. Lastly, the findings can be beneficial to enhance managerial and efforts to enhance the management of railway transportation in Indonesia.

The paper is structured as below. Section 2 provides a detailed literature review. The methodology section (Section 3) outlines the research design and data collection analysis. Section 4 and Section 5 provide the result and discussion, respectively. Finally, the conclusion, implication, and suggestion are presented in Section 6.

2. LITERATURE REVIEW

2.1. Indonesian Railway

PT. Kereta Api Indonesia (Persero) is one of the organizers of public railway transportation, which is believed to be a cheap mode of public transportation, especially for long-distance route options ([Suwardi, Hum, Silfiah, & Kuswanto, 2019](#)). Railways are also considered a mode of transportation that provides many choices of travel routes ([Nurhidayat, Widayastuti, & Utomo, 2018](#)). These two factors continue to make trains the preferred option in the mass transportation sector. One of the challenges that PT. Kereta Api Indonesia (Persero) must overcome is enhancing the performance of its facilities and infrastructure to improve the quality of services it provides, with the quality of station services in Indonesia being one of the most crucial factors. According to the inclusive review of several dimensions and factors of service quality in previous research, ROPMIS analysis combines newly developed elements, such as quality dimensions related to management, image, and social responsibility ([Thai, 2008](#)). The six dimensions of this model are resources, outcomes, process, management, images, and social responsibility which can measure the performance of PT Kereta Api Indonesia (Persero).

2.2. A ROPMIS and Customers Satisfaction

Customer expectations are the customer's estimates or beliefs about what they will receive if they buy or consume the product and service they purchased. Various studies in various industries have confirmed the positive

correlation between customer satisfaction and service quality, albeit with conflicting evidence (Ginting, Chandra, Miran, & Yusriadi, 2023; Yulisetiari, Susanto, & Saputra, 2020). Numerous studies have focused on transportation, such as those on airline companies (Antwi, Ren, Owusu-Ansah, Mensah, & Aboagye, 2021) and train services (Agustien & Haryono, 2021). The ROPMIS model is more appropriate to the transportation industry because it combines aspects of image and social responsibility that are essential in this industry (Thai, 2008).

Previous research (e.g., (Le-Hoang, 2020)) also underpinned that dimension involving the results and process of service provision, as well as management factors, all of which focus on customer satisfaction received high ratings. However, previous studies found that not all variables had a robust effect on customer satisfaction. For instance, research in Korea states that there are three variables among six variables that influence customer satisfaction (Yeo, Thai, & Roh, 2015). A study conducted in Singapore reveals that out of six ROPMIS variables examined, four variables impact customer satisfaction (Thai, 2016). Figure 1 presents the conceptual model for the influence of ROPMIS on customer satisfaction more clearly.

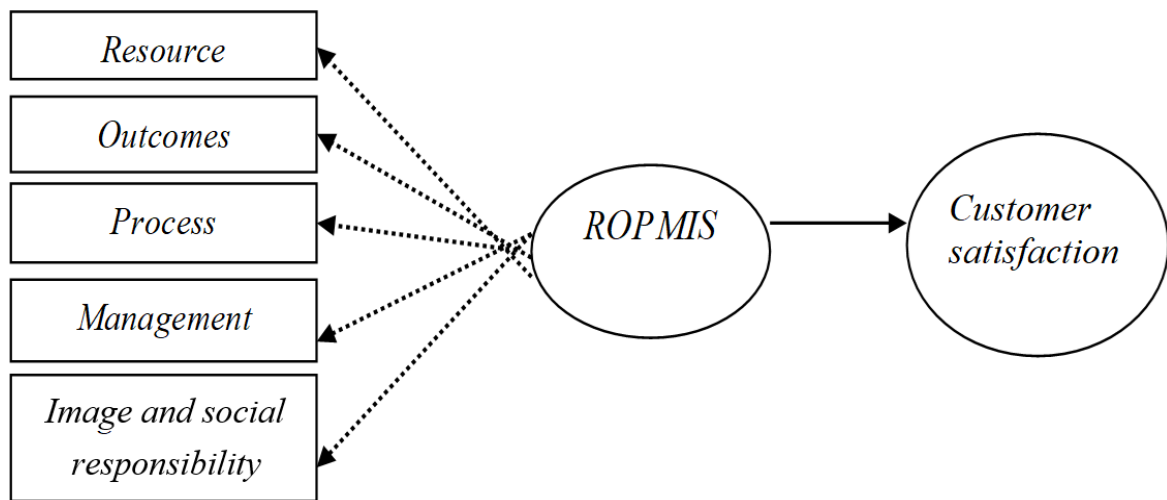


Figure 1. The linkage between ROPMIS and customer satisfaction.

2.3. Hypotheses Development

According to Antwi et al. (2021) facilities and infrastructure influence the level of passenger satisfaction. When passengers are satisfied with the performance of facilities and infrastructure, passengers tend to be satisfied with the company that provides them. Additionally, well-maintained station facilities and infrastructure enhance passenger comfort, which can lead to increased satisfaction. A prior study by Ramadhan, Wibisono, Nasution, and Novani (2015) remarked that reliable service will influence passenger satisfaction. There are three service needs that are most essential to passengers, namely the involvement of company staff, curation of services provided, and suitability of the services provided with what passengers need. According to Taş and Yorulmaz (2021) passengers will obtain satisfaction when they are supported by service delivery by professional, reliable, and responsive employees. The aforementioned study also noted that passengers will feel satisfied if the company understands their needs and desires (Tahanisaz & Sajjad, 2020). Moreover, passengers perceive more appreciation if the organization or company shows the need for feedback (Sherf & Morrison, 2020). Later, passengers view the company as having a positive reputation and behavior in society (Hwang & Lyu, 2020). Therefore, this study proposes the set of hypotheses below.

H₁: Resources influence passenger satisfaction.

H₂: Outcomes influence passenger satisfaction.

H₃: Process influences passenger satisfaction.

H₄: Management influences passenger satisfaction.

H₅: There is an influence between image and social responsibility on passenger satisfaction.

3. METHOD

3.1. Study Area

This study A cross-sectional design was employed to investigate the linkage between ROPMIS variables and customer satisfaction. The object of this research is PT. KAI (Persero), with the research location at Daop 9 Jember (Daop 9 JR). Daop 9 Jember is one of the operational areas under PT Kereta Api Indonesia (Persero), which is under the Directors of PT Kereta Api Indonesia and is led by an Executive Vice President (EVP)/Head of Regional Operations, who is under and responsible to the Directors of PT Kereta Api Indonesia. Daop 9 Jember working areas are Jember Station, Ketapang Station, Banyuwangi City Station, Probolinggo Station, Pasuruan Station, Kalisat Station, and Kalibaru Station. The research was carried out in June-December 2023. The collected data were further analyzed using structural equation modeling.

3.2. Population and Sample

The targeted population in this research was all railway passengers who had used the Pandalungan train on the Jember to Gambir route and vice versa during June and December 2023. While the sample was extracted using a probability sampling technique, namely the simple random sampling method. In this study, 100 passengers of PT Kereta Api Indonesia (Persero) were taken, with the consideration that the number is expected to be representative of a research sample.

3.3. Operational Definition and Measures

This study involved ROPMIS modeling to capture customer satisfaction, which was adopted from [Thai \(2008\)](#). The first variable of ROPMIS is resource, which relates to physical resources, financial resources, condition of facilities, equipment, location, and infrastructure. The resource variable comprises five items, such as passenger facilities and the modernization of station facilities. Additionally, the variable of outcomes is associated with the services that customers receive, such as fast service, reliable service, consistent service provision, and so on.

The next variable is a process that relates to factors regarding interactions between employees and customers. There process is measured using four items, one of which is the professional attitude and behavior of employees when providing services. Furthermore, the variable of management was measured by six items, such as comprehensive ICT implementation, high efficiency in operational and management performance, and good knowledge. Image and social responsibility were calculated using seven items, such as good relations with other transportation service providers and a good reputation for its reliability as a transportation service provider.

Customer satisfaction in this study is the customer's perception of feeling happy or disappointed due to the comparison between product/service performance and customer expectations. Customer satisfaction involved five items from [Yeo et al. \(2015\)](#) including (a) satisfaction with station facilities, equipment, and infrastructure, (b) satisfaction with management and employees, (c) satisfaction with the quality of station services, (d) recommend perceived service quality, and (e) continue to use the services.

4. RESULTS

4.1. Demographic of Respondents

The questionnaires were distributed to 100 samples of Pandalungan train passengers. The majority of respondents are 69 men (69%), and 31 people are women (31%), with the majority aged 20 years to 40 years. The majority of jobs of the participants that used railway transportation were private employees, as many as 35 people (35%), private employees, as many as 28 people (28%); entrepreneurs, as many as 21 people (21%), students, as many as 11 people (11%); and retirees, as many as 5 people (5%). The majority of respondents had monthly incomes ranging from IDR 1,500,000 to IDR 5,000,000 for 52 individuals (52%). The details of demographic respondents are provided in [Table 1](#).

Table 1. Demographic of respondents.

Information	Profile	Frequency	%
Gender	Women	31	31
	Men	69	69
Age	< 20 years old	9	9
	20 – 40 years old	62	62
	> 40 years old	29	29
Occupation	Private employee	35	35
	Civil servant	28	28
	Entrepreneur	21	21
	Retirees	5	5
	Students	11	11
Average income	> IDR 1,500,000	33	33
	IDR 1,500,000 – IDR 5,000,000	52	52
	> Rp 5,000,000	15	15

4.2. Validity and Reliability

A valid measuring instrument is able to express data accurately and provide an accurate description of the data. The validity test criteria are the p-value ≤ 0.05 , while the reliability criterion is the CR value ≥ 0.60 . As shown in Table 2, it can be concluded that to test the validity of all variables: resources, outcomes, process, management, image, and social responsibility shows that the p-value ≤ 0.05 , indicating all variable indicators are valid. The CR value for all variables is ≥ 0.60 ; thus, all variable indicators are reliable.

Table 2. Validity and reliability.

Construct	Item	P value	Decision	CR	Decision
Resource	R1	0.019	Valid	0.961	Reliable
	R2	0.002	Valid		
	R3	0.010	Valid		
	R4	0.001	Valid		
	R5	0.012	Valid		
Outcomes	O1	0.000	Valid	0.935	Reliable
	O2	0.011	Valid		
	O3	0.003	Valid		
	O4	0.030	Valid		
	O5	0.005	Valid		
	O6	0.012	Valid		
	O7	0.011	Valid		
Process	P1	0.039	Valid	0.926	Reliable
	P2	0.014	Valid		
	P3	0.001	Valid		
	P4	0.000	Valid		
Management	M1	0.028	Valid	0.942	Reliable
	M2	0.023	Valid		
	M3	0.012	Valid		
	M4	0.005	Valid		
	M5	0.032	Valid		
	M6	0.013	Valid		
Image and social responsibility	I1	0.006	Valid	0.958	Reliable
	I2	0.032	Valid		
	I3	0.001	Valid		
	I4	0.004	Valid		
	I5	0.021	Valid		
	I6	0.021	Valid		
	I7	0.010	Valid		

4.3. Normality Test

The assumption of multivariate normality is a requirement for CB-SEM (covariance-based structural equation modeling). The normality requires to be carried out properly for some variables involved at once in the final estimation. Table 3 presents the results of the normality assumption test. The normality estimation test can be carried out by undergoing the z statistical value for skewness and kurtosis and can be seen empirically from the Critical Ratio (CR). If a significance level of 5% is used, then CR values that are between -1.96 to 1.96 ($-1.96 \leq CR \leq 1.96$) are said to be normally distributed data. As shown in Table 3, the CR value of 1.822 is between -1.96 to 1.96, so it can be said that the data is normally distributed.

Table 3. Normality test.

Construct	Item	Min.	Max.	Skew	C.R.	Kurtosis	C.R.
Resource (X_1)	R1	4.000	5.000	-0.533	-2.175	0.455	1.897
	R2	4.000	5.000	-0.342	-2.321	-0.910	1.346
	R3	3.000	5.000	-0.432	-2.986	0.321	-1.106
	R4	4.000	5.000	-0.213	-3.102	-0.342	1.012
	R5	4.000	5.000	-0.534	-2.010	0.433	0.012
Outcomes (X_2)	O1	4.000	5.000	-0.042	-2.511	0.421	1.085
	O2	4.000	5.000	-0.544	-2.322	0.543	-10156
	O3	3.000	5.000	-0.598	-2.433	0.553	0.772
	O4	4.000	5.000	0.432	-2.342	0.700	-1.416
	O5	4.000	5.000	0.543	-2.251	-0.932	-0.262
	O6	4.000	5.000	0.604	-2.362	-0.323	-1.341
	O7	3.000	5.000	0.503	-2.576	0.343	1.012
Process (X_3)	P1	3.000	5.000	-0.157	-2.641	0.392	0.085
	P2	4.000	5.000	0.321	-2.440	0.412	1.012
	P3	4.000	5.000	0.211	-2.570	0.431	1.250
	P4	3.000	5.000	0.129	-2.770	0.512	1.986
Management (X_4)	M1	2.000	5.000	-0.892	-3.671	0.407	-1.465
	M2	4.000	5.000	-0.902	-2.270	0.544	-1.303
	M3	4.000	5.000	-0.809	-2.770	0.601	-1.451
	M4	4.000	5.000	-0.811	-2.530	0.560	-1.564
	M5	3.000	5.000	-0.734	-2.720	-0.432	-0.408
	M6	4.000	5.000	-0.654	-2.810	-0.532	0.538
Image and social responsibility (X_5)	I1	3.000	5.000	-0.604	-2.468	0.301	-0.200
	I2	4.000	5.000	0.605	-2.470	-0.231	-0.788
	I3	4.000	5.000	-0.612	-2.370	-0.432	-0.878
	I4	4.000	5.000	-0.702	-2.470	-0.532	0.897
	I5	2.000	5.000	-0.901	-2.770	0.645	0.346
	I6	3.000	5.000	-0.431	-2.170	0.821	-0.106
	I7	4.000	5.000	0.312	-2.670	0.532	1.012
Customer satisfaction (Y)	CS1	4.000	5.000	-0.112	-2.459	0.362	1.895
	CS2	4.000	5.000	0.232	-2.470	0.423	0.173
	CS3	4.000	5.000	-0.121	-2.570	0.809	-0.211
	CS4	4.000	5.000	-0.116	-2.670	0.543	0.321
	CS5	3.000	5.000	-0.211	-2.770	0.544	0.432
Multivariate						1.120	1.822

4.4. Multicollinearity Test

The determinant of the covariance matrix provides insight into the multicollinearity estimation. A determinant score that is small or close to zero implicates that there is a multicollinearity or singularity issue. The results of data estimation in this research show that the determinant matrix indicates the number 41.702. This number is far from zero, so there is no singularity. Therefore, the data can be involved for further examination in research.

4.5. Outliers Test

The outlier estimation is a scrutiny of data that has unique characteristics that appear very divergent from other observations that occur and in the form of extreme scores, either for a single dimension or a combination of variables. The criteria involved are based on the Chi Square value of degrees of freedom equal to the number of indicators constructed at a significance level of $p \leq 0.05$. The results indicate that the largest Mahalanobis distance value is 36.258. This value is still under the X^2 table value at $df = 39$, namely 54.5722, so it can be concluded that there are no outliers in the data.

4.6. Goodness of Fit Test

Model estimation in SEM aims to see the adjustment to the model with the data, which can be illustrated in Table 4. Based on Table 4, it is known that of the eight criteria used to check whether a model is appropriate or not, eight criteria are accomplished; thus it can be known that the model is acceptable, which means there is suitability between the model and the data. The statistical outputs with the AMOS program propose structural equation model results that show the linkage between variables as illustrated in Figure 2.

Table 4. Goodness of fit.

Criteria	Cut-off value	Output	Decision
Chi square	$\leq X^2$ with $df = 39$)	48,321 Prob = 0.542	Good
Sign. probability	≥ 0.05	0.549	Good
Root mean square error of approximation (RMSEA)	≤ 0.08	0.078	Good
Goodness of fit index (GFI)	≥ 0.90	0.931	Good
The adjusted goodness of fit (AGFI)	≥ 0.90	0.952	Good
Chi-square divided by degrees of freedom (CMIN/DF)	≤ 2 or 3	1.239	Good
Tucker-Lewis index (TLI)	≥ 0.95	0.989	Good
Comparative fit index (CFI)	≥ 0.95	0.988	Good

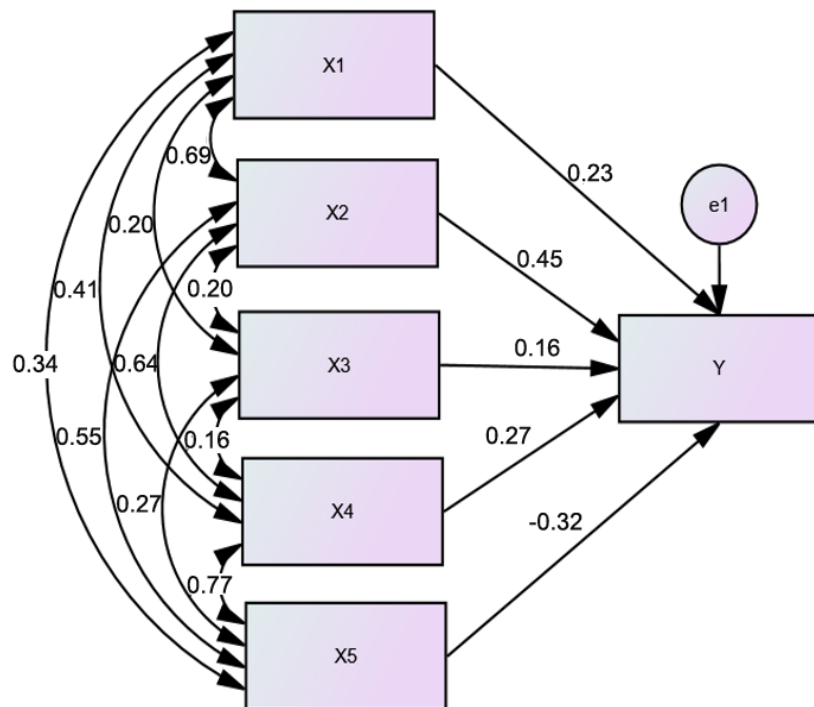


Figure 2. Final model.

4.7. Hypothesis Testing

After evaluating the suitability of the proposed model, the further stage is to check the causality of the hypothesis proposed in the research model. Table 5 presents a detailed hypothesis testing process. The results of the analysis show that each variable resource, outcomes, process, management, image, and social responsibility has an effect on customer satisfaction. The estimation remarks that all proposed hypotheses can be accepted.

Table 5. Direct effect estimation.

Variable	C.R	Probability	Decision
Resource → Customer satisfaction	2.338	0.019	Significant
Outcomes → Customer satisfaction	3.743	0.000	Significant
Process → Customer satisfaction	2.062	0.039	Significant
Management → Customer satisfaction	2.197	0.028	Significant
Image and social responsibility → Customer satisfaction	2.765	0.006	Significant

5. DISCUSSION

This study involved ROPMIS modeling to capture customer satisfaction at an Indonesian railway station. The first finding suggests that resources have a significant impact on customer satisfaction. The result supports previous studies by Antwi et al. (2021) which found that facilities and infrastructure affect the level of passenger satisfaction. This is evident in showing that the majority of passengers strongly agree that PT Kereta Api Indonesia (Persero) perceived that all the equipment and facilities available are good and clean, as well as modernization; then there are physical facilities, such as parking lots, comfortable lobbies, passenger waiting rooms, toilets, places of worship, and comfortable canteens. The next finding also shows a robust link between outcomes and customer satisfaction. The result supports previous studies by Ramadhan et al. (2015) and Thai (2016) which remarked that reliable service will affect passenger satisfaction. The results of the study showed that passengers of PT Kereta Api Indonesia (Persero) felt that the service received was very fast, reliable, and consistent according to passenger needs, and there was certainty of safety and security of passengers and goods. Passengers also received clear and complete proof of payment, delivery, and storage of goods. The finding indicates that when the results or outcomes delivered meet expectations, customer satisfaction will also increase and vice versa.

The third result indicates that the process also promotes customer satisfaction. The result supports a prior study by Agustien and Haryono (2021) which noted that the process has a significant effect on customer satisfaction. This suggests that PT Kereta Api Indonesia (Persero)'s process influences passenger satisfaction. Passengers strongly agree that there are professional attitudes and behaviors of employees in providing services, responsiveness in responding to passenger questions and requests, employee knowledge of good passenger requirements and needs, and comprehensive Information and Communication Technology (ICT) in supporting services to passengers. In addition, this work confirmed the role of management in driving customer satisfaction. The result supports previous studies by Thai (2016) that remarked that management has a robust effect on customer satisfaction. The finding indicates that there is a comprehensive application of ICT, sufficient knowledge and competence covering handling incidents at the station, a comprehension of passenger needs, and passenger feedback on services for improvement and enhancement of services and improvement of customer-oriented operational and management processes. This creates a pleasant travel experience and increases customer satisfaction (Kusumawati & Sri Rahayu, 2020).

The last finding shows that image and social responsibility can enhance customer satisfaction. The result supports previous studies by Thai (2016) that found that process and image have an impact on customer satisfaction. The output of this study remarked that PT Kereta Api Indonesia (Persero) has a good relationship with other transportation service providers. A positive image creates a higher perception of quality and trust, while social responsibility shows a company care can make customers feel better about supporting that business.

6. CONCLUSION, IMPLICATIONS, AND FUTURE DIRECTIONS

This study examined the determinants of customer satisfaction at railway stations in Indonesia using the ROPMIS model. The findings indicate that all constructs of ROPMIS, including resource, outcome, process, management, image, and social responsibility, can promote overall customer satisfaction, which further can enhance organizational performance. These results enrich the literature and knowledge on management and public transportation management in Indonesia. The application of the ROPMIS framework in the context of Indonesian railway stations provides a new perspective in understanding customer satisfaction. From a practical perspective, the paper can be a valuable guide for organizations (PT. KAI Persero) to optimize train station performance. As with other studies, this study has the main limitation of the narrow study area that cannot be generalized for the railway station in Indonesia. In addition, the variability of ROPMIS can be elaborated with other potential predictors to provide a new model for measuring customer satisfaction at railway stations. Further research can expand the research area so that the research results can be generalized in general and can measure passenger satisfaction using the Customer Satisfaction Index and potential gain in customer value.

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Institutional Review Board Statement: The Ethical Committee of the Universitas PGRI Argopuro, Indonesia has granted approval for this study on 23 May 2024 (Ref. No. 339/PT.106/LPPM/C.1/2024).

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Data Availability Statement: The corresponding author can provide the supporting data of this study upon a reasonable request.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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