

Study Conducted on the Passenger Satisfaction regarding the Supply of Linen in Air Conditioned Class in Indian Railway with reference to Raipur Division

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Abstract:

Supply of linen forms an important amenity in air-conditioned coaches, of the long distance trains, in the Indian Railways. The main items provided are bed sheets, pillow covers, blankets and face towel. The bed sheets, pillow covers and face towels are washed after every use and blankets are washed on a monthly basis. Many complaints lodged by the passengers that they were supplied uncleaned and unhygienic linen on the trains. Indian Railway is the largest supplier of the linen on board. A number of agencies are involved in the process of the cycle of linen right from procurement, supply, washing, packing and then supplying it to the passengers. This study aims on the survey conducted on 100 passengers travelling by 10 different long distance originating trains from Durg station of Raipur division of South Eastern Central Railway, based on their satisfaction on the linen supplied, measured on five point Likert type convenient scaling technique.

Keywords: Linen, Passenger amenity, Air-conditioned Coaches

Introduction:

Indian Railways is one of the largest railway systems of the world and functions as a vertically integrated organization providing passenger and freight services. It carries approximately 25 million passengers and hauls 2.5 million tons of freight over 64,410 route kilometers. The Railways are currently running 19,186 numbers of trains. Looking at the huge numbers of passenger's traffic, it becomes imperative that the Indian Railways provide efficient passenger services. The Passengers travelling by AC class are provided with fresh bed sheets, pillow cover, face towel and blanket each in a sealed paper envelop. The washing of linen is been done through outsourcing by Railways. The majority of the complaint by the passengers involves unclean and unhygienic linen supplied on board trains. Faced with the risk of soiling its reputation over complaints of unwashed linen being provided in the AC coaches, the railways have finally pulled up its socks and set up the Mechanized laundry.

The study conducted to obtain passenger feedback of the trains starting from Raipur division of SEC Railway. During the study it was revealed that the AC passengers, who are generally well educated and are supposed to be aware of their responsibility to society, are cleaning shoes with the linen supplied to them and the face towel are used for a number of purposes for dusting or to remove the food particles from the berth. Many times the passenger use to take away the linen with them. With a view to improve upon the standards of cleanliness and hygiene in linen supplied to the passengers in trains, guidelines were issued to the Railways for setting up of mechanized laundries.

Operational Definitions:

AC Coaches: The Railway coach provided with Air Conditioning for the passengers and may be AC-I, AC-II, ACIII and AC Chair Car.

Amenity: The quality of being pleasant or attractions, agreeableness, something that contributes to physical or material comfort.

Customer satisfaction: is a term frequently used in marketing. It is a measure of how products and services supplied by a company meet or surpass customer expectation

Passengers: The term passenger means, a traveler on a public or a private conveyance other than the driver, pilot or crew.

Passengers' satisfaction: Means the extent of satisfaction derived by the passengers from their arrival at any railway station or from their travel by train.

Railway: A permanent track composed of a line of parallel metal rails fixed to sleepers, for transport of passengers and goods in trains.

Linen: Dictionary meaning is the thread made from fibers of plant, cloths woven from this thread. Article or garments such as sheet, tablecloths etc.

Supply of Linen:

Supply of linen forms an important amenity in air conditioned coaches/trains, as well as long distance trains. The linen provided in a particular train is done by the primary (owning) depot of the respective train. The main items provided are bed sheets, pillow covers, blankets and face towels. The bed sheets, pillow covers and face towels are washed after every use and blankets once in a month.

Washing of Linen:

The washing of linen is done through outsourcing by Railways. It was noticed that majority of the complaint by passengers involves unclean and unhygienic linen supplied on board trains. On further investigation, it was revealed that the rates for washing of linen had not been revised for a long time and the remuneration for the same was not adequate, adversely affecting the washing of linen. Further the kind of service providers available, were not able to provide proper output. Railways realized that the cleaning of the linen cannot be outsourced as the service providers do not have the equipment, machinery and the facility to do this kind of mass washing activity. Survey was conducted in the hotels and hospitals where the washing of linen was done in bulk. A complete study was done of how to take care of this problem and the conclusion drawn was to harness the latest technology for putting up mechanized laundries of its own. Railways decided to set up mechanized laundry plant on its own premises. Railways have taken the initiative of creating their own laundries and have set up a mechanized laundry. In order to improve the quality of washing of linen supplied to the passengers in AC coaches of trains, a state-of-the-art, fully mechanized departmental laundry was set up with the capacity of the mechanized laundry to clean 16 tonnes of linen per day. Till date Railways has set up 33 mechanized laundries in different locations stations. This initiative has led to a marked improvement in the standards of cleanliness/hygiene in the linen being supplied to the passengers in the train and passenger complaints have reduced whenever linen washed in mechanized laundries is supplied in trains.

Procurement of Linen:

The procurement of the linen is done by the Railway itself as per its specifications by the stores department and handed over to the Mechanical department. The Mechanical department is the custodian of the linen supplied in the AC coaches. The following checks are required to be conducted on receipt of new linen.

- Marking of Manufacture’s name, month and year of manufacturing, batch no. /lot no. and monogram of Indian Railways on every bed sheet.
- Tags provided on each pillow covers and hand towels indicating name of manufacturer, month and year of manufacturing.
- Bed sheets, pillow covers and towels supplied in bundles having marking of batch number/lot number, name of manufacturer.
- Check for quality in each lot for dimensional check, colour, feel and workmanship etc.

Stock verification is carried out in the stores depot quarterly. 5% of the new supplies received from the store depot are inspected by senior supervisor of the Mechanical department.

Test checks are conducted on the washed linen generally in conformance with the following:

Table No. 1

Sr. No.	Item	Level of Inspection	% random sample check	Periodicity	Action to be taken
1	Inspection at washing plant before dispatch of material	Assistant Scale Officer / Senior Supervisor	2%	Once in every quarter	In case of samples not meeting the quality norms, double the sample size should be inspected. If the samples fails again, then the entire lot should be rejected along with imposition of penalty
2	Inspection while receiving the washed linen in the depot	JA grade/Branch Officer	2%	Once in every quarter	
		Assistant Scale Officer / Senior Scale Officer	2%	Once in every month	
		Supervisor In charge of linen/Section Engineer	2%	Every consignment received after washing and cleaning	

Cleaning and Supply of Linen:

The mechanized laundry plant set in the Railway land at its own cost; it also provides water supply and electricity for the operation to the contractor/company who got the approval for washing of linen. However, the company will not be allowed to use the unit for any purpose other than washing and cleaning railways’ linen. The company will be in charge of collection, transportation of used linen to the unit, cleaning and loading the packed linen to AC coaches. Laundry collected from the trains from the Railway station to be cleaned regularly by the company. The laundry system will consist of a washing system

with features including pressing using hydraulic press and a drying system. A mechanical conveyor system will be used to transfer linen from one stage to another. This will be done with optimal usage of water, power, steam and chemicals. After the procedures are completed, the linen will be packed neatly in environmental-friendly bags and supplied on the trains.

Linking of Payments with Test Checks and Inspection:

Monthly report of summary of all inspections/test checks carried out by the officers and supervisors, or during surprise inspection and penalties imposed in case of any discrepancies noticed should be prepared and all payments to be released only after the recovery of all penalties/ dues.

Inventory of Bed Rolls:

Proper assessments of daily requirements are made and fresh procurement made. Provisions of enough buffer stock for all the linen items to cater requirements of at least 2 to 3 days made so that train services are not affected in case of delay/short supply and care is also taken for provision of linen to the special trains and during augmentation of train lengths of regular trains at short notice.

Life of Linen Kits:

The service life of the linen kit as prescribed by the Railway board is as given below

Table No. 2 Service Life of Linens

Sr. No	Items	Existing Life	Revised Life
1	Bed Sheet	24 months	a) 12 month for Khadi supplied by M/S ACASH b) 24 months for Polyvastra supplied by KVIC or mill made variety
2	Pillow cover & face towel	12 months	9 months
3	Pillow	36 months	24 months
4	Blanket	60 months	48 months

Condemnation of Linen:

The condemnation of linen are carried out based on prescribed life as given in the table no.2 or on a condition basis. The condemnation on condition basis is done by the condemnation committee nominated by the DRM. The recommendation of the committee is accepted by DRM/ADRM.

Objective of Study:

1. To study the condition of the linen supplied on board
2. To obtain feedback from the passengers
3. What measures are required to be adopted for increasing passenger’s satisfaction

Literature Review:

Kandhavadi (2011) in his research paper “Design and development of hospital textiles using lyocell fiber and its blend”, stated that among the vast categories of medical textile products, hospital textiles such as bed linen, uniforms and mattresses are expected to be fulfill hygienic and comfort properties such as breathability, moisture management property, thermal conductivity, wet ability, wick ability and antimicrobial activity”

Methodology:

This study identified the condition of the linen supplied to the AC class passengers having reserved accommodation in a train. The Study conducted on Raipur Division, which is under the jurisdiction of South East Central Railway. In Raipur division from Durg Stations 12 numbers of trains originates, out of which 10 numbers of trains are having AC coaches in which the linen are supplied by the Durg primary base depot. The base depot of Durg is also having the mechanized laundry located in its periphery. The study is based on the empirical research. Determinants are identified as the condition of the linen given to the passengers such as face towels, white sheets, pillow, pillow cover and blanket. The current study utilizes a non-probability technique that is convenience sampling. Convenience sampling is a sampling technique that obtains and collects the relevant information from the sample or the unit of study that are conveniently available (Zikmund, 1997). Convenience sampling is normally used for collecting a large number of completed surveys speedily and with economy (Lym et al. 2010). The condition of the linen is considered to be the most important factor by the passengers. The factor determines the passenger satisfaction; it also reflects the image of the Indian Railway as well. The study provides a direction to the Railway as a whole in the field of linen supply and passengers' satisfaction. The present study conducted on Durg base depot of Raipur division in SEC Railway. The study covers a sample of 100 respondents, and the survey was conducted in all the 10 originating trains having primary maintenance from Durg depot, in which the bed rolls are supplied after the linen are cleaned, washed and ironed by the contractor of the mechanized laundry set up by the Railway at its own cost on its own land from June to July 2015. Sampling was done by interviewing randomly selected passengers in different trains. The questionnaire was directed towards the satisfaction of the passengers that get from the service of the linen. The questionnaire were phrased in the form of statement on a convenience scale, rating 1-5 scale in the form of magnitude estimation, as they approximate the properties of the interval data. Here this scale is used as statistical tools and found to be appropriate for interval data and to analyze these data with the underlying assumption that values given on such a rating scales are considered to have equal intervals. Where 1 indicates poor rating, 2 indicates average, 3 indicate good, 4 indicate very good and 5 indicate outstanding.

Limitations of Study:

The study may suffer from the following limitations:

- i. Study is based upon data collected from the originating trains of Raipur division and may not be generalized for the whole Indian Railways.
- ii. Correctness of the survey is subjected to the correctness of the respondents.
- iii. Study is based on sample survey therefore it has some inherent shortcomings of a sample study.
- iv. Passengers may have some personal reasons for not responding to some of the questions.

Data Analysis:

In the present study, the passenger satisfaction regarding the condition of the linen supplied to the AC class passengers having reserved accommodation in a train was studied. Survey conducted on 100 numbers of passengers from 12 numbers of trains originating from the Raipur division of South East Central Railway. Data analysis in the present study is based on testing of hypothesis, finding the relationship between the variables and analysis of variables on the basis of mean and percentage scores.

Hypothesis to Be Tested:

1. H1_O The Quality of pillow supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H1_A The Quality of pillow supplied by the Indian Railways on board meet the passenger’s satisfaction.

2. H2_O The Quality of pillow cover supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H2_A The Quality of pillow cover supplied by the Indian Railways on board meet the passenger’s satisfaction.

3. H3_O The Quality of Blanket supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H3_A The Quality of Blanket supplied by the Indian Railways on board meet the passenger’s satisfaction.

4. H4_O The Quality of Bed sheet supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H4_A The Quality of Bed sheet supplied by the Indian Railways on board meet the passenger’s satisfaction.

5. H5_O The Quality of Face Towel supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H5_A The Quality of Face Towel supplied by the Indian Railways on board meet the passenger’s satisfaction.

6. H6_O The Quality of Bath Towel supplied by the Indian Railway on board does not meet the passenger’s satisfaction.

H6_A The Quality of Bath Towel supplied by the Indian Railways on board meet the passenger’s satisfaction.

Frequency Table:

Table No. 3 Gender of Passenger					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	73	73.0	73.0	73.0
	Female	27	27.0	27.0	100.0
	Total	100	100.0	100.0	

Table number 3 shows that out of the 100 passengers surveyed 73% were male and 27% were female.

Table No. 4 Quality of Pillow Supplied					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	4	4.0	4.0	4.0
	Very Good	47	47.0	47.0	51.0
	Excellent	49	49.0	49.0	100.0
	Total	100	100.0	100.0	

Table number 4 shows that out of 100 passengers surveyed, the passengers satisfaction on the quality of pillow supplied was found to be Good by 4%, 47% found it to be Very Good, and 49% found it to be Excellent.

Table No.5 Quality of Pillow Cover Supplied					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	1	1.0	1.0	1.0
	Good	9	9.0	9.0	10.0
	Very Good	49	49.0	49.0	59.0
	Excellent	41	41.0	41.0	100.0
	Total	100	100.0	100.0	

Table number 5 shows that out of 100 passengers surveyed, the passengers satisfaction on the quality of pillow cover supplied was found to be Average by 1%, Good by 9%, 49% found it to be Very Good, and 41% found it to be Excellent.

Table No. 6

Table No. 6 Quality Of Blanket Supplied					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	6	6.0	6.0	6.0
	Very Good	53	53.0	53.0	59.0
	Excellent	41	41.0	41.0	100.0
	Total	100	100.0	100.0	

Table number 6 shows that out of 100 passengers surveyed, the passengers satisfaction on the quality of Blanket supplied was found to be Average by 1%, Good by 9%, 49% found it to be Very Good, and 41% found it to be Excellent.

Table No. 7 Quality of Bed sheet Supplied

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	2	2.0	2.0	2.0
	Good	3	3.0	3.0	5.0
	Very Good	39	39.0	39.0	44.0
	Excellent	56	56.0	56.0	100.0
	Total	100	100.0	100.0	

Table number 7 shows that out of 100 passengers surveyed, the passengers satisfaction on the quality of Bed sheet supplied was found to be Average by 2%, Good by 3%, 39% found it to be Very Good, and 56% found it to be Excellent.

Table No. 8 Quality of Face Towel supplied

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	5	5.0	5.0	5.0
	Very Good	45	45.0	45.0	50.0
	Excellent	50	50.0	50.0	100.0
	Total	100	100.0	100.0	

Table number 8 shows that out of 100 passengers surveyed, the passengers satisfaction on the quality of Face Towel supplied was found to be Good by 5%, 45% found it to be Very Good, and 50% found it to be Excellent.

Table No. 9 Quality of Bath Towel Supplied

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Good	5	5.0	35.7	35.7
	Excellent	9	9.0	64.3	100.0
	Total	14	14.0	100.0	
Missing	System	86	86.0		
Total		100	100.0		

Table number 9 shows that out of 14 passengers surveyed in the AC 1st Class, the passengers satisfaction on the quality of Face Towel supplied was found to be 35.7% found it to be Very Good, and 64.3% found it to be Excellent.

Reliability Testing:

Cronbach's alpha is a common measure of internal consistency (a measure of reliability). It is used to determine how much the items on a scale are measuring the same underlying dimension. It is most commonly used when multiple Likert questions in a survey/questionnaire that form a scale or subscale, and to determine if the scale is reliable.

Table No. 10 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.770	.761	6

Higher values of Cronbach's alpha are better. What constitutes a good level of internal consistency differs depending on what source you refer to, although all recommended values are 0.7 or higher (De Villis, 2003; Kline, 2005).

Result: A Questionnaire was employed to measure different, underlying constructs, one construct, and Passengers satisfaction, consisted of six questions. The scale had a high level of internal consistency, as determined by Cronbach’s alpha of 0.770.

Validity Testing:

The test of validity of data was examined with the help of a Kaiser-Meyer-Ohlin (KMO) measure of sample adequacy and Barlett’s test of sphericity. These two tests satisfied the validity of data for factor analysis.

Table No. 11 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.599
Bartlett's Test of Sphericity	Approx. Chi-Square	31.604
	df	15
	Sig.	.007

The KMO measure is 0.599 which is acceptable.

The Barlett’s test of sphericity is statically significant as can be seen in the table no 11 above (i.e. $p < .05$)

One sample t- test was conducted to test the estimate mean of a population and compare it to a reference value set as standard from the passenger’s satisfaction level. By using this test we can determine whether the mean of a group differs from a specified value and will be able to calculate value that is likely to include to the population mean.

Table No. 12 One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Quality of pillow supplied	100	4.45	.575	.058
Quality of pillow cover supplied	100	4.30	.674	.067
Quality of blanket supplied	100	4.35	.592	.059
Quality of bed sheet supplied	100	4.49	.659	.066
Quality of Face Towel supplied	100	4.45	.592	.059
Quality of bath Towel supplied	14	4.64	.497	.133

Table No. 13 One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Quality of pillow supplied	25.210	99	.000	1.450	1.34	1.56
Quality of pillow cover supplied	19.282	99	.000	1.300	1.17	1.43
Quality of blanket supplied	22.786	99	.000	1.350	1.23	1.47
Quality of bed sheet supplied	22.611	99	.000	1.490	1.36	1.62
Quality of Face Towel supplied	24.474	99	.000	1.450	1.33	1.57
Quality of bath Towel supplied	12.362	13	.000	1.643	1.36	1.93

A one-sample t-test was run to determine whether the passengers travelling by Air Conditioned class are satisfied with the linen supplied on board, the standard for the satisfaction value for passengers was considered to be 3. The scores were found to be normally distributed, as assessed by skewness and kurtosis, Q-Q plots, and there were no outliers in the data, as assessed by the inspection of the box plots.

1. Mean satisfaction score of the quality of pillow supplied. (4.45± 0.575) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.45 (95% CI, 1.34 to 1.56), t (99) = 25.210, p=.0005.

There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H1_A The Quality of pillow supplied by the Indian Railways on board meet the passenger's satisfaction.

2. Mean satisfaction score of the quality of pillow cover supplied. ($4.30 \pm .674$) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.30 (95% CI, 1.17 to 1.43), $t(99) = 19.282$, $p = .0005$. There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H2_A The Quality of pillow supplied by the Indian Railways on board meet the passenger's satisfaction.

3. Mean satisfaction score of the quality of blanket supplied. ($4.35 \pm .592$) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.35 (95% CI, 1.23 to 1.47), $t(99) = 22.786$, $p = .0005$. There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H3_A The Quality of Blanket supplied by the Indian Railways on board meet the passenger's satisfaction.

4. Mean satisfaction score of the quality of bed sheet supplied. ($4.49 \pm .659$) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.49 (95% CI, 1.36 to 1.62), $t(99) = 22.611$, $p = .0005$. There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H4_A The Quality of Bed sheet supplied by the Indian Railways on board meet the passenger's satisfaction.

5. Mean satisfaction score of the quality of face towel supplied. ($4.45 \pm .592$) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.45 (95% CI, 1.33 to 1.57), $t(99) = 24.474$, $p = .0005$. There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H5_A The Quality of Bed sheet supplied by the Indian Railways on board meet the passenger's satisfaction.

6. Mean satisfaction score of the quality of Bath towel supplied in AC 1st. ($4.64 \pm .497$) was higher than the normal satisfaction score of 3.0, a statistically significant difference of 1.64 (95% CI, 1.36 to 1.93), $t(99) = 12.362$, $p = .0005$. There was significant difference between means ($p < .0005$) and therefore we can reject the null hypothesis and accept the alternate hypothesis.

H6_A The Quality of Bed sheet supplied by the Indian Railways on board meet the passenger's satisfaction.

Conclusions:

The study conducted on the supply of the linen to the passengers found to meet the satisfaction level of the passengers. Hence we can say that the quality of washing of the mechanized laundry of Durg station of Raipur Division and other things like packing, stacking, preserving and quality inspection of the linen are commendable.

SUGGESTIONS:

The Mechanized laundry should also be installed and used by the other Railways also so as to increase the comfort level of the passengers.

ABBREVIATIONS:

ADRM- Additional Divisional Railway Manager

DRM- Divisional Railway Manager

KVIC- The Khadi and Village Industries Commission

Polyvastra- Polyester cotton blended khadi

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