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INDIAN RAILWAYS ENGINEERS' INFORMATION SEEKING BEHAVIOR: IMPLEMENTATION OF LECKIE ET AL'S MODEL AND STUDY OF THEIR AWARENESS OF INFORMATION

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Abstract

The purpose of this paper is to implement the Leckie, Pettigrew & Sylvain model of information seeking behavior on Indian railways field civil engineers and to study their awareness about the requisite information (Leckie et al,1996). The six variables of awareness considered in the study are trustworthiness of information, convenient source of information, timeliness of information, accuracy & detailed information, accessibility of information with ease and cost of information. The study aims to establish these variables in systematic order, which Leckie et al considered in random order. The Indian railways engineers information seeking behavior is correlated with the generalized model developed by Leckie, Pettigrew & Sylvain. Study is conducted on one of the aspect of the model i.e. awareness of information. For this, survey method is applied to carry out the study by Questionnaire is prepared for data collection. The data on scores is presented as Mean and Standard deviation (SD). The inter-group statistical comparison of distribution of means of scores is tested using analysis of variance (ANOVA). The underlying normality assumption was tested before subjecting study variables to ANOVA. It is found that the Leckie et al's model of information seeking behavior can be applied to the Indian railways engineers. Further research establishes the order of awareness of engineers as 1) Trustworthiness of information 2) Accuracy and detailed information 3) The information is giving them information timely 4) Accessibility of information with ease 5) Convenient source of information and 6) Cost of information. The paper implements the generalized model developed by Leckie et al's to study the information seeking behavior of Indian railways engineers. The paper also establishes the order of variables of awareness of Indian railways engineers' information. This has not been explored previously.

Keywords– Indian railway engineers, Information seeking behavior, Awareness of information, Trustworthiness, Timeliness, Accuracy & detail, Accessibility and Cost of information.

1. INTRODUCTION

Indian Railways (IR) are the largest government railway in the world. Unlike the railway systems the world-over that have been corporatized, Indian railways is strictly managed by the government directly through a separate ministry, and constitutes the world's largest government owned railway network. Annually carrying passengers exceeding the global population, the railway services in India remain stretched and popularly perceived as highly over staffed, although there is a dearth of any scientific literature on the subject. The Indian railways is a departmental commercial undertaking of the government of India, functions as a vertically integrated organisation providing passenger and freight service (Outcome and performance budget of railways for 2016-17, 2016). The Indian national carrier runs nearly 21,000 trains of which about 13,000 are the passenger trains, hauling about 23 million passengers daily, while the remaining 8,000 trains carry freight, nearly 3 million tons on a daily basis. IR is low cost, passenger friendly mode of public transport that runs the length and width of India with 8,500 stations. In India, each km of track serves 19,133 persons when measured by Country's population (Government of India, 2015).

Indian Railways Field Civil Engineers: The Indian railway employees are working round the clock to operate the trains safely, efficiently and punctually. Civil engineers are the major

contributors for the operation of the trains safely. The engineers of civil engineering department are directly responsible for safety of railway assets and operation of passengers and freight traffic throughout the width and breadth of the entire mainland India. Engineering has been called an applied science that has as its goal in the creation or improvement of products or technologies with immediate practical application (Tenopir & King, 2004). The Indian railway engineers are performing their duties as per laid down provisions of various codes, manuals and instructions received from railway board and other authorities. They continuously need themselves updated about the changes and additions taken place in various provisions in codes and manuals. All this information is being provided by railway administrations to them in various forms. They also need to be aware about various factors affecting their area of jurisdiction such as temperature, weather, unusual occurrences, etc. The present study is focused on the information seeking behaviour of Indian railways civil engineers, the Junior Engineer (JE)/ P. Way, Senior Section Engineer (SSE) / P. Way, JE/Works, SSE/Works, JE/Bridge and SSE/Bridge in permanent way (P. Way), works and bridge departments respectively. Railway Recruitment Boards, formerly Railway Service Commissions, are in charge of the procedure of making appointments to fill up JE positions on Indian railways as per para 109 of Indian Railways Establishment Manual (Government of India, 1989). Minimum qualification of JE is either diploma in

civil engineering or Bachelor degree in civil engineering or a combination of any stream of basic streams of civil engineering from a recognised University/ Institute. JEs are further promoted to the post of SSEs (Government of India, 2018).

2. INFORMATION SEEKING BEHAVIOR OF ENGINEERS

Purposive information seeking as a result of a need to achieve a goal is defined as information seeking behaviour (Wilson, 2000). The purpose of engineers to seek the information is the need arising out of their role in the organisation. According to Wilson, in information exchange, an individual may be looking for facts, advice or opinions, and may receive any of these either in writing or orally (Wilson, 1981). The information is being used to satisfy the goals. The engineers use various sources to seek the information. Engineers' various work roles can result in a variety of information requirements. Leckie, et.al, developed an original model of the information seeking of professionals including engineers (Leckie et al ,1996).

2.1. Information Seeking Behaviour Of Indian Railway Engineers: To perform their respective roles in such a large organization, the SSEs and JEs are constantly in need of information. The present study tried to apply generalized information seeking behavior model designed by Leckie et.al. to the SSEs and JEs of civil engineering department of IR.

2.1.1 Information seeking of SSES and JES deployed in permanent way (p. Way) department of Civil Engineering: Chapter 1 of Indian Railways Permanent Way Manual, describes roles and tasks to be performed by SSEs and JEs as duties of permanent way officials (Government of India, 2020). The roles are specified as SSE/P.Way in overall charge, SSE/ JE sectional and SSE/ JE other than sectional or in-charge. The tasks are listed in depth in the document. The SSE/ JE has to

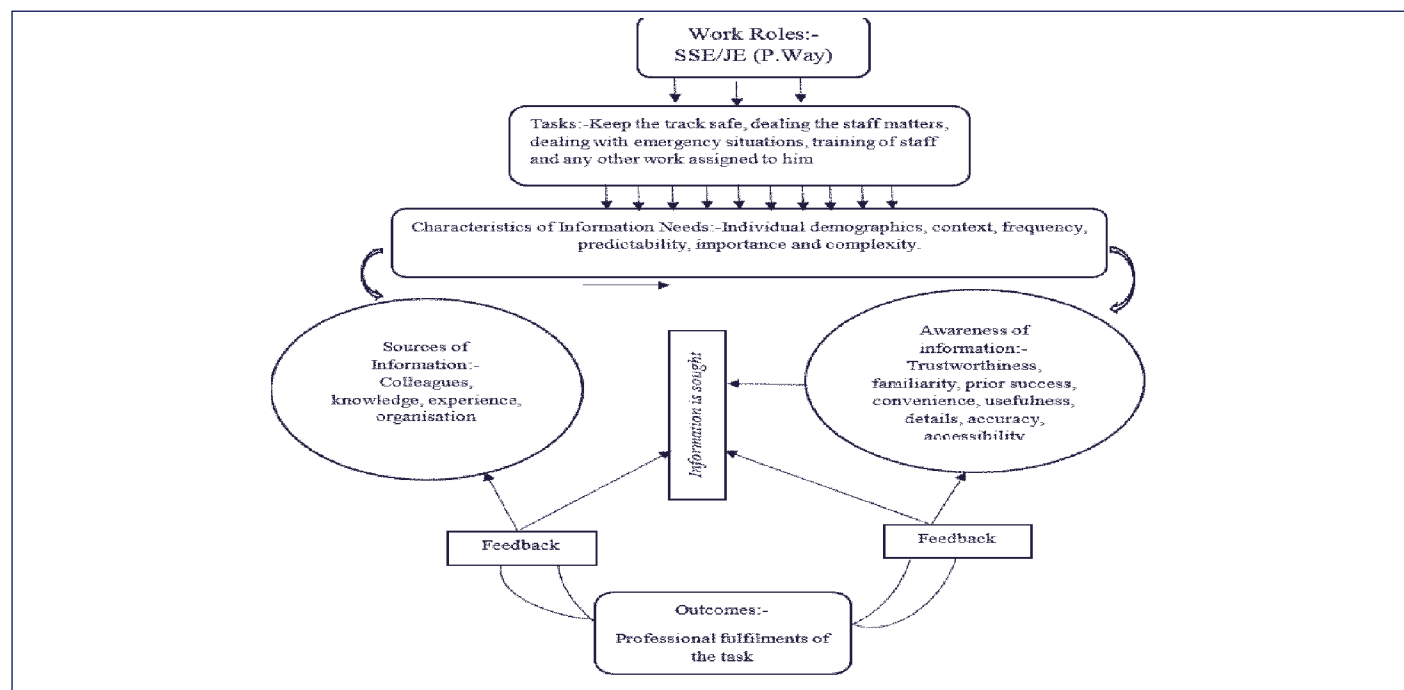
perform these tasks as per procedures/ rules provided in the codes & manuals and instructions issued from time to time. These procedures keep changing vide the issue of correction slips from time to time. The extract of the tasks to be performed by the SSE/P.Way and JE/P.Way are to keep the track safe, to deal with the staff matters, to deal with the emergency situations, training of staff and any other works assigned to them from higher authorities. The tabular representation of role and tasks are given in table 2.1.1.

Table 2.1.1:-Roles and tasks of SSE / P.Way, JE / P.Way and JE/SSE Other than in overall charge & sectional

Sub Department	Document	Date and year of publication	Role	Tasks (Extract)
P. Way	Indian Railways Permanent Way Manual	June, 2020	SSE In overall charge	1.Keep the track safe 2.Dealing the staff matters 3.Dealing with emergency situations 4.Training of staff
			JE/SSE sectional	1.Keep the track safe 2.Dealing with emergency situations 3.Training of staff
			JE/SSE Other than in overall charge & sectional	1.Keep the track safe 2.Any other work assigned to him

Information seeking model of P.Way engineers based on Leckie et al's model: Leckie, Pettigrew & Sylvain developed generalized model for the professionals including engineers comprising of work roles, tasks, characteristics of information needs, awareness of information, sources of information and outcomes (Leckie et al's ,1996). These various components of information seeking behaviour model for P.Way engineers of Indian railways are inducted in the model drawn in figure 2.1.1.1.

Fig 2.1.1.1. Information seeking model of P. Way engineers based on Leckie et al's model



2.1.2 Information seeking of SSEs / JEs deployed in works department of Civil Engineering: Indian Railways Works Manual chapter 1-B, describes roles and tasks to be performed by SSE and JE as duties of Section Engineer, works (Government of India, 2000). Designation of Inspector of Works were classified as SSE & JE works as per recommendations of seventh pay commission. The tasks are listed in depth in the document. The SSE/JE has to perform these tasks as per procedures provided

in the document at various places, rules provided in other documents and instructions issued time to time. The extract of the tasks to be performed by the SSE and JE are to upkeep of railway buildings, roads, water supply, sewerage, construction of new buildings /structures, maintenance of land boundaries & removal of encroachments, dealing the staff matters and training of staff. The tabular representation of role and tasks are given in table number 2.1.2.

Table 2.1.2:-Roles and tasks of SSE / Works and JE/Works

Sub Department	Document	Date and year of publication	Role	Tasks (Extract)
Works	Indian Railways Works Manual	February, 2000, (updated on 17 th February 2005)	SSE/JE	1. Upkeep of railway buildings, roads, water supply, sewerage 2. Construction of new buildings /structures 3. Maintenance of land boundaries & removal of encroachments 4. Dealing the staff matters 5. Training of staff

Information seeking model of Works engineers based on Leckie et al's model: The information seeking model will remain same as per figure 2.1.1.1 above except roles and associated tasks.

Information seeking of SSEs and JEs deployed in Bridge department of civil engineering: Chapter 1-C of Indian Railways Bridge Manual, describes roles and tasks to be performed by SSE and JE as duties of bridge inspector (Government of India, 1998). Designation Bridge Inspector

was designated as SSE & JE / Bridge as per recommendations of seventh pay commission. The tasks are listed in depth in the document. The SSE/JE has to perform these tasks as per procedures provided in the document at various places, rules provide in other documents and instructions issued time to time. The extract of the tasks to be performed by the SSE and JE are Upkeep of bridges, dealing with emergency situation, dealing the staff matters. The tabular representation of role and tasks are given in table number 2.1.3.

Table 2.1.3:-Roles and tasks of SSE / Bridge and JE / Bridge

Sub Department	Document	Date and year of publication	Role	Tasks (Extract)
Bridges	Indian Railways Bridge Manual	September 1998 (updated on 14 th January 2020)	SSE/JE	1. Upkeep of bridges 2. Dealing with emergency situation 3. Dealing the staff matters

2.1.3.1 Information seeking model of Bridge engineers based on Leckie et al's model: The information seeking model will remain same as per figure number 2.1.1.1 above except roles and associated tasks.

3. AWARENESS OF INFORMATION

The generalized model shown in figure 2.1.1.1 above, comprising of work roles, tasks, characteristics of information needs, awareness of information, sources of information and outcomes. This paper considered only the awareness of information of Indian railway field civil engineers as Leckie et al. described individual's knowledge and awareness of information sources plays crucial role in information seeking process (Leckie et al's, 1996).In their study ,they have placed them in random order. The present paper attempted to find order of following variables which describes the awareness of information of Indian railways field civil engineers:-

1. Trustworthiness of information
2. Convenient source of information
3. Information is giving information timely
4. Accuracy and detailed information

5. Accessibility with ease and
6. Cost of information.

4. METHODOLOGY

One of the authors is posted as Assistant Professor/Track-1 in Indian Railways Institute of Civil Engineering, Pune (IRICEN). This is the only centralised training institute of Indian railways providing training of railway civil engineering. The field engineers are regularly attending training at IRICEN, Pune. The information seeking behaviour of field civil engineers of Indian railways is inducted in the generalised model developed by Leckie et al., then their awareness of information variables studied. The present study is descriptive research by its purpose. The researcher does not have any control over variables, nor does he manipulate any variables (Kumbhar, R., 2014). Research is carried out by applying survey method. Questionnaire is prepared for data collection .Sample size is selected using Krejcie and Morgan table (Kumbhar, R., 2014). Samples are selected amongst the Indian railway field civil engineers who attended training at Indian Railways Institute of Civil Engineering (IRICEN), Pune in year 2020, using

stratified random sampling. Many engineers attended more than one course. After eliminating multiple entries the number of field civil engineers took training at IRICEN comes to be 1666 numbers. After dividing the engineers into six strata's

and applying stratified random sampling techniques 840 samples selected as per following table 4. Thus, the study has representative samples.

Table 4:- Selection of samples by applying systematic sampling technique.

	Sample size as per Krejcie and Morgan table				
	Population	Sample	Responses received	Invalid responses	Final data
SSE/P.Way	725	256	230	19	211
JE/P.Way	213	136	118	12	106
SSE/Works	377	181	164	8	156
JE/Works	169	118	71	8	63
SSE/Bridges	108	86	54	2	52
JE/Bridges	74	63	37	5	32
Total	1666	840	674	54	620

Questionnaire has been sent to all selected 840 engineers, 620 valid responses are analysed for this paper.

describes the awareness of information of Indian railways field civil engineers, following data is considered for study as Indian railway field civil engineers as one group:-

5. ANALYSIS OF DATA

As this paper aimed to find out the order of variable, which

Table 5- Responses received from the field engineers (Numbers)

Question: - Please describe your awareness of Information.							
Likert Scale Response Anchors	Very Important	Fairly Important	Important	Slightly Important	Less Important	Not Important	Total Resp.
Number of Responses	Assigned weight:- 6	Assigned weight:- 5	Assigned weight:- 4	Assigned weight:- 3	Assigned weight:- 2	Assigned weight:- 1	
Trustworthiness of information	452	70	86	7	1	4	n=620
Convenient source of information	298	148	140	20	2	12	n=620
Timely information	380	124	101	11	0	4	n=620
Accuracy and detailed information	429	104	75	3	4	5	n=620
Accessibility with ease	337	143	118	10	3	9	n=620
Cost of information	194	135	138	66	37	50	n=620

5.1 Statistical Data Analysis: The data on the responses on ranking was weighted averaged to obtain the scores for each aspect of information needs. The following weighing scheme was adopted in the formation of scores: Very important (score 6), Fairly important (score 5), Important (score 4), Slightly important (score 3), Less important (score 2) and Not important (score 1). The data on scores is presented as Mean and Standard deviation (SD). The inter-group statistical comparison of distribution of means of scores is tested using

analysis of variance (ANOVA). The underlying normality assumption was tested before subjecting study variables to ANOVA. All results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly.

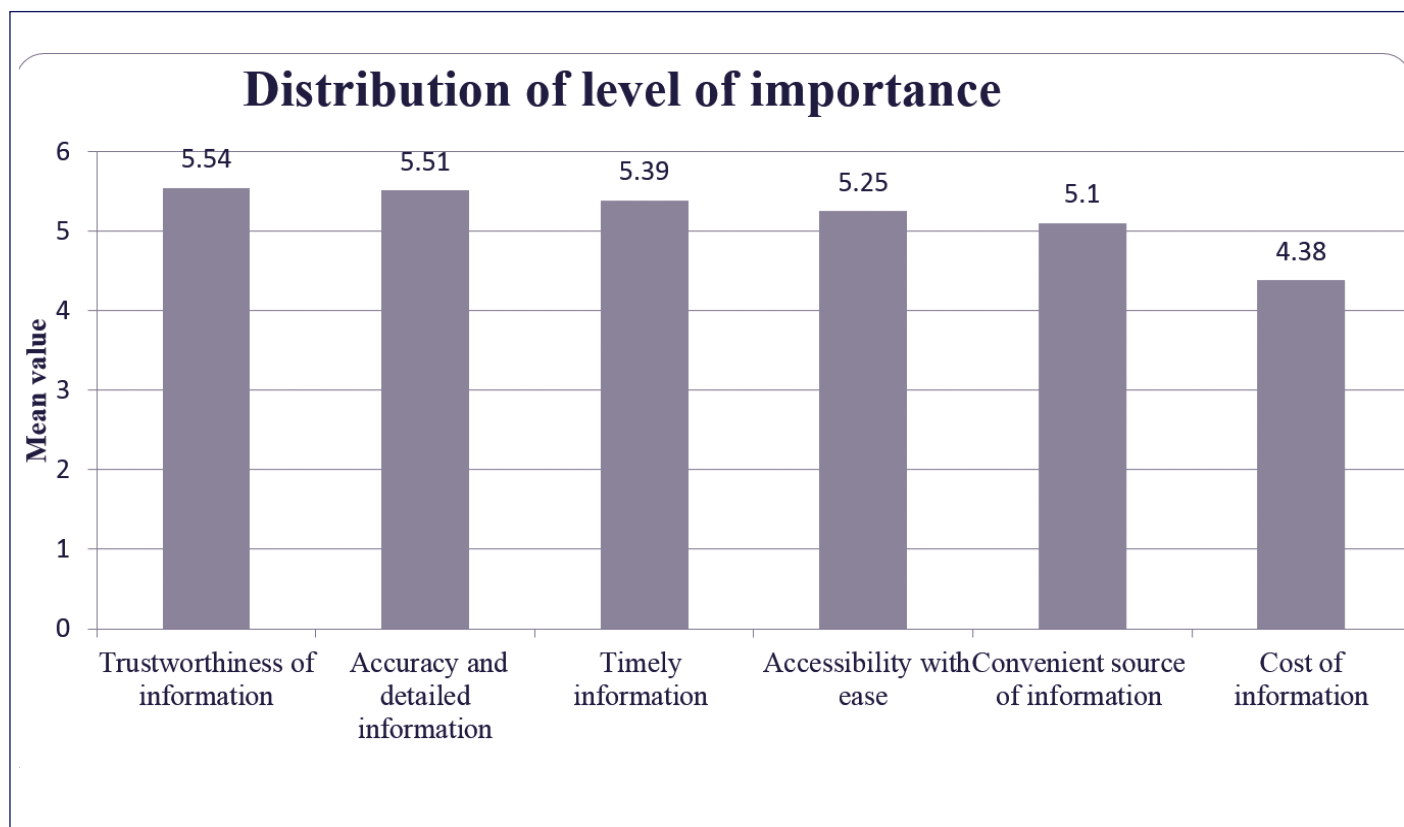
In the entire study, the p-values less than 0.05 are considered to be statistically significant. The entire data is statistically analyzed using Statistical Package for Social Sciences (SPSS ver. 22.0, IBM Corporation, USA) for MS Windows.

Table 5.1:- Distribution of level of importance in terms of mean ranks of several aspects of information awareness.

	Questionnaire (n=620)	
Aspect	Mean	SD
Trustworthiness of information	5.54	0.86
Accuracy and detailed information	5.51	0.87
Timely information	5.39	0.89
Accessibility with ease	5.25	1.00
Convenient source of information	5.10	1.08
Cost of information	4.38	1.55
P-value	0.001***	
Higher mean score indicates higher importance and vice-versa. P-value by ANOVA. P-value<0.05 is considered to be statistically significant. ***P-value<0.001.		

Distribution of mean rank differs significantly for various aspects of information needs (P-value=0.001). The mean rank is significantly higher for trustworthiness of information

followed by accuracy and detailed information, timely information, accessibility with ease, convenient source of information and cost of information (P-value=0.001).

Figure 5.1:- Distribution of level of importance in terms of mean ranks of several

5.2 Outcome of analysis: The distribution of mean rank differs significantly for various aspects of information needs by questionnaire method (P-value=0.001). The mean rank is significantly higher for trustworthiness of information followed by accuracy & detailed information, timely information,

accessibility with ease, convenient source of information and cost of information (P-value=0.001).

As per the outcome the study the variables which describes the awareness of information of Indian railways field civil engineers are placed in the following order in table 5.2.

Table 5.2:- order of variables which describes the awareness of information of Indian railways field civil engineers

Rank	Variable
One	Trustworthiness of information
Two	Accuracy and detailed information
Three	Timely information
Four	Accessibility with ease
Five	Convenient source of information
Six	Cost of information

6. CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

The JE and SSE are performing various tasks allotted to them. If their information needs are fulfilled they can accomplish the tasks seamlessly. If they need further information they seek information from various sources. One single trustworthy source of information which provides accurate & detailed information in time, which will be easily accessible & convenient is strongly needed by the JEs and SSEs. This source can develop various task based modules implementing the above model described in figure number 2.1.1.1. From the above analysis of data, the Indian railways field civil engineers have clearly established their awareness of information as the P value calculated using ANOVA test comes out to be 0.001, which is much lesser than 0.05 and statistically significant. This indicated that they significantly prioritize the trustworthiness of information. Previous research conducted by Marshall, West & Aitken establishes trust as one of the key features of source of information (Marshall, West & Aitken, 2008). Trustworthiness of information, accuracy and detailed information, the information is giving them information timely, accessibility of information with ease, convenient source of information and cost of information is the order of awareness of information established from the study. Further research is needed on other aspects of their information needs and information seeking behavior. Suitable modules can be developed to provide the information to the field engineers on Indian railways by trustworthy institute.

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