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Train Passenger Satisfaction With the Operational Risk Management Performance of Pt. Kereta Api Indonesia (Persero) Mediated By Customer Trust

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Abstract: *This study analyzes the aspects of operational risk management performance in railway transportation concerning passenger trust and satisfaction using a quantitative approach. Operational risks are categorized into human resource risks that intersect with customers, leading to the quality of services, systems, and infrastructure. The study was conducted with 160 respondents who had used long-distance trains in the past year, showing that infrastructure risk management can influence the level of trust, and the resulting level of trust affects customer satisfaction. The conclusion of this study reveals that in building trust, handling infrastructure aspects is crucial, and railway passenger satisfaction is determined by the level of trust generated*

1. INTRODUCTION

Tourism encompasses a variety of activities supported by various facilities and services provided by the community, businesses, the Government, and Local Government (Indonesian Law No. 10 of 2009; Goeldner and Ritchie, 2011). Tourism is a social, cultural, and economic phenomenon that involves the movement of people to places outside their usual environment for personal or professional purposes (UNWTO, 2008). Tourism includes a combination of activities, services, and industries that provide a travel experience, such as transportation, accommodation, food and beverage establishments, shops, entertainment, facilities, activities, and other hospitality services available to individuals or groups traveling far from home (Hall and Williams, 2008).

Tourism business refers to enterprises that provide goods and/or services to fulfill the needs of tourists and facilitate tourism activities (Law No. 10 of 2009), including, among others: tourist attractions, tourism areas, tourist transportation services, travel services, food and beverage services, accommodation provision, entertainment and recreation activities, organizing meetings, incentive travel, conferences, and exhibitions, tourism information services, tourism consultancy services, tour guide services, water tourism, and spas. Transportation is an integral part of tourism. There are four perspectives in the understanding

of tourism: tourists, businesses providing tourism goods and services, local government hosts, and the local community (Camilleri, 2018). From the tourist's perspective, tourism is an activity to gain pleasant experiences, seeking various physical and psychological satisfaction. This involves traveling from one place to another. Regarding mobility, transportation is required, including land, sea, and air transportation. Any type of transportation should comply with the Passenger Transport Service Standards for public transport companies, which must meet minimum service standards covering safety, security, comfort, affordability, equality, and regularity (Indonesian Law No. 22 of 2009).

In this context, the research focuses on the journeys undertaken by tourists using land transportation, specifically trains in Indonesia. Currently, in Indonesia, particularly on the island of Java, the train mode of transportation is very popular because it is economical, has a large passenger and cargo capacity, is relatively fast and punctual, and is free from traffic congestion. Managed by PT. Kereta Api Indonesia (KAI), train transportation services are a safe and non-pollutive public transportation option.

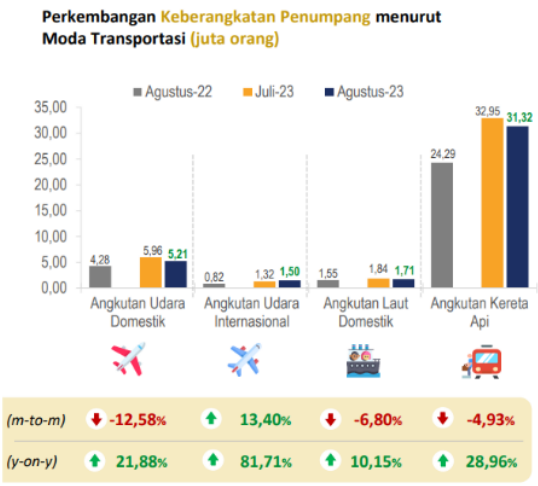

Figure 1. Number of Passengers on Public Transportation Modes

In its operations, railways are not exempt from tourism business risks triggered by risk events. Risk events are various incidents that pose the potential for adverse outcomes leading to losses (Bong, et al, 2019; Sugiarto, 2023). Risk events can occur as direct or indirect impacts and are referred to as risk losses, which can be financial or non-financial in nature. In the

tourism industry, three aspects are generally considered highly important by tourists/customers: safety, security, and certainty (Sugiarto and Herawan, T, 2022).

Although KAI's service performance has shown improvement recently, it has not yet achieved zero accidents. The potential demand for rail transportation remains high, driven by the increasing need for transportation services, high levels of traffic congestion, and demand for environmentally friendly transportation. Public demand remains high for cheaper transportation modes with better performance and services, customer and employee safety through the use of technology, and the provision of health protocols at stations at affordable prices to enhance passenger trust (KAI, 2022).

Given the increasing public demands for service quality, aspects of safety, security, certainty, and comfort are crucial for business managers in the tourism industry. Therefore, effective and efficient risk management strategies and their implementation tools are increasingly necessary to maintain the service provider's reputation and enhance tourist/customer satisfaction (Bong, et al, 2019; Sugiarto, 2023).

Rail transportation has major risks, namely operational security and safety risks during travel (KAI, 2022). Security and travel safety risks are related to operational risks and external risks, which, if not properly managed, can lead to an increased risk to reputation. Data on railway risk events from 2015 to 2022 are shown in Table 1.

Table 1. Number of Train Accidents by Cause 2015 - 2022

No	Causes (case)	2015	2016	2017	2018	2019	2020	2021	2022
1	Facilities	7	7	2	6	4	4	1	1
2	Infrastructure	29	8	6	9	6	12	8	5
3	Human Resources	11	0	0	1	1	1	1	2
4	External	7	0	1	0	0	1	3	0
5	Nature	1	0	6	0	0	0	0	0
	number of accident	55	15	15	16	11	18	13	8

Sources = Dirjen Perkeretaapian (2023)

Based on data from the past 8 years, the highest number of incidents occurred in 2018. The most frequent type of event was train derailments, which are an infrastructure factor in operational risk. The trend in the number of railway accident victims from 2015 to 2022 is shown in Table 2.

Table 2. Number of Train Accident Victims 2015 – 2022

No	number of victims (people)	2015	2016	2017	2018	2019	2020	2021	2022
1	die	1	43	87	1	0	0	0	0
2	serious injuries	3	41	79	1	0	0	0	0
3	minor injuries	39	13	86	2	19	0	0	0
	number of accident victims	43	97	252	4	19	0	0	0

Sources = Dirjen Perkeretaapian (2023)

The following figure displays data on the causes of accidents in the last 10 years.

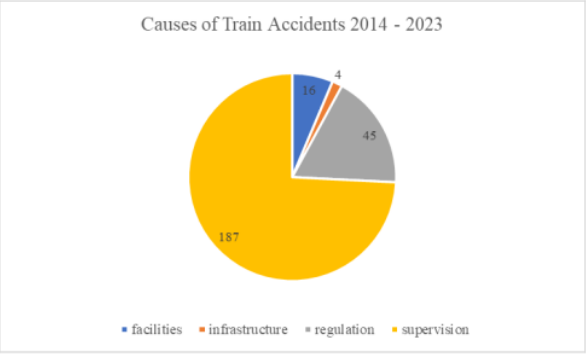

Figure 2. Causes of Train Accidents 2014 – 2023

Sources = Komite Nasional Keselamatan Transportasi (2024)

The highest percentage of accident incidents was caused by supervision aspects. The supervision aspect, related to the internal management control of human resources, accounted for 64.7%. The next major cause, accounting for 15.6%, was due to rules related to systems and regulations, as well as infrastructure and facilities aspects. Employment aspects and customer satisfaction are part of the company's sustainable performance implementation towards society.

Table 3. Human Resources and Customer Satisfaction

Description	score	2020	2021	2022
Human Resources Aspects				
employee satisfaction	%	83.6	84.4	83.4
employee complain	case	403	409	304
work accidents	person	17	6	7
Customer Aspects				
customer complain	case	24,132	15,818	29,196
customer satisfaction	scale	4.22	4.34	4.39

Sources: KAI (2022)

From previous relevant studies accessible to the researcher, it was found that, so far, no research has been conducted on Customer Satisfaction in railway transportation in Indonesia that is influenced by operational risk management factors such as the quality of human resources, operational systems, and infrastructure, either partially or simultaneously. Previous studies have stated that operational risk management has a positive effect on customer satisfaction among homestay visitors (Sugiarto and Herawan, Tutut, 2022). Thus, this study is conducted to address this phenomenon gap with the problem statements: How does the performance of operational risk management such as the quality of human resources, operational systems, and infrastructure influence customer trust? How does the performance of operational risk management such as the quality of human resources, operational systems, and infrastructure influence customer satisfaction? And how does passenger trust influence customer satisfaction? This research aims to evaluate the performance of operational risk management from the aspects of human resource management quality, operational systems, and infrastructure in railway transportation in Indonesia, evaluate the factors affecting passenger trust, and evaluate passenger satisfaction.

2. RESEARCH METHOD

Customer Satisfaction

Customer Satisfaction is the feeling of pleasure or disappointment that arises from comparing perceived performance against expectations (Kotler and Keller, 2022). If performance fails to meet expectations, customers will feel dissatisfied; if performance meets expectations, customers will be satisfied; and if performance exceeds expectations, customers will be very satisfied.

Customer Satisfaction is an individual's feeling about the performance of a product they have experienced (Schiffman and Kanuk, 2004). Many business managers are obsessed with creating customer satisfaction due to its strong relationship with customer loyalty, market share, and profitability. According to Relogio and Tavares (2023), the level of passenger satisfaction is determined by waiting time and services at the management office, comfort during travel, and the empathy of the staff during the journey. According to Stranjancevic and Bulatovic (2015), factors influencing customer satisfaction include staff kindness, professionalism, service speed, food quality, atmosphere, and comfort.

Satisfaction is pleasure fulfillment, which means meeting customer expectations; therefore, customer satisfaction is a post-purchase evaluation conducted by customers (Oliver, 1996). Customer satisfaction is the emotional reaction of customers after a purchase, which can

be anger, dissatisfaction, annoyance, neutrality, excitement, or pleasure (Lovelock & Wright, 2005). Satisfaction is the emotional level of the experience received compared to the expected expectations (Uzir, et al, 2020). The assessment conducted by customers is the satisfaction obtained from the ability of the service to meet customer desires. This assessment is an evaluation of comparing the emotions that arise with expectations (Rita, et. al, 2019). Customer satisfaction with services is influenced by the affective value of the customers (Park, et al, 2019).

In customer satisfaction, there are two cognitive processes: the expectation paradigm and disconfirmation. Customers form expectations that serve as a reference to evaluate the company's service performance. Positive disconfirmation (performance exceeds expectations) and negative disconfirmation (performance falls below expectations) significantly influence customer satisfaction and dissatisfaction (Oliver, 1997).

Customer satisfaction can be assessed from cumulative satisfaction and transactional satisfaction. Cumulative satisfaction is the overall evaluation of a customer's experience with a company, while transactional satisfaction is specific to a particular service transaction (Henning, Thurau, Gwiner, and Gremmler, 2002; Johnson and Gustafsson, 2000). According to Oliver (1997), cumulative satisfaction is the comprehensive assessment by customers forming a global evaluation of need fulfillment for customer satisfaction. Although cumulative satisfaction and transactional satisfaction are related, companies need to understand both variables as the factors influencing them might differ (Shankar, Smith, Rangaswamy, 2000).

Customer satisfaction is a more specific measure of each service transaction or interaction between the company and customers and is short-term in nature (Parasuraman et al, 1985; Hoffman and Bateson, 1997). The concept of customer satisfaction is an overall evaluation of the customer's experience with the company. Cumulative satisfaction is the individual's comprehensive assessment forming a global evaluation of the fulfillment of needs that please the customer (Oliver, 1999). Customer satisfaction is influenced by the product, customer needs, and consumer acceptance of price (Belas and Gabcova, 2016). Therefore, cumulative customer satisfaction is based on the overall customer experience with the company.

Service satisfaction is influenced by aspects such as safety and security, ticket booking systems, travel information, congestion at stations and on trains, frequency, cleanliness, and comfort. The results of the study are also influenced by the socio-economic factors and travel characteristics of the users (Obsie, et al, 2020).

Operational Risk

Risk is a condition where the results obtained differ from the expected results. Risk indicates a deviation from targets, goals, or expectations, which may result in losses due to the possibility of undesirable outcomes (Bong, et al, 2019; Sugiarto, 2023). The main reason why risk needs to be managed is to increase the likelihood of achieving organizational objectives by addressing risks that have negative impacts (Sugiarto, 2023).

Risk classification in tourism includes operational, market, external, regulatory, reputational, business, and financial risks (Bong, et al, 2019; Sugiarto, 2023). Risk events are triggered by conditions of uncertainty and are explained through risk typology, which categorizes risks based on their characteristics as stated in the Tourism Risk Event Model (Sugiarto, 2023).

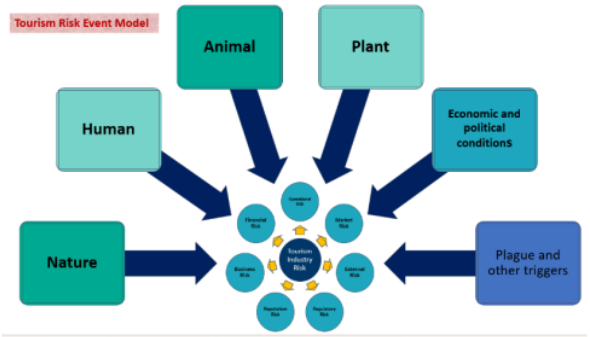

Figure 3. *Tourism Risk Event Model*

Sources: Sugiarto (2023)

In that classification, operational risk is a risk relevant to the operations of railway transportation. Operational risk arises from the inability or failure of internal processes (software, employees, hardware facilities, and amenities). Operational risk encompasses risks that arise due to deficiencies in the quantity and quality of employees (human resources) and supporting hardware facilities in the conduct of business in the tourism industry (Sugiarto, 2023). Operational risk emerges from various internal factors that should be manageable within the conduct of business in the tourism industry (Bong et al., 2019; Kiswantoro et al., 2022). The perception of security is one of the factors supporting customer satisfaction, especially for customers traveling (Ringle et al., 2011). In this study, the review of operational risks will focus on the quality of human resources in terms of services, systems, and infrastructure.

Quality of Human Resource

The quality of human resource services is an action or deed by an individual or organization aimed at providing satisfaction to customers or employees. In a competitive business environment, many public and private companies focus on service quality (Laine & Ma, 2017) as a competitive advantage in the service industry (Meesala & Paul, 2018). The quality of human resources is reflected in the performance of service quality.

One component of service quality is reliability, defined as the ability to provide customer service needs as promised without assistance (Baker, 2014). Reliability is the ability to deliver service performance independently and accurately, such as punctuality, efficiency in the check-in process, comfort, and accuracy in the booking and ticket purchasing process (Kim and Lee, 2011). In the Indian railway system, the main factors in service quality are basic facilities, security and safety, cleanliness, and worker behavior towards customers (Rajan et al., 2020). According to Mageshwarii and Vasanthi (2020), the aspects of service quality that need attention in Indian railways are physical facilities, equipment, external appearance, and employee appearance.

Service quality is the customer's impression of the excellence of a company's services compared to competitors (Tsoukatos and Rand, 2006). Service quality consists of three dimensions: service outcome quality, service interaction quality, and physical environment quality (Pollack, 2008). Parasuraman et al. (1988) defined service quality as the degree of comparison between customer expectations and their assessment of service performance. According to Zeithaml et al. (2000), service quality results in customer satisfaction. Service quality is an attitude formed from an overall evaluation of a company's service performance in the long term (Parasuraman et al., 1985; Hoffman and Bateson, 1997).

Service quality measurement is conducted with SERVQUAL (Service Quality), known as the gap model (Parasuraman et al., 1985). The essence of the service quality gap model is the function of the difference or gap between customer expectations and perceptions. SERVQUAL uses five measurement dimensions: Reliability, Assurance, Tangibles, Empathy, and Responsiveness (Parasuraman et al., 1988).

Table 4. RATER

Dimensions	***Definition***
Reliability	*The ability to perform the promised service dependably and accurately*
Assurance	*The knowledge and courtesy of employees and their ability to convey trust and confidence*
Tangibles	*The appearance of phisical facilities, equipment, personnel and communication materials*
Emphaty	*The provision of caring, individualized attention to customers*
Responsiveness	*The willingness to help customers and to provide promt service*

Sources: Parasuraman, et al (1988)

Operational System

Railways have a lower accident rate compared to other forms of ground transportation, making them the safest ground transport. Trains operate on dedicated tracks, which separate them from other vehicular traffic. This separation reduces the risk of collisions and accidents caused by human error. Additionally, in terms of safety, there are automation systems, signaling, and strict operational procedures in place to ensure passenger safety. With integrated travel routes and regular departure schedules, trains offer an alternative mode of transportation to avoid congestion and travel time uncertainty. When trains run on time according to the published schedule and experience minimal disruptions, they foster trust and repeated use of rail services (Prihandono et al., 2023).

The development of operational systems, particularly information systems, can support mobilization efficiency in urban areas (Gayialis et al., 2022). Efficiency can impact economic, environmental, social, safety, and other aspects. This impact is not limited to customers but also affects regulatory aspects such as employee working hours and emissions (Taniguchi et al., 2014).

According to Khalid et al. (2014), punctuality, ticket booking systems, departure delays, train departure frequency, safety elements, and comfort are direct experiences and interactions with the railway operational system that provide passenger service perception evaluations. According to Zhen et al. (2018), the High-Speed Rail in Shanghai Nanjing must maintain high-speed train performance, including departure frequency, positive worker behavior, ticket purchasing convenience, travel access ease, and cleanliness of carriages to provide pleasure and satisfaction to users.

Infrastructure

Passenger comfort and convenience are crucial factors in providing a pleasant travel experience. Comfortable seating, ample legroom, and well-maintained train interiors are aspects that passengers pay attention to in enjoying their journey (Prihandono et al., 2023). The layout of seats on a train affects passengers' perceptions of safety and comfort (Seriani et al., 2024). According to Zhen et al. (2018), toilet cleanliness, seat comfort, power supply, and mobile signal are performance sub-standards that can be prioritized to improve train performance. Tangible factors in LCC (low-cost carrier) airline services include physical equipment, facilities, workers, and communication devices, which are crucial aspects (Kim and Lee, 2011).

According to Chauhan et al. (2021), infrastructure comprises fundamental facilities and systems that support the functional sustainability of a company. Services in a country, city, or specific area require facilities to carry out economic functions. Infrastructure forms the basis of an economic structure and includes transportation facilities. Transportation facility infrastructure includes clear directional and prohibition signs, ticket facilities, clear route information including stop lists, seating arrangements in dining areas, billboards, time information, ticket counters, and customer service.

According to Xu et al. (2020), passengers' in-vehicle experience regarding equipment and facilities is assessed based on the clarity of available information, the audibility of information delivery, safety equipment (hammers, emergency contacts), the clarity of safety instructions, and the visibility of electronic equipment displays in the vehicle. Environmental sanitation within the vehicle is evaluated by the cleanliness of seats, appropriate temperature, noise level, suitability of video or advertisements, communication signals, disruptive passenger behavior, and the presence of unpleasant odors.

B.3. Trust

Trust is a variable used to analyze the relationship between customers and companies, particularly customer behavior in making purchases, such as customer satisfaction and loyalty (Berry, 1995). The relational relationship between customers and companies can benefit both parties by establishing social bonds that can enhance trust, thus providing value, guaranteeing company performance, creating better cooperation between customers and companies, enhancing company reputation, and increasing investment efficiency (Kumar, 1999).

According to Morgan and Hunt (1994), trust plays an essential role in the commitment between customers and companies. The best way to retain customers is to have a relational

relationship with them. Price and Arnould (1999) suggest that the best way to build relational relationships with customers is when the company has a high dedication to efforts in building relational bonds with customers, thereby gaining customer trust. Trust is the company's credibility based on how far customers believe in the promises made by the company. Trust towards customers is caused by credibility, honesty, and goodwill (Dyer et al., 2000).

Trust is a brand's promise to meet customer expectations. Trust is important in forming customer loyalty. Trust is built when customers obtain and evaluate information from the product. According to Chandio et al. (2015), a company can build emotional trust if it can prove that the perceived performance meets customer expectations. Companies should focus on promotions that depict the current condition and stop making statements about things they cannot fulfill.

Ganesan (1994) and Kumar et al. (1995) describe trust as a company's virtue towards customers, focusing on service quality, the company's intentions, and behavior in providing services using two dimensions: benevolence and credibility. Pal et al. (2022) state that trust is a belief used to create long-term relationships with customers. Trust is the expectation that words, promises, or statements made by the company will be fulfilled (Bigne et al., 2023). Trust involves an exchange process where there is confidence in the integrity of the other party (Alzaidi and Agag, 2022). Customer trust is a crucial factor in the development of the service industry because services are intangible and heterogeneous, meaning they can be directly evaluated by customers and service providers (Souiden et al., 2020).

In transportation, trust is closely related to safety aspects. Safety aspects in transportation, including proper vehicle maintenance, safety regulations, and the implementation of security measures, can help build trust and provide a positive experience for users. Additionally, transparency in communicating about improvements and future plans can also build trust (Prihandono et al., 2023).

Operational Risk Management

Operational risk management includes service quality that reflects human resource quality performance, operational systems as intangible factors, and infrastructure as tangible factors. According to Ganesan (1994), companies must develop high expertise to foster trust. High service quality impacts customer trust. According to Bergeron, Richard, and Perrien (2003), service quality significantly and positively affects trust. Harris and Goode (2004) also state that service quality affects trust. Ehbara and Shukor (2016) found a positive relationship between service quality and trust.

M. Bulakh et al. (2021) found that operational systems implemented according to risk management, including technology and technical applications, impact railway traffic safety in Ukraine. The implementation of operational systems affects customer trust. According to Rostamian et al. (2023), the factors customers seek include the atmosphere in the plane, marketing programs, staff, scheduling, planning, management, scope of passenger choices, and physical facilities. Therefore, the research hypothesis is formulated as follows: Hypothesis 1: Operational Risk Management affects Trust.

According to Han et al. (2008), trust significantly and positively affects customer satisfaction. Swan and Bowers (1999) found that trust positively affects customer satisfaction and loyalty. Sign and Sindrmukh (2000) state that trust affects customer satisfaction. Hoang et al. (2023) found that EFA (information availability, customer service, reliability, comfort, security, and safety) positively impacts satisfaction levels. Therefore, the research hypothesis is formulated as follows:

Hypothesis 2: Customer Satisfaction is influenced by Trust.

Based on these research hypotheses, the research model is structured as follows:

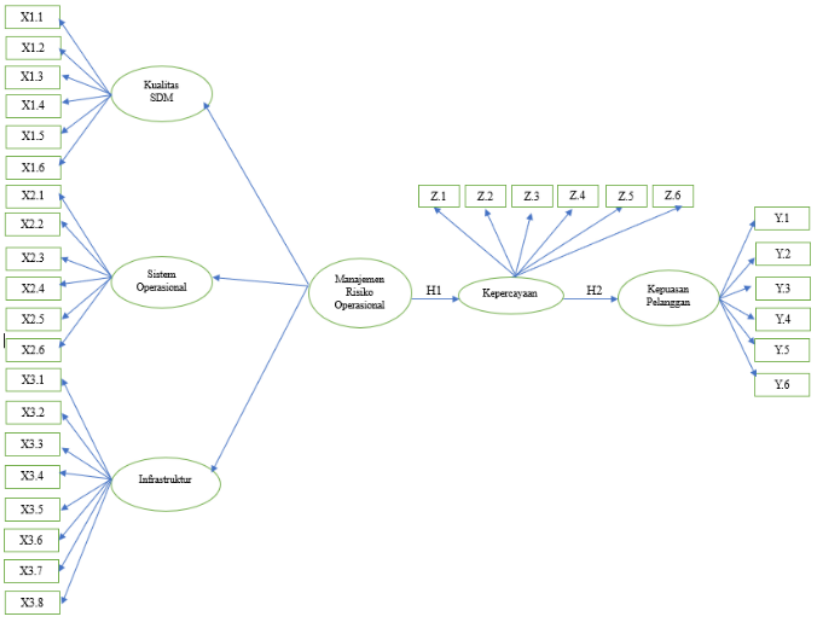

Figure 7. Research Model

Sources: Researcher (2024)

Research Methodolody

This study uses a quantitative method. The research subjects are users of railway transportation services in Indonesia. The data used includes both primary and secondary data. Data collection was performed using triangulation techniques, which involved communication techniques with questionnaires, observation techniques using eye recordings by the research team, and secondary data from various relevant publications. Data collection via questionnaires was conducted using Google Forms and targeted railway users in April 2024. The study involved 160 respondents who met the researchers' criteria, which was five times the number of indicators for all variables. Supporting or secondary data were collected from open reports by PT. Kereta Api Indonesia (Persero). The primary data processing was done using PLS SEM (Partial Least Square Structural Equation Modelling) (Sugiarto, 2022; Sugiarto, Hendratono, T. & Sudibyo, D, 2015).

Indicators related to the research variables were selected based on their relevance to risks directly impacting customers.

Table 5. Empirical Indicator

Variable	Notation	Indicator
Human Resources Quality	X1.1	1. hospitality
(SQ)	X1.2	2. empathy
	X1.3	3. reliability
	X1.4	4. polite appearance
	X1.5	5. informative
	X1.6	6. honesty
Operational System (SYS)	X2.1	1. customer understanding
	X2.2	2. customer operational
	X2.3	3. integrating system
	X2.4	4. data security
	X2.5	5. on time
	X2.6	6. orderly arrangement
Infrastructure (INF)	X3.1	1. safety train
	X3.2	2. cool temperature
	X3.3	3. cleanliness
	X3.4	4. spatial planning
	X3.5	5. information sound
	X3.6	6. adequate public facilities
	X3.7	7. adequate sitting
	X3.8	8. information in train
Trust (TR)	Z.1	1. attention to passengers
	Z.2	2. needs understanding

	Z.3	3. keeping promoses
	Z.4	4. kompetensi
	Z.5	5. accurate information
	Z.6	6. be professional
Customer Satisfaction (CS)	Y1.1	1. best choice
	Y1.2	2. needs
	Y1.3	3. satisfaction
	Y1.4	4. be wise in choosing
	Y1.5	5. pleasant service
	Y1.6	6. good exeperience

3. RESULTS AND DISCUSSIONS

The following are the results of questionnaire data processing from 160 respondents who have used long-distance train transportation in the last 1 year.

Tabel 6. Respondents Gender

No	Gender	Respondent (person)	Persentage (%)
1	Male	66	41,3
2	Female	94	58,7
	Amount	160	100

Tabel 7. Respondents Age

No	Age (years)	Respondents (person)	Persentage (%)
1	17-26	34	21,2
2	27-37	27	16,9
3	>37	99	61,9
	Amount	160	100

Tabel 8. Respondents Income per Month

No	Income (milion rupiah)	Respondents (person)	Persentage (%)
1	< 5	33	20,6
2	5-10	78	48,8
3	>10	49	30,6
	Amount	160	100

Tabel 9. Respondents Education

No	Education	Respondents (person)	Persentage (%)
1	SMA	9	5,6
2	D3	25	15,6
3	S1	97	60,6
4	S2	29	18,2
	Amount	160	100

Tabel 10. Train Passengers Class

No	Class	Respondents (person)	Persentage (%)
1	Economic	70	43,8
2	Business	29	18,1
3	Executive	61	38,1
	Amount	160	100

Based on the respondent data collected, 61.9% are over 37 years old. This indicates that the majority of respondents are adults capable of making decisions regarding their choice of transportation mode. Regarding monthly income profiles, 79.4% earn over 5 million Rupiah, indicating that most passengers can afford railway travel, from economy to executive class. In terms of educational background, over 90% of respondents have at least a diploma, suggesting that they are capable of understanding the questionnaire and providing objective responses.

According to Haustein et al. (2013), there is an exploration of the relationship between age and perception of public transportation services. Passengers over 65 years old prioritize security from crime, whereas passengers under 30 years old find time-saving to be a satisfying factor. Each age category has different priorities.

In this study, statistical analysis using Smart PLS (Partial Least Square) 3.0 involved validity testing, reliability testing, and hypothesis testing. Validity testing was conducted with construct validity, which demonstrates the extent to which a test measures the construct it is intended to measure and the extent to which valid conclusions can be drawn from the operationalized variables. Validity testing can use factor analysis, which analyzes the structure of relationships among a large number of variables by determining a set of underlying dimensions. The value considered is a loading factor greater than 0.708. In validity testing, AVE (Average Variance Extracted) is also assessed, indicating how much the variable explains the variance of its indicators (Sugiarto et al., 2023).

The test results showed that the loading factor values are greater than 0.708, and the AVE (Average Variance Extracted) values for all variables are greater than 0.5. This indicates that each research variable has good validity.

Reliability testing pertains to the consistency and predictability of a measurement tool. Validity is assessed through Internal Consistency Reliability, where higher values indicate higher reliability. Indicators of Internal Consistency Reliability include Composite Reliability (CR), which indicates data reliability, with good CR values ranging from 0.7 to 0.9. Cronbach's alpha (Ca) is a more conservative measure of Internal Consistency Reliability, with good Ca values being above 0.7 (Sugiarto et al., 2023).

The reliability test results show that the CR (Composite Reliability) values for all variables are above 0.9. This indicates that each indicator used in the research variables has good reliability.

VIF (Variance Inflation Factor) is used to test multicollinearity in regression models. Higher VIF values indicate a high correlation between indicators. However, some indicators had VIF values greater than 5. Therefore, indicators with high VIF values (greater than 5) were removed, resulting in the following model:

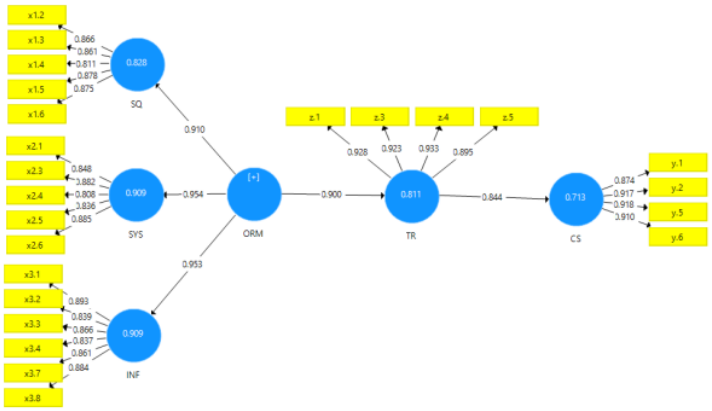

Figure 8. Research Model after Testing

Sources: Researcher (2024)

Each number in the model above reflects the loading factor between indicators and dimensions, as well as dimensions and variables. A loading factor value above 0.708 indicates that each indicator and variable have good validity. The table below shows the validity and reliability tests of the research model, demonstrating that the model has good validity and reliability.

Table 11 Validity and Reliability Test

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CS	0.926	0.931	0.948	0.819
INF	0.932	0.933	0.946	0.746
ORM	0.963	0.964	0.967	0.645
SQ	0.911	0.911	0.933	0.737
SYS	0.906	0.906	0.930	0.727
TR_	0.939	0.941	0.957	0.846

The following data represents the VIF testing after removing several indicators, including X1.1, X2.2, X3.5, X3.6, Z2, Z6, Y3, and Y4. It can be seen that the obtained VIF values are below 5, indicating no collinearity issues between the variables.able 12. Indicator VIF

Table 12 Indicator VIF

Outer VIF Values	
	VIF
x1.2	**2.844**
x1.3	**2.559**
x1.4	**2.139**
x1.5	3.029
x1.6	3.093
x2.1	**2.770**
x2.3	3.466
x2.4	**2.249**
x2.5	**2.647**
x2.6	3.294
x3.1	3.281
x3.2	**2.378**
x3.3	**2.863**
x3.4	**2.596**
x3.6	3.555
x3.7	3.628
y.1	**2.738**
y.2	3.530
y.5	3.732
y.6	3.359
z.1	4.008
z.3	4.123
z.4	4.382
z.5	3.089

Direct Effects

There are five direct effects in the research model as follows:

1. Infrastructure on Operational Risk Management
2. Operational Risk Management on Trust (Hypothesis 1)
3. Human Resource Quality on Operational Risk Management
4. Systems on Operational Risk Management
5. Trust on Customer Satisfaction (Hypothesis 2)

Testing the relationships between variables with a significance level (α) of 0.05. The relationships between variables are assessed using the P-value approach. The P-value indicates the probability that H0 is false. If the P-value is below the significance level (0.05), H0 is rejected. H0 states that there is no relationship between the variables.

Table 13. Hypothesis Test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (IO/STDEVI)	P Values
INF -> ORM	0.422	0.423	0.011	39.126	0.000
ORM -> TR_	0.899	0.900	0.017	53.989	0.000
SQ -> ORM	0.315	0.314	0.009	35.675	0.000
SYS -> ORM	0.332	0.332	0.007	48.309	0.000
TR_ -> CS	0.844	0.844	0.024	34.826	0.000

In the test results, it can be seen that all P values are below the significance level (α). The direct relationships between variables indicate significant effects. The path coefficients are useful for indicating the direction of the relationship between variables, whether the hypothesis is positive or negative. Path coefficients range from -1 to 1. If the value is negative, the relationship direction is negative, and vice versa. The higher the path coefficient value, the stronger the effect.

Table 14. Direct Effect Path coefficients

Path Coefficients

	CS	ORM	TR_
INF		0.422	
ORM			0.899
SQ		0.315	
SYS		0.332	
TR_	0.844		

Based on the testing of path coefficients, the direct relationships between variables are all positive. The strongest influence is between Operational Risk Management and Trust, followed by the relationship between Trust and Customer Satisfaction.

Indirect Effects

There are seven indirect effects evaluated using path coefficients in the research model as follows:

1. Infrastructure on Customer Satisfaction, through Operational Risk Management and Trust

2. Human Resource Quality on Customer Satisfaction, through Operational Risk Management and Trust
3. Operational Risk Management on Customer Satisfaction, through Trust
4. Operational Systems on Customer Satisfaction, through Operational Risk Management and Trust
5. Infrastructure on Trust, through Operational Risk Management
6. Human Resource Quality on Trust, through Operational Risk Management
7. Operational Systems on Trust, through Operational Risk Management

Tabel 15 Indirect Effects Path coefficients

Specific Indirect Effects

	Specific Indirect Effects
INF -> ORM -> TR_ -> CS	0.320
SQ -> ORM -> TR_ -> CS	0.239
ORM -> TR_ -> CS	0.759
SYS -> ORM -> TR_ -> CS	0.252
INF -> ORM -> TR_	0.379
SQ -> ORM -> TR_	0.283
SYS -> ORM -> TR_	0.299

In the testing of indirect relationships between variables, there are also significant and varied effects. According to Amin et al. (2023), customer satisfaction is determined by various variables related to the quality of human resources in terms of service. KAI is a service company that sells service-based offerings, so customer satisfaction is a key measure of business success. This study tests aspects of operational risk and trust on service satisfaction.

Tabel 16 Endogen Construct R2 Test

R Square

	R Square	R Square Adjusted
CS	0.713	0.711
ORM	1.000	1.000
TR_	0.808	0.807

The R^2 value is the coefficient of determination for endogenous constructs, indicating how strongly endogenous variables are explained by exogenous variables. According to Chin (1998), an R^2 value of 0.67 is strong, 0.33 is moderate, and 0.19 is weak. In the R^2 testing conducted, Customer Satisfaction, Operational Risk Management, and Trust all have values exceeding 0.67, indicating strong explanatory power.

Discussion of Analysis Results

Hypothesis 1

The first hypothesis states that Operational Risk Management significantly affects Trust. The research results show that Operational Risk Management affects Trust. This is evidenced by a P value of 0.000 (less than 0.05). This finding is consistent with previous studies by Ganesan (1994), Bergeron, Richard, and Perrien (2001), Harris and Goode (2004), Ehbara and Shukor (2016), M Bulakh, A Okorokov, D Baranovskyi (2021), and Narges Rostamian, Bahram Ranjbarian, Arash Shahin, Azarnoosh Ansari (2023).

Hypothesis 2

The second hypothesis states that Trust significantly affects Customer Satisfaction. The research results show that Trust affects Customer Satisfaction. This is evidenced by a P value of 0.000 (less than 0.05). This finding is consistent with previous studies by Ehbara and Shukor (2016) as well as Lainnamngern and Sawmong (2019).

4. CONCLUSION

The aspects of Operational Risk Management significantly influence Trust, and Trust aspects significantly affect Customer Satisfaction in railway transportation services in Indonesia. The testing of direct and indirect relationships between variables shows a positive relationship with varying degrees of influence.

This provides insight that operational risk mitigation is one of the strategies that companies can use to build relational relationships with customers. The study was conducted on all classes of long-distance trains. Each route and station have different facilities. In each class of train, the infrastructure facilities received by customers differ, leading to varying perceptions of service quality and infrastructure. The research does not compare the perceptions of KAI (the Indonesian railway company) with those of the customers.

To reduce these risks, KAI should conduct regular risk evaluations and implement preventive measures and assessments of the mitigation efforts. This involves investment in infrastructure maintenance, employee/staff training, and strengthening security systems and contingency planning for emergency situations. Future research could extend the study period and include additional independent variables such as external risks, and incorporate other variables like price, customer loyalty, and customer behavior.

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