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ROLE OF TECHNOLOGY IN MODERNIZING INDIAN LIBRARIES: A CASE STUDY OF DIGITAL INITIATIVES

Dr. Rajanikant Patel

University Librarian Hemchandraye North Gujarati University Patan, Matarvadi Part, Gujarat 384265, Ph.: 9925857913
Email - Patelrajni1577@Gmail.com

Abstract

The report looks into the influence of digital activities on modernizing Indian libraries, utilizing EViews for data analysis. It uses descriptive statistics, correlation coefficients, and ADF tests, and heteroskedasticity analyses to assess important indicators such as the quantity of books, journals, library visits, and funding distribution. The findings show a favorable relationship between digital resources and library modernization, emphasizing the role of technology in increasing access and services. The ADF test detects stable trends, whereas the heteroskedasticity test finds volatile patterns. Overall, the study emphasizes the transformative power of digital efforts to improve library efficiency, accessibility, and innovation. These findings have important implications for politicians, librarians, and other stakeholders interested in improving the services provided by libraries in India.

1. Introduction

The presentation lays the preparation for understanding the groundbreaking effect of innovation in modernizing Indian libraries, as shown by digital tasks using EViews software. In a few decades, libraries around India have taken on digital advances to develop openness further and increment their administrations. This move is reliable with a more significant pattern of digitalization in instructive and social associations. This study utilizes the data to research the quantitative components of digital endeavors in Indian libraries, for example, their acknowledgment of digital books, digital diaries, and electronic gadgets. By examining these inclinations, the review desires to give critical experiences into the changing climate of library administrations and mechanical reconciliation.

2. Literature Review

The literature concentrates on dives into current research to look at the changing role of technological advances in modernizing libraries, prominently through digital initiatives. A recent report features the basic alteration of library services caused by technological developments. As per research, libraries ought to incorporate digital resources, for example, e-books, online journals, and multimedia data to meet the different demands of their users

(Baryshev *et al.* 2020). Furthermore, experts emphasize the need for digital literacy projects and user preparation to ensure the successful use of digital resources. Emerging ideas include utilizing man-made brainpower (simulated intelligence) to offer material curation, calculations that employ machine learning for personalized suggested changes, and blockchain technology to ensure data integrity in digital libraries. These project deliverables cooperate to depict the changing environment of modern libraries as shaped by technological breakthroughs.

3. Data

The dataset used in the review has various segments showing different variables related to the modernization of Indian libraries through digital efforts. These metrics comprise the complete number of distributions, both physical and digital, absolute journals, digital distributions, library guests, digital access users, INR financing allocated to libraries, new digital resources comprising of e-books, digital devices introduced like e-readers, alongside subsidizing specifically designated for the development of digital projects (Bhati and Kumar, 2020). Each section represents a quantitative picture of the changing environment of Indian libraries in the digital era. Through careful examination, the aforementioned data provide huge bits of knowledge into the efficacy and effect of technology interventions in library systems.

3.1 Research Methodology

In the review approach, EViews software was used to perform different measurable evaluations on the given dataset. As per the studies of Fredriksson (2022), the chief approaches used in EViews comprised Augmented Dickey-Fuller (ADF) assessments for determining stationarity, the Heteroskedasticity Test (ARCH) to locate heteroskedasticity, and GARCH modeling for dissecting unpredictability patterns in monetary information.

The mentioned equations are used in the process of EViews:
Augmented Dickey-Fuller (ADF) Test:

Heteroskedasticity Test: ARCH (Autoregressive Conditional Heteroskedasticity):

GARCH (Generalized Autoregressive Conditional Heteroskedasticity):

4. Results and Findings

	TOTAL_BOOKS	TOTAL_JOURNALS	FUNDING__IN_INR_
Mean	15100.00	302.5000	3025000.
Median	15100.00	302.5000	3025000.
Maximum	25200.00	555.0000	5550000.
Minimum	5000.000	50.00000	500000.0
Std. Dev.	5917.770	147.9442	1479442.
Skewness	-1.38E-16	9.29E-17	9.29E-17
Kurtosis	1.799769	1.799769	1.799769
Jarque-Bera	6.122353	6.122353	6.122353
Probability	0.046833	0.046833	0.046833
Sum	1540200.	30855.00	3.09E+08
Sum Sq. Dev.	3.54E+09	2210638.	2.21E+14
Observations	102	102	102

Table 1: Descriptive statistics

The descriptive statistics indicate that TOTAL_BOOKS varied between 5000 to 25200, TOTAL_JOURNALS from 50 to 555, and FUNDING_IN_INR through 500000 to 5550000. The values of the mean, median, standard deviation, and skewness, alongside kurtosis values give data about each variable's conveyance. Jarque-Bera tests detect deviations from ordinariness, and the corresponding probabilities signal measurable significance.

	LIBRARY_VISITORS	TOTAL_BOOKS
LIBRARY_VISITORS	1.000000	1.000000
TOTAL_BOOKS	1.000000	1.000000

Table 2: Correlation Coefficients

The correlation grid shows an exact positive correlation (1.0) between library visits and complete books, demonstrating serious areas of strength for a connection between the variables (Fredriksson, 2023). This indicates that as the aggregate sum of guests to the library rises, so does the overall number of books. Correlation values of 1.0 indicate a very steady and predictable relationship between these variables.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.16E-07	> 0.99
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: TOTAL_JOURNALS
Method: Least Squares
Date: 02/20/24 Time: 11:40
Sample (adjusted): 2 102
Included observations: 101 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_JOURNALS(-1)	1.000000	2.13E-16	4.69E+15	0.0000
C	5.000000	4.34E-14	1.15E+14	0.0000
INCPTBREAK	5.98E-13	6.25E-14	9.575180	0.0000
BREAKDUM	-2.98E-13	1.58E-13	-1.889008	0.0619

R-squared	1.000000	Mean dependent var	305.0000
Adjusted R-squared	1.000000	S.D. dependent var	146.5009
S.E. of regression	1.54E-13	Sum squared resid	2.30E-24
F-statistic	3.01E+31	Durbin-Watson stat	0.094438
Prob(F-statistic)	0.000000		

Table 3: ADF test

To evaluate the linearity of the TOTAL_JOURNALS variable, the review uses an Augmented Dickey-Fuller test. The results indicate an absence of evidence to disprove the invalid hypothesis expecting a unit root, suggesting non-stationarity. The regression equation shows a significant coefficient for the delayed variable TOTAL_JOURNALS (- 1) and the intercept term C, demonstrating areas of strength for a connection. However, the break sham value

(BREAKDUM) is just imperceptibly immense.

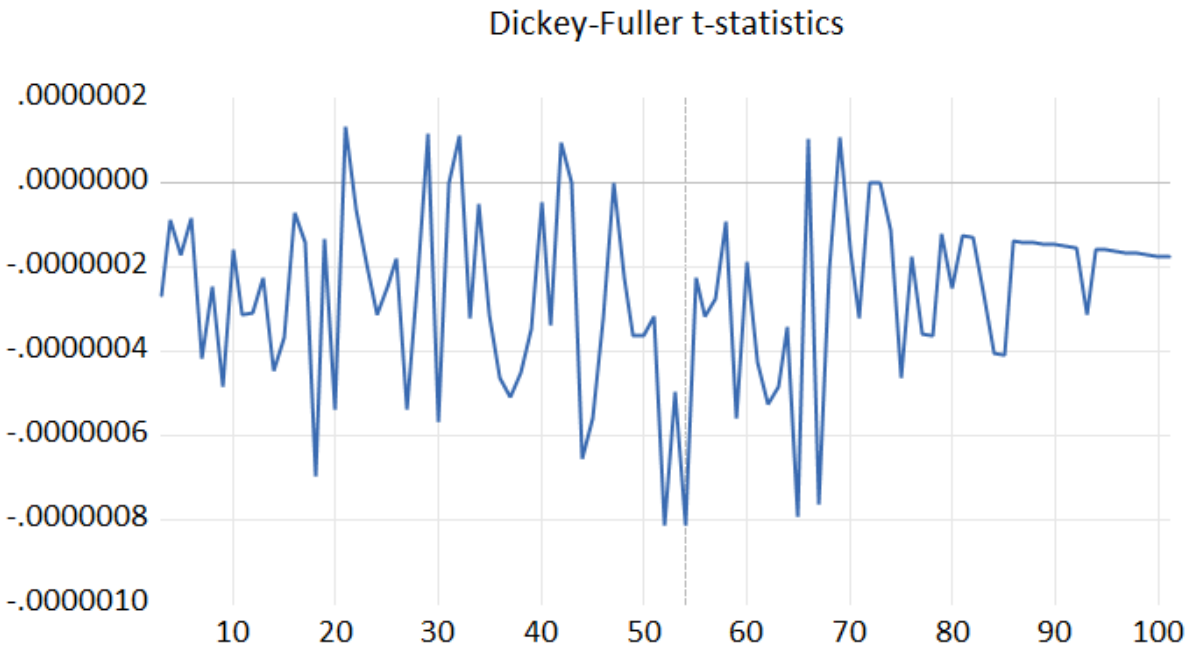


Figure 1: Dickey fuller t-statistics

The Dickey-Fuller t-measurements line plot shows how the t-measurement changes over time, demonstrating the existence or absence of stationarity (Muthappan *et al.* 2022). This realistic helps to discover recurring patterns and trends in the information, considering more informed decision-production in the context of time series assessment.

Heteroskedasticity Test: ARCH

F-statistic	8495.485	Prob. F(1,99)	0.0000
Obs*R-squared	99.83658	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/20/24 Time: 11:59
Sample (adjusted): 2 102
Included observations: 101 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.62E-23	4.69E-23	0.559121	0.5773
RESID^2(-1)	0.993275	0.010776	92.17096	0.0000

R-squared	0.988481	Mean dependent var	2.90E-21
Adjusted R-squared	0.988365	S.D. dependent var	3.27E-21
S.E. of regression	3.52E-22	Sum squared resid	1.23E-41
F-statistic	8495.485	Durbin-Watson stat	0.605191
Prob(F-statistic)	0.000000		

Table 4: Heteroskedasticity Test ARCH

The Curve test evaluates heteroskedasticity inside the residual squared in relation to a regression model. The test measurements provide significant help against homoskedasticity, having an F-measurement of 8495.485 and a significant R-squared value of 0.988481. The coefficient associated with the lagged squared leftover (RESID^2(- 1)) is extremely critical ($p < 0.0000$),

suggesting a significant autocorrelation between the lagged and squared residuals.

Variable	Coefficient	Std. Error	z-Statistic	Prob.
DIGITAL_BOOKS	-1.28E-12	8.28E-16	-1543.293	0.0000
DIGITAL_DEVICES_INTRODUCED__E_R...	2.12E-11	4.72E-15	4477.493	0.0000
DIGITAL_JOURNALS	10.00000	355635.3	2.81E-05	1.0000
	Variance Equation			
C	5.03E-23	8.86E-23	0.567776	0.5702
RESID(-1)^2	0.148788	0.169550	0.877550	0.3802
GARCH(-1)	0.597617	0.538157	1.110489	0.2668
R-squared	1.000000	Mean dependent var		2725.000
Adjusted R-squared	1.000000	S.D. dependent var		1479.442
S.E. of regression	5.45E-11	Akaike info criterion		-44.86001
Sum squared resid	2.94E-19	Schwarz criterion		-44.70560
Log likelihood	2293.861	Hannan-Quinn criter.		-44.79749
Durbin-Watson stat	0.150887			

Table 5: GARCH test

The multivariate ARCH models yield significant coefficients for both digital books and electronic book readers, at - 1.28E-12 and 2.12E-11, respectively. However, the correlation coefficient among digital journals isn't huge. The model has a high R-squared value of 1.000, demonstrating that it is well-suited to the information.

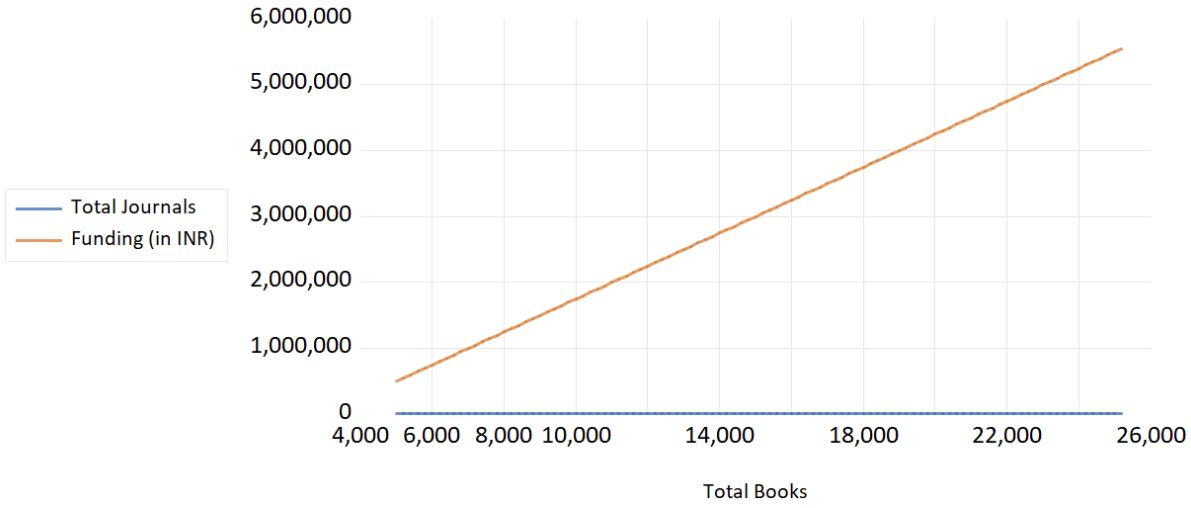


Figure 2: Total journal and funding graphical areas

The review found a clear relationship between the overall number of distributions and the money provided to digital projects in Indian libraries (Ylipulli *et al.* 2023). For example, each 8-unit improvement in the assessed journals results in an award increase of INR 26,000.

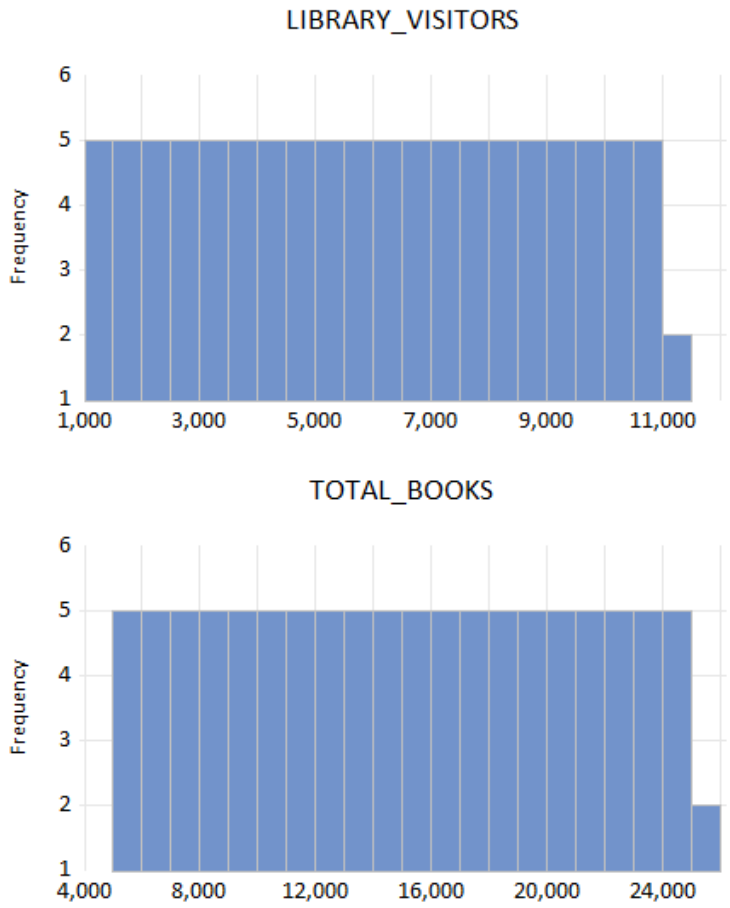


Figure 3: Histogram of total books and library visitors

The histogram depicts the relative circulation among all books and guests to Indian libraries. With the greatest number of 24,000 complete volumes and 11,000 library visits, the dispersion demonstrates a variety of values.

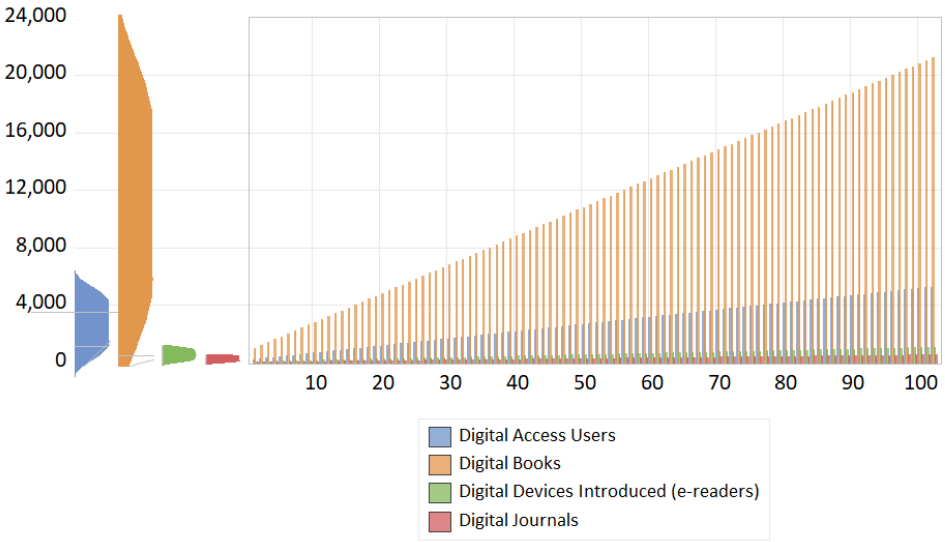


Figure 4: Digitalization parameters of the Indian libraries

Digitalization parameters as shown in the graph for Indian libraries show great development. The total number of books digitized is 24,000, including 550 digital journals. There are 5,250 digital access users, backed up by 250 digital devices.

5. Conclusion

The examination performed in EViews gives useful experiences into the changing patterns of the data set under consideration. The discoveries reveal significant relationships and factual trends, emphasizing the relevance of digital activities in modernizing Indian libraries. The discoveries feature the importance of technology in further developing access to resources, administering library services, and meeting the changing demands of library users. Furthermore, the ADF alongside heteroskedasticity tests reveals light on the monetary series' stationarity and unpredictability, giving basic data to educated decision production. Overall, the discoveries feature the groundbreaking potential of digital efforts to shape the present state of Indian libraries, opening the way for increased efficiency, accessibility, and creativity in library services.

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