Asia Pacific Journal of Advanced Business and Social Studies
ISBN (eBook): 978 0 9943656 7 5 | ISSN : 2205-6033
Year: 2023, Volume: 8, Issue: 1

PROPOSED DESIGN OF INDONESIAN HSR SERVICE QUALITY KPI

Felicia Annice [a] & Yuliani Dwi Lestari, PhD [b]
[a] Institut Teknologi Bandung, Bandung, Indonesia.
Corresponding email: felicia.annice@sbm-itb.ac.id

Abstract

High-Speed Railway (HSR) transportation development in certain country embodies a significant technology to support modern society's value of time and dynamic activities. Despite of complicated operation and huge investment spent, various studies stated that HSR industry faces barrier challenges to increase ridership due to lack of punctuality, reliability, pricing scheme, and inconvenience in passenger journey. It majorly affects the reasons on why passengers may and may not choose the transport option since it influences passenger satisfaction level. Acknowledging this global issue, an anticipation to the upcoming Indonesian HSR operation is made through this paper to survey Indonesian HSR passenger expectation which result was being the basis of performance management design. The quantitative data from across-age 200 respondents was generated through statistical analysis to determine the prioritization and it shown tangibility and reliability attributes as the first and second most important. Afterwards, the process continued with qualitative and quantitative analysis from Indonesian railway expert interview and previous publication of worldwide HSR which utilized to conduct external benchmarking, validate the findings, and discover contextual performance indicators for both attributes using Knowledge-based Performance Management System. The paper resulted 6 performance variables on tangibility and 7 performance variables on reliability attributes which were linked and weighted for further implementation. Differ from other countries, our findings indicate that physical facilities' importance is uniquely considered by Indonesian as it impacted tourist motivation. These new insights could focus Indonesian HSR operators to invent on-target solutions to improve passenger satisfaction which also impacting the increase of economic benefit.

Keywords: High-Speed Railway, Knowledge-based Performance Management System, Product Quality, SERVQUAL, Tangibility and Reliability.

1. Introduction

With the ability to support modern society's value of time and dynamic activities, High-Speed Rail (HSR) is being considered as today's intercity transport in several countries which actively upgraded their route availability and existing infrastructure with high operating speed within the range of 125 mph (200 km/h) to 220 mph (350 km/h).

Based on McKinsey Report (2022), the research done to representative sample of passenger worldwide has exhibited different decision criteria preference in each country. The result raised the need to apply unique approach to satisfy passengers across region on operational strategy level. Despite of these global trends and its strength to solve passengers transport challenges in terms of speed, volume and sustainability, HSR service faces barrier challenges to increase ridership due to its pricing scheme, lack of punctuality and reliability, and lack of convenience in

passenger journey– which affects several reasons on why passengers may and may not choose rail transport and how it changes consumer behaviour.

It is known that working out rail transport's market share and profitability compared to other transport industry could be difficult with wrong strategy. Strengthen by the data, Watson (2015) stated that most HSRs globally are not profitable – even big cities in developed countries such as France and Spain experienced declining profits due to low occupancy of trains and high-ticket prices. Based on the issue, Danaher and Rust (2018) stated that service quality improvement proved to increase revenue through higher percentage of existing customers, attracting new customers through recommendation, and increase the usage rate of current customers.

Therefore, this paper discusses the focused performance indicator based on important service quality attributes for Indonesian HSR potential passengers. The study was done through literature review from books/previous publication, and in-depth interview with Indonesian railway expert. The findings covered Indonesian HSR passenger prioritized attributes' performance indicator that would be used to initiate service quality improvement and prevented common issue to be happened later. The development of this service quality performance indicators would grant further HSR operator to point out the important sub-attributes under service quality attributes, find suitable indicators to improve service quality, anticipate the market expectation, and adjust their strategy. Despite that, there are many studies conducted to determine service quality and performance indicator of worldwide HSR, yet specific research for upcoming Indonesian HSR has not been conducted.

2. Proposed Literature Review & Framework

Told by Peelen and Beltman (2013), the logical starting points of CRM is to know the customers. The essential to develop relationship and design personalized offering is enabled by recognizing and understand the customers. One of the best practices to know customers can be applied by conducting market research—to gain insights about expectation and feedback on performance. Therefore, this research implemented this theory to seek understanding about potential passengers' expectation through market survey. Data taken from the survey was recognized and guided the management to determine the most impactful service attribute to be focus on. Hopefully, the improvement suggested could benefit both sides of potential passengers and management to increase passenger experience and satisfaction.

About the next theory, the paper about HSR industry would be intercorrelated with the theory of product and service quality to perform objective measures. From product viewpoint, Garvin (1987) proposed a product quality definition that included major approaches across discipline, dimensional elaboration, and empirical relationship between quality to important variables. The assessment of product quality could be overseen from its eight dimension that cover broad range of concept. It was sorted from most to least prioritized characteristic: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. While from service viewpoint, SERVQUAL instrument as the most scientifically recognized method of service quality measurement in service industry, including public transport sector (Cavana, 2005) is utilized to examine the quality. It enables us to identify and measure the elements of customers' expectation. There are five set of dimensions that is used widely and ranked as the most important service quality through industries – tangibility, reliability, responsiveness, assurance, and empathy (Badri, 2005).

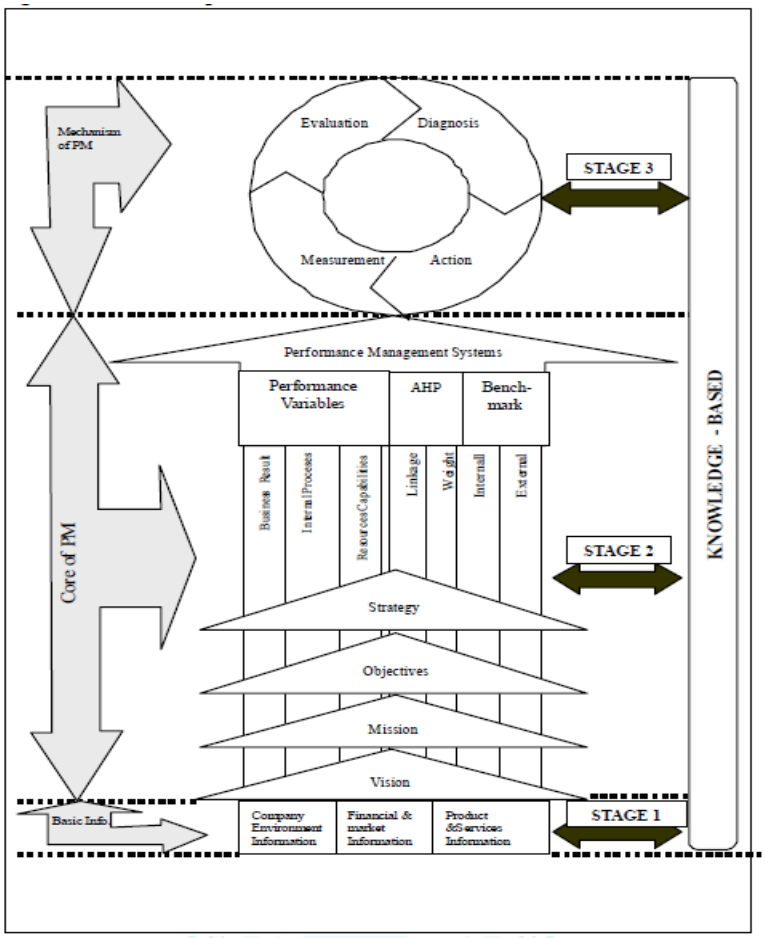

Figure 1: KBPMS Framework (Wibisono & Khan, 2010)

Combining previous theory into systematic framework, KBPMS introduced improvement of previous PMS frameworks as an integral management control system —especially in knowledge based expert system, AHP analysis, and gap analysis to support decision-making process and performance management design (Wibisono & Khan, 2010). In Indonesia, the practice of KBPMS is more suggested as it covers both financial and non-financial metrics – the organization output, tangible/intangible resources, and the internal process alignment to business strategy are recognized. Overseeing different organizations that has different culture and output in different environment, the non-financial metrics should be considered to make things objective. There are three stages to develop PMS: Basic Information of Business Environment, Core of Performance Management, Performance Management System. The illustration of design methodology through KBPMS attached on Figure 1.

3. Methodology and Data Collection

In this research, mixed methodology was used to answer the research questions. It focused on collecting and analysing mixing both quantitative and qualitative method which supporting the research objective from multiple perspectives (Sekaran & Bougie, 2016). The quantitative method was implemented in the pre-research step. This pre-research was conducted to oversee Indonesian HSR passenger expectation towards upcoming service quality. The data was collected through ranking-based questionnaire to 200 potential passengers– the number of respondents was determined using Slovin's formula.

In the main research step, qualitative and quantitative method is utilized to determine the suitable and impactful indicators of Indonesian HSR service quality PMS. The service quality chosen in this step was referring to the pre-research result –highest expected attributes would be dig further for PMS development. To support the analysis, additional data was retrieved through primary (expert in-depth interview) and secondary (previous publication) data which supported the PMS development. Experts participated on the interview was coming from background of expertise: O&M Planning, Train Passenger Service, Station Passenger Service, and Permit Property/Business Development with range of experience of 9 – 26 years. Maintaining the data validity, the secondary data generated was coming from several sources and period, the author has selectively curated it ensuring its relevancy to be acknowledge as basis of this research.

3. 1 Pre-research Analysis

The data collected through questionnaire which was mainly developed from SERVQUAL framework of tangibility, reliability, responsiveness, assurance, and empathy. Total of 30 questions correspond to the mix of 22-items originally suggested by Parasuraman (1985). The concern points written on questions was adjusted to be contextual with HSR industry and common behaviour of Indonesian railway passengers. Respondents were offered to rank their expectation to each dimension and attributes of HSR service from 1 – the most expected to 5 – the least expected. Additional questions related to personal data of respondents, such as gender, profession, age range, frequency of mobilizing, frequency of using public transportation during it, prior experience of using HSR services, and main issue of not using public transportation is also asked to enrich the knowledge about potential passengers' consideration. 200 potential passengers with specific criteria of: (1) age within 18-55 years old, and (2) actively travelling back forth from future operational targeted cities were involved as respondents. From the respondents' data, it is revealed that:

- Vast majority of respondents are travelling with the purpose of holiday (66,5%), study and work (49%), and family visit (39%). 71,5% of respondents stated they are considering to use HSR service, meanwhile the other 25% stated that they maybe use the service and the other 3,5% is certain to not use the service.
- They mostly never used public transportation (30%), rarely using it varied from once in six months (23,5%) and once in three until four months (12,5%) compared to public transportation services with several reasons: far pick-up point, unavailability of integrated transport system, long travel time, schedule flexibility, and uncomfortable facilities.

Through descriptive statistical analysis through mode and median calculation, the qualitative data turned to quantitative data. The result of this analysis seen on Table 1. Based on it, we can clearly conclude that Indonesian potential passengers value tangibility more than reliability as unique traits. But generally, both of the service attributes tangibility and reliability would be determined as the highest ranking and main focus of the Performance Management System (PMS) design.

Table 1: Indonesian HSR Service Quality Attributes Ranking

Overall Dimensions	Mode	Median	#	Tangibility Attributes	Mode	Median	#
Tangibility	1	2	1	Comprehensive & Cleanliness of Station Facilities	1	2	1
Reliability	2	2	2	Comfortability: Room Temperature & Seat Type	2	2	2
Responsiveness	3	3	3	Clear Direction on Station & Train	3	3	3
Assurance	4	4	4	Station & Train's Modern Interior	4	4	4
Empathy	5	4	5	Station & Train's Design Accordance	5	4	5
Reliability Attributes				**Responsiveness Attributes**			
Passengers' Safety	1	1	1	Politeness & Hospitality of Staffs	1	2,5	1
Time Punctuality	2	2	2	Problem Solving Accuracy	2	2	2
Train Route & Accurate Schedule	3	3	3	Service Initiatives	3	3	3
Reliable Capabilities of Staffs	4	4	4	Problem Solving Speed	4	3	4
Overall Process Digital Integration	5	4	5	Staffs Effective Coordination	5	4	5
Assurance Attributes				**Empathy Attributes**			
Prevention & Action to Hazardous Passengers	1	2	1	Retail & On-board Service Ops Hours Compatibility	1	2	1
Handling & Informing Special Condition	2	3	2	Operational Flexibility during Special Conditions	2	3	2
Clarity of Exchange and Cancellation	3	3	3	Infrastructure & Service for Special Passengers	3	3	3
Standby Staffs	4	3	4	Individual Attention to Passengers	4	4	4
On-site Ticketing for Impromptu Passengers	5	4	5	Special Treatment on Passengers' Special Day	5	5	5

Summarizing the issue and future tendency from external analysis, the author oversaw these three intercorrelated issue of: lack of demand, long-term growth of demand, and the risk of unprofitability due to decreasing amount of ridership as focus of this research. To tackle this, the application of CRM theory could be corresponding to solve issue. Rather than conducting "sales-at-all-cost-approach" that resulted in discontentment and unethical selling behaviour, it is suggested for Indonesian HSR to take care of passenger service and satisfaction to keep the opportunities to foster growth and relationship bond. Especially in Indonesia, it is proven based on Customer Experience Trends Report 2020 (SurveySensum, 2019) that 67% of customers switch option of brands not because of the features or price, but because lack of experience. If it applies in HSR industry, the probability of customer choosing other transport option could be higher once particular service could not meet passengers' expectation.

Publicized by Parasuraman (1986), Churchill and Surprenant (1982) and Asubonteng et al. (1996), customer satisfaction measured through organization's actual service delivery in conformity with customers expectation, defined as perceived quality attainment, and meeting customers' needs and wants beyond their expectation. Maintaining customer satisfaction perspective is on top of determining comprehensive customer experience (Worick, 2019). To achieve higher passenger satisfaction of Indonesian HSR, attention to passenger experience through service quality improvement considering internal and external factors is needed. Passenger experience does not rely on passenger satisfaction, but passenger satisfaction does depend on good experience. Better experience can be achieved by putting some effort to meet passengers' expectation. So, in order to maximize the impact of the solution offered, both two

service qualities found on the survey and statistical analysis – tangibility and reliability – were being strongly linked into the analysis to bring improvement to passenger experience and satisfaction. Performance measurement could help organization to understand the situation and improve performance – the measurement quantifies the current state, regulate, and break down the related components (Bhattacharyya, 2011). The measurement is highly depending on well-designed PMS which provides clear link between human capability and organizational strategy.

3. 2 Data Analysis

In this study, the PMS developed was designed for operational level – especially passenger-service department. Since the HSR service has not been operated yet in Indonesia, basic operational performance measurement has not been designed. The actual data to generate correlation and AHP analysis are also not available and it was invalid to use prediction data. Through general viewpoint, core of performance management was observed from Asian HSR's best practice – Asian HSR was prioritized due to higher similarities and contextual culture it could have to be implemented in Indonesia.

The first stage of designing PMS was covering the crucial characteristic information of the industry, government, community, market, competitors, and products or services study. On the other way, this process could involve PESTEL or Porter Five Forces approaches as a tool to analyse the environment, learn the competitor, and create significant input for system design. Besides, it is also stated that the executives required to understand business process workflow before they able to set suitable benchmarks for process improvement. By noticing the importance of each business step, the most relevant indicators could be determined.

Then, the second stage of designing PMS was begin with the determination of Indonesian HSR operator's core organization statement covering the vision, mission, and strategy which generated through compilation and benchmarking analysis of best practice HSR's organization statement: China Railway High-speed (CRH), Taiwan High-speed Rail (THSR), Japan Shinkansen, and Korea Train Express (KTX). The benchmark countries were chosen based on its fulfilment to the Asian requirement and outstanding performance in reliability attributes. The vision, mission, and strategy were examined based on criteria proposed by Wibisono (2016), finalized, and became the basis input for the next stages. Following it, the sets of performance indicators of most expected service attributes were selected and classified under business result perspective. The analysis of the indicator's considerations was explained, linked, and weighted referring to the initial pre-research statistic analysis. Concluding all the findings from previous stages, the Objectives, Measures, Target, and Initiatives (OMTI) for measurement and evaluation system is defined as practical and ready-to-use PMS for Indonesian HSR.

4. Analysis

4.1 Basic Information (Environmental Scanning)

Speaking of the characteristic, it is stated by UIC (2018) that HSR do encompasses a complex reality including many technical aspects, starting from rolling stock, infrastructure, operations, strategic business, and cross-sector matters. The technology is proven to be flexible and attractive that can be developed under many circumstances – in different culture and context. The operations system of HSR could differ based on geographical, cultural, and capabilities issues. Highlighting the PESTEL analysis to study the industry's environment, it concluded that Indonesian HSR could bring wide benefit from political, economic, social, technology, and environment aspects. It would directly experience by all stakeholders related: Government of Indonesia (GoI), HSR Operator, Commercial Sector, SMEs Business Owner and Society, such as: increase opportunity of business linkage with other countries, development of local /tourism industry, increase people well-being, technology transfer knowledge and offer of sustainable yet

fast transport option. Despite of having positive benefits, crucial mistake could turn it into obstacle since it has quite high risk on political relationship, economic, and social impact.

Observing the competitiveness through Porter Five Forces analysis, it was found that the both bargaining power of supplier (HSR operator) and buyer (HSR potential passengers) tend to be strong. Passengers has more power compared than HSR operator due to lots of transport option besides HSR. They have the tendency to push the price down and create limitation for HSR operator to gain sustainable profits. The competitors of HSR would be the other transportation options that provide good service with lower price and satisfactory service – such as conventional train, travel, and the most competitive one: private vehicle. Additional effort to shift private vehicle to HSR passengers would be needed to increase further demand.

Acknowledging the potential thread, it was seen that threat of new entrants for HSR industry in Indonesia is quite weak. Whereas, the threat of substitutes from HSR to other transport option would be quite high because of some determinants, such as: accessibility, connectivity, strategic pick-point area, facilities, schedule variation, integration with other transport option, and unique service attributes presented by HSR service compared to other options.

4.2 Core of Performance Management (Strategic Framework)

The vision, mission, and strategy for Indonesian HSR will be generated through the combination of Asian HSR references since most of HSR operates with same objectives – to offer faster, reliable, and sustainable transport choice to the society. Based on initial study on several HSR business model, four representatives of Asian HSR were chosen to be analysed along with the generation of Indonesian's HSR core statements. After getting through the checklist, the optimum statement between four representatives could be determined and it was also found that there were similar keywords applied between vision, mission, and strategy of HSR itself which could be specifically combined and developed for Indonesian HSR to fulfil the same objective. The findings gotten from this stage was summarized on Table 2.

Table 2: Indonesian HSR Core Performance Management Summary

Vision	To be the preferred transportation choice that simplify, connect, and improve people's life.
Mission	Indonesian HSR is committed to provide safe, punctual, comfortable fastest transportation which offer excellence customer experience to enhance better future. Striving to maintain service satisfaction, Indonesian HSR always pursue to deliver high-quality product, brilliant customer service, and relevant improvement to be long-lasting passengers' choice.
Strategy	• Improving high-speed transport services by keep fulfilling the mission to be preferred transportation choice that safe, punctual, comfortable fastest transportation which offer excellence customer experience, • Encouraging employees to continuously pursue growth and establish strong management base, • Keeping the spirit of collaboration towards mutual-benefited objectives, • Implementing positive cycle of ESG management to create better business environment, • Strengthen organization's earning power to grant added-value for stakeholders.

Observing the operation complexity and limited information to the specific organization, performance measurement design tool chosen for this study would be the Knowledge-Based Performance Management System (KBPMS). It offers the opportunity to oversee business result perspective related to service quality improvement's objective. The next step of this stage would

be the performance variables determination and its weights—which considering the gap and false alarm of the proposed indicators of tangibility and reliability service attributes (Table 3).

Table 3: Service Quality Performance Variables & Weights for Indonesian HSR

Tangibility Variables	Equivalent to Prev. SERVQUAL	Explanation	Initial Rank	Final Rank
Perceived cleanliness rating on station and train (%)	Comprehensive and Cleanliness of Station Facilities	Environment condition proved to have strong impact passenger impression, satisfaction, and retention to the service.	1	1
Asset Turnover Ratio (x)	Comprehensive & Cleanliness of Station Facilities	Asset turnover ratio embodies the value of HSR operator sales or revenue relatively to the value of overall assets.	1	2
Physical Facilities Feature Innovation within Passenger Journey	Comprehensive & Cleanliness of Station Facilities	This indicator would measure the total improvement idea received for feature innovation within overall HSR passenger journey.	1	3
Average value of facilities-related suggestions & feedback from passengers applied (%)	Comprehensive & Cleanliness of Station Facilities	This indicator would be addressed to observe how much the ability of HSR operator to process the facilities-related suggestion and feedback from passengers for station and train improvement.	1	4
Passengers' complaints against facilities inconvenience (%)	Comfortability: Room Temperature & Seat Type	Preventing inefficient circulation or ticketing system, parking issues, safety concern, narrow space, uncomfortable seats or indoor temperature, etc. HSR's attention to passenger convenience would impact comfort.	2	5
Percentage of market absorption ability during the launch of new product or service (%)	Clear Direction on Station & Train	The new implementation of HSR service would need initial observation regarding market response to the offer, whether both physical product and service has the ability to be absorbed in the market.	3	6

Reliability Variables	Equivalent to Prev. SERVQUAL	Explanation	Initial Rank	Final Rank
Number of railway accidents and person seriously injured/killed (per train km)	Passengers' Safety	Railway accidents might occur due to error of railway system and lack of awareness of passengers, for example: crossing or suicide accident. This commonly utilized to evaluate current system and plan corrective measure.	1	7
Number of operation defect (per one hundred million total number of passengers)	Passengers' Safety	There are lots of defect probability due HSR complex system. The cause might come from the EMU and rail condition. This indicator is suggested to increase awareness and equipment standard conformity of train/station crew to thoroughly done inspection to eliminate error.	1	8
Accuracy of on-board travel time (%)	Time Punctuality	The accuracy of on-board travel time covers the trip travel time, for example: 35 minutes, 45 minutes, etc.	2	9
Percentage of Actual Service Delivered Meet Scheduled Service (%)	Train Route & Accurate Schedule	This focuses on the punctuality of the EMU departure time.	3	10
Standard Operation Procedure (SOP) Conformity Rate (%)	Reliable Capabilities of Staffs	HSR operational required high SOP conformity of technical and non-technical aspects. This indicator aims to set higher level of non-physical procedure conformity of crews.	4	11
Overall Customer Satisfaction Score (%)	Reliable Capabilities of Staffs	Customer Satisfaction Score (CSAT) measured short-term loyalty of passengers, whereas NPS utilized to evaluate the long-term one. The satisfaction feedback took part to provide HSR operator about the service evaluation—what is working well, and what is not.	4	12
Net Promoter Score (NPS) of Passenger Service (Customer Service) (%)	Reliable Capabilities of Staffs	This indicator focuses on human resources capability to serve excellent service. Levels of customer service that are used by industries ranging from unsatisfactory to exceptional.	4	13

4.3 External Benchmarking

Through benchmarking process, organization could gain several benefits, such as: transfer technology, new knowledge, and manager performance improvement. It is said to be a sustainable systematic process from best-practice organization evaluation to determine improved business workflow in order to arrange rational business objectives (Wibisono, 2016). It took part as reference or comparison which considered as measurable standard. In this paper, the benchmarking process would be reconducted to four representatives of Asian HSR services which its service quality attribute has been tested and ranked before for market validation purposes. Due to limitation of SERVQUAL-related previous studies, an example of railway service is added – since the service quality scheme for both conventional and high-speed are mostly alike. The collection of benchmarking data summarized on Table 4.

Table 4: Benchmarking of Service Quality Attributes for Indonesian HSR

No.	Attributes	Sub-attributes
1.	Tangibility	Clean, tidy, and neat overall environment (train and station)
2.		Toilet sanitation
3.		Neat appearance of employees
4.		Comfortability: air conditioning, seat comfort, seat space, noise insulation on-train
5.		Train equipment or facilities including on-train entertainment services, cell phone signal, and adequate power outlets
6.		Visually appealing modern equipment and infrastructure
7		Entry/exit convenience
8.	Reliability	Punctuality of train
9.		Reliable train schedule
10.		Safety and steadiness on-train (during the trip)
11.		Luggage safety
12.		Station public security
13.		Staff professional ability which includes their courtesy and knowledge to handle inquiries efficiently
14.		Accuracy of ticket information, reservation, station identification, train forecast, and record keeping
15.		Convenience of ticket purchase process and transfer/transit access to other transport modes

From the attributes comparison above, it could be seen that most of railway services paid more attention to reliability attributes. It was in accordance with previous statement which refer that many worldwide HSR rarely focus on the tangibility aspect. Based on the benchmarking result, there were lots of physical attributes that focused on train facilities and neat appearance of employees compared to the station facilities. It is stated by the interview respondent that as a fast transportation option, less passenger would likely spend their time on the station – therefore, service on-train is prioritized. Whereas, on reliability attributes, it was found that safety, punctuality, schedule, staff capabilities, accessibility and convenience of supporting process was mentioned several times across the reference. Besides, the prioritization of reliability attributes was also seen by the higher rankings it had compared to the tangibility ones.

4.3 Definition of Key Performance Indicators (KPI) for Implementation

Adapting concept retrieved from another performance measurement framework, it could also be applied in KBPMS that each performance indicator needs to define the following: strategic objectives, measures, target, and initiatives (OMTI) for implementation guide—including the measurement basis, and the follow-up action plan. The performance indicator would be weighted for final measurement based on its prioritization rank that has been sorted on Table 6 and determined the red-yellow-green status to monitor the trend of performance. The linking of KPI for implementation elaborated on Table 5.

Table 5: Definition and Measurement Guide for Service Quality Indonesian HSR KPI

No.	Strategic Objectives	Measure	Targets			Initiatives
			Green	Yellow	Red	
Tangibility Variables						
1.	Maintaining cleanliness of station and train facilities	Perceived cleanliness rating on station and train (%)	≥ 95%	90 – 94%	< 90%	• Monitoring cleaning inspection report, • Setting clear cleaning standard.
2.	Monitoring contribution efficiency of overall assets to HSR operator's sales or revenue – in order to accommodate right and profitable facilities for passengers	Asset Turnover Ratio (x)	≥ 1,2 times	1 – 1,19 times	< 1 time	• Increase value of current asset investment, • Wisely allocating budget for facilities improvement and replacing ineffective facilities.
3.	Motivating internal management to increase innovation through creative problem-solving method	Physical Facilities Feature Innovation within Overall Passenger Journey	> 1 idea per quarter	1 idea per quarter	0 idea per quarter	• Developing stronger R&D department in charge of innovation, • Preparing incentive for performing employee.
4.	Observing the ability of HSR operator to process facilities-related suggestion and feedback for improvement	Average value of facilities-related suggestions and feedback from passengers applied (%)	≥ 20%	10 – 20%	< 10%	• Assigning team to evaluate and create action plan, • Assessing financial/non-financial impact for proceeding response.
5.	Increasing convenience level and comfortability of physical facilities	Passengers' complaints against facilities inconvenience (%)	0%	1 – 5%	< 5%	• Assigning responsive staffs to handle repairment, • Investing effort to increase comfort.

6.	Evaluating market response to the new products and services offered	Percentage of market absorption ability during the launch of new product or service (%)	≥ 55%	40 – 54%	< 40%	• Conducting promotional bundle or special price. • Increasing the ease of use feeling to new technology.
Reliability Variables						
7.	Planning preventive measures to increase safety policy and safety level to cover the accident risks	Number of railway accidents and person seriously injured/killed (per train km)	0 accident	1 accident	≥ 2 accidents	• Conducting routine evaluation to OCC trip record, • Developing real-time performance dashboard tracking-purposes.

6.	Evaluating market response to the new products and services offered	Percentage of market absorption ability during the launch of new product or service (%)	≥ 55%	40 – 54%	< 40%	• Conducting promotional bundle or special price. • Increasing the ease of use feeling to new technology.
Reliability Variables						
7.	Planning preventive measures to increase safety policy and safety level to cover the accident risks	Number of railway accidents and person seriously injured/killed (per train km)	0 accident	1 accident	≥ 2 accidents	• Conducting routine evaluation to OCC trip record, • Developing real-time performance dashboard tracking-purposes.

8.	Increasing awareness to eliminate error and keeping the equipment standard conformity of train and station crew through thorough inspection	Number of operation defect (per one hundred million total number of passengers	≤ 1,5%	1,4 – 2%	≥ 2,1%	• Optimizing maintenance and hardware check before train operates, • Developing responsive defect detection and automatic emergency command to increase safety plan.
9.	Ensuring the accuracy of on-board travel time (for example: 35 minutes from station to station)	Accuracy of on-board travel time (%)	≥ 99%	95 – 98,9%	< 95%	• Upgrading system controller accuracy, • Prevent time delay through pre-trip planning, • Conducting traffic control formulation.

10.	Ensuring the punctuality of EMU departure time	Percentage of Actual Service Delivered Meet Scheduled Service (%)	≥ 100%	95 – 99,9%	< 95%	• Designing reliable real-time technology to inform the planned schedule into several media, • Preparing backup plan when delay occur.
11.	Setting higher level of non-physical procedure conformity of crews	Standard Operation Procedure (SOP) Conformity Rate (%)	≥ 100%	95 – 99,9%	< 95%	• Assigning supervisor of the SOP conformity, • Developing automatic warning system during SOP violation.
12.	Retrieving score of long-term passenger loyalty and collecting passenger satisfaction feedback to quantify the performance	Overall Customer Satisfaction Score (%)	≥ 80%	70 – 80%	< 70%	• Offering incentive for passengers who are willing to fulfill the feedback form, • Developing automated system to evaluate and collect the feedback response.
13.	Monitoring service staff capabilities to fulfill passenger service standard: speed, accuracy, transparency, accessibility, and friendliness	Net Promoter Score (NPS) of Passenger Service (%)	≥ 80%	70 – 80%	< 70%	• Considering the feedback given by the passengers, • Service staff additional standardization training.

5. Implications

This study has implemented passenger-based approach using validated service quality which aligns with potential passenger of Indonesian HSR. It implies that companies could benefit from considering these performance indicators and service attributes when developing their services, especially in terms of passenger experience and passenger satisfaction. To evaluate the service quality KPI's impact to HSR operational performance, the accomplishment to service quality KPI target would not directly assess from the increasing number of ridership to tackle the issue. It was suggested for HSR operator to oversee it from bigger view—the profitability performance—which has also recognized HSR fare-box and non-fare box revenue calculation.

Strengthening the explanation above, it was stated by several publications that passenger satisfaction has strong relation with retention rate due to the fulfilment of passengers' expectation. Passenger satisfaction has intercorrelation with Customer Retention Rate (CRR) which gained through the passengers' viewpoints understanding. It was found that the CRR increase of 5% would accelerate profitability by 25% in minimum. Referring to CRR formula, the increase of passengers' number at start, end, and acquired during period should be prioritized to prevent declining performance. The decline of CRR could impacting operators' profitability.

To be more precise, reassessment of the proposed KPI should be examined through additional research using actual data. After the service established, the relevant actual data should be retrieved and take important part in reassessing the current indicators. Besides, the

development of the other three service attributes: responsiveness, assurance, and empathy are suggested to be completed in order to offer comprehensive service to the passengers.

Conclusion

The findings of this study indicated important performance indicator which influencing service quality of Indonesian HSR through specific focus on passenger experience and passenger satisfaction. Based on the service quality customer expectation survey which data has been analysed using statistic descriptive analysis, the result shown tangibility and reliability as the most important service quality for Indonesian HSR potential passengers. Hence, the focus of the solution generated in this study was focusing on those validated and impactful attributes. Complementing the tested service attributes, the external benchmarking process to Asian HSR operation resulted 7 tangibility attributes and 8 reliability attributes which enriched the determination of relevant performance indicator for Indonesian HSR.

Depending on the pre-research findings, benchmarking, and literature reviews, 6 tangibility performance indicators and 7 reliability performance indicators was found under business result perspective. The performance indicators were purposely designed based on the service attributes validated to potential passengers. The degree of importance of these 13 indicators is provided using previous survey's statistic data ranking and previous study related to Asian HSR service quality. The indicators weight along with its red-yellow-green status was indicated to assist Indonesian HSR operator in conducting measurement, evaluation, diagnosis, and action. It developed with the objective to initiate service quality improvement and prevented common issue of lack demand happened to the upcoming Indonesian HSR operation. The solution would grant them the opportunity to be competitive, quickly penetrated, and accepted by the market.

This study considered as preliminary stage of roadmap in service quality PMS design for Indonesian HSR. Due to limitation, the study did not focus on specific HSR operator, but it is available to be used by any HSR operator in Indonesia. The discussion was focusing only on HSR indicators, excluding the conventional train model. For further studies, it is recommended that correlation and AHP analysis should be included to validate the suggested indicators after commercial operation launching. Then, additional interview is suggested to be performed to have larger viewpoints which accommodate every related stakeholder besides passengers.

References

i. Asubonteng, P., McCleary, K. J., and Swan, J. E. 1996. Servqual Revisited: A Critical Review of Service Quality, *J. Serv. Market*, 10, pp. 62–81. https://doi.org/10.1108/08876049610148602

ii. Badri, M.A., Abdulla, M. and Al-Madani, A. 2005. Information Technology Center Service Quality: Assessment and Application of SERVQUAL, *International Journal of Quality & Reliability Management*, 22(8), pp. 819-848. https://doi.org/10.1108/02656710510617247

iii. Bhattacharyya, D. K. 2011. *Performance Management Systems and Strategies*, Pearson Education, United Kingdom.

iv. Cavana, R.Y., Corbett, L.M. and Lo, Y.L.(G). 2007. Developing zones of tolerance for managing passenger rail service quality, *International Journal of Quality & Reliability Management*, 24 (1), pp. 7-31. https://doi.org/10.1108/02656710710720303

v. Churchill, G. A. Jr., and Surprenant, C. 1982. An Investigation into the Determinants of Customer Satisfaction. *J. Mark. Res*., 19, pp. 491–504. https://doi.org/10.2307/3151722

vi. Diwan, T. 2019. *Customer-driven Future: Indonesian Customer Experience Trends to Watch for in 2020*. Available at: https://www.surveysensum.com/blog/indonesia-customer-experience-trends-2020/ (Accessed: 17 December 2022)

vii. Garvin, D.A. 1987. Competing in the Eight Dimensions of Quality. *Harvard Business Review*, 87, pp. 101-109.

viii. UIC. 2018. High Speed Rail: Fast Track to Sustainable Mobility, *8th World Congress on High-Speed in Philadelphia*, pp. 3. Available at: https://uic.org/IMG/pdf/uic_high_speed_2018_ph08_web.pdf (Accessed 15 December 2022).

ix. McKinsey & Company. 2022. *Boosting Passenger Preference for Rail*. Available at: https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/boosting-passenger-preference-for-rail (Accessed: 28 November 2022)

x. Parasuraman, A., Zeithaml, V. A., and Berry, L. L. 1985. A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing*, 49(4), pp. 41–50. https://doi.org/10.2307/1251430

xi. Peelen E. and Beltman, R. 2013. *Customer Relationship Management (Ed. 2),* Pearson Education Limited, United Kingdom.

xii. Rust, R. T., Danaher, P. J., and Varki, S. 2000. Using Service Quality Data for Competitive Marketing Decisions. *International Journal of Service Industry Management*, 11(5), pp. 438–469.

xiii. Sekaran, U., Bougie, R. 2016. *Research Methods for Business: A Skill-Building Approach, Seventh Edition (Ed. 7)*, John Wiley & Sons, Inc, United Kingdom.

xiv. Watson, I. 2021. High-Speed Railway. *Encyclopaedia 2021*, 1, x. https://doi.org/10.3390/encyclopedia1030053

xv. Wibisono, D. 2016. *How To Create World Class Company: Guide for Director and Manager,* ITB Publisher, Indonesia.

xvi. Wibisono, D. and Khan, M. K. 2010. The Conceptual Framework of a Knowledge-Based Performance Management System, *Gadjah Mada International Journal of Business*, 12(3), pp. 393-414. https://doi.org/10.22146/gamaijb.5506

xvii. Worick, L. 2019. *What's The Difference Between Customer Experience and Customer Satisfaction?* Available at: https://www.themsrgroup.com/customer-experience-management/whats-the-difference-between-customer-experience-customer-satisfaction/#:~:text=Simply%20put%2C%20customer%20satisfaction%20is,customers%20feel%20about%20your%20brand (Accessed: 17 December 2022)