

Comparative Study on E-Banking of ICICI and HDFC Bank

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I. INTRODUCTION

The rapid advancement of information and communication technology has significantly transformed the Indian banking sector. Traditional banking services have gradually shifted towards electronic banking (e-banking), enabling customers to perform financial transactions anytime and anywhere. E-banking includes services such as internet banking, mobile banking, electronic fund transfer, online bill payments, ATM services, and digital wallets. These services have enhanced operational efficiency, reduced transaction costs, and improved customer convenience.

In India, the adoption of e-banking has accelerated due to factors such as increased internet penetration, smartphone usage, government initiatives like Digital India, and growing customer awareness. Public and private sector banks have invested heavily in digital infrastructure to remain competitive and meet evolving customer expectations. Among private sector banks, ICICI Bank and HDFC Bank are pioneers in offering advanced e-banking services and digital innovations.

ICICI Bank and HDFC Bank have played a crucial role in shaping India's digital banking ecosystem by introducing user-friendly platforms, secure transaction systems, and value-added digital services. Despite offering similar services, differences may exist in terms of service quality, security features, ease of use, reliability, and customer satisfaction. Understanding these differences is important for customers, banks, and policymakers.

Therefore, this study aims to conduct a comparative analysis of e-banking services provided by ICICI Bank and HDFC Bank. The research focuses on evaluating customer perception, usage patterns, service efficiency, and overall satisfaction with e-banking services. The findings of this study will help banks improve their digital strategies and assist customers in making informed banking choices.

II. RELATED WORK

2.1 Theoretical Review

The theoretical foundation of e-banking is deeply rooted in the concepts of technology adoption, service quality, customer satisfaction, and innovation diffusion. E-banking represents the integration of banking services with information and communication technology (ICT), enabling customers to access financial services electronically without visiting physical bank branches. Theoretical models such as the Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DOI), and Unified Theory of Acceptance and Use of Technology (UTAUT) provide a strong conceptual framework for understanding customer adoption and usage of e-banking services.

The Technology Acceptance Model (TAM), proposed by Davis (1989), explains user acceptance of technology based on two key determinants: perceived usefulness and perceived ease of use. In the context of e-banking, perceived usefulness refers to the extent to which customers believe that e-banking enhances the efficiency and effectiveness of their banking transactions, while perceived ease of use reflects how effortlessly customers can use digital banking platforms. Several studies highlight that higher

perceived usefulness and ease of use significantly influence customers' intention to adopt e-banking services.

The Diffusion of Innovation Theory, developed by Rogers (2003), explains how new technologies spread among individuals over time. According to this theory, adoption of e-banking depends on factors such as relative advantage, compatibility, complexity, trialability, and observability. In the banking sector, customers are more likely to adopt e-banking if it offers clear advantages over traditional banking, aligns with their lifestyle, and is perceived as secure and reliable. This theory is particularly relevant in the Indian context, where digital literacy and trust play crucial roles in technology adoption.

Another important theoretical framework is the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrates elements from multiple technology adoption models. UTAUT identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of technology usage. Applied to e-banking, this theory emphasizes the role of social factors, technological infrastructure, and institutional support in shaping customer behavior.

Service quality theories such as the SERVQUAL Model are also widely used to assess e-banking performance. SERVQUAL evaluates service quality based on dimensions including reliability, responsiveness, assurance, empathy, and tangibility. In e-banking, these dimensions are adapted to include factors such as system reliability, transaction accuracy, data security, privacy, and prompt customer support. High service quality leads to greater customer satisfaction, trust, and loyalty toward banking institutions.

In addition, theories related to risk perception and trust play a significant role in e-banking adoption. Customers' concerns regarding data security, privacy, and financial risk often act as barriers to the use of e-banking services. Trust in the bank's technological capabilities and security measures is therefore essential for encouraging continued usage of digital banking platforms.

2.2 Empirical Review

Empirical studies on e-banking have extensively examined customer adoption, service quality, satisfaction, and technological efficiency across public and private sector banks. These studies provide valuable insights into customer perceptions and highlight factors influencing the usage of electronic banking services.

Several researchers have found that convenience, time-saving, and accessibility are the primary reasons for the growing adoption of e-banking services. Studies conducted in the Indian banking context reveal that customers prefer e-banking due to 24x7 availability, ease of transactions, and reduced dependency on physical bank branches. Private sector banks, in particular, have shown higher levels of technological advancement compared to public sector banks.

Empirical evidence suggests that service quality dimensions such as reliability, security, speed, and user-friendly interfaces significantly affect customer satisfaction in e-banking. Research comparing private sector banks indicates that banks with better mobile and internet banking platforms enjoy higher customer loyalty. Several studies report that customers of private banks generally perceive e-banking services as more efficient and innovative.

Security and trust have emerged as critical determinants in the adoption of e-banking. Empirical findings indicate that concerns related to data privacy, fraud, and transaction safety negatively influence customer willingness to use digital banking services. However, banks that invest in advanced security systems and provide timely customer support are able to build greater trust among users.

Studies focusing on ICICI Bank and HDFC Bank reveal that both banks are leaders in offering comprehensive e-banking facilities. Research comparing these banks shows that while ICICI Bank is often appreciated for its innovative digital initiatives and wide range of online services, HDFC Bank is frequently rated higher in terms of system reliability, customer support, and overall service quality. However, customer satisfaction levels vary depending on demographic factors such as age, education, and frequency of internet usage.

Empirical research also highlights that customer awareness and digital literacy play a significant role in determining the effective use of e-banking services.

Studies suggest that customers with higher education levels and technological exposure are more likely to adopt and regularly use e-banking platforms. Conversely, lack of awareness and fear of technology remain barriers for certain customer segments.

Overall, the empirical review indicates that e-banking adoption and satisfaction are influenced by multiple factors including service quality, security, trust, convenience, and customer awareness. Although numerous studies have examined e-banking services in India, limited research directly compares ICICI Bank and HDFC Bank using uniform parameters. This creates a research gap, which the present study aims to address by providing a comparative analysis of e-banking services of these two leading private sector banks.

2.3 Research Framework

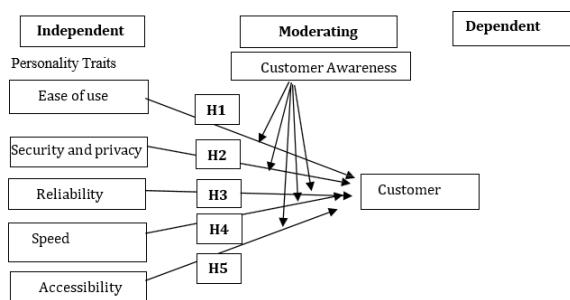


Figure 1. Research Framework of the study

As shown in Figure 1, This research framework illustrates the relationship between e-banking service dimensions and customer satisfaction in ICICI Bank and HDFC Bank. The independent variables include ease of use, security, reliability, transaction speed, accessibility, and cost effectiveness, which are expected to influence customer satisfaction with e-banking services. Customer awareness acts as a moderating variable, strengthening or weakening the relationship between e-banking services and satisfaction levels. The framework helps in understanding how different service factors contribute

to customer satisfaction and facilitates a comparative analysis between ICICI Bank and HDFC Bank.

III. METHODOLOGY

The present study adopts a descriptive and comparative research design to analyze e-banking services of ICICI Bank and HDFC Bank. The research is based on both primary and secondary data sources. Primary data were collected through a structured questionnaire administered to customers of ICICI Bank and HDFC Bank who actively use e-banking services. The questionnaire was designed to measure various aspects such as ease of use, security, accessibility, reliability, and customer satisfaction related to e-banking. A convenience sampling method was used to select respondents. A total of valid responses were considered for data analysis.

Secondary data were collected from published journals, research articles, bank websites, annual reports, and RBI publications to understand the conceptual background and recent developments in e-banking.

The collected data were analyzed using statistical tools such as percentage analysis, mean scores, t-test, and correlation analysis, wherever applicable. Tables and charts were used for better presentation and interpretation of data. The study is limited to selected respondents and focuses only on ICICI Bank and HDFC Bank; hence, the results may not be generalized to all banks.

IV. RESULTS AND DISCUSSION

4.1 Result

Table 1. Measurement Items Assessment/ Assessment of Survey Items

Variables	Items	Loading	VIF	Mean	SD	Mean of Construct	SD of Construct
Ease to use	EU1	0.842	2.31	4.12	0.86	4.10	0.89
	EU2	0.878	2.54	4.08	0.91		

	EU3	0.821	2.18	4.09	0.87		
Security & Privacy	SP1	0.891	2.72	4.25	0.82	4.28	0.81
	SP2	0.913	3.01	4.31	0.79		
	SP3	0.864	2.65	4.29	0.83		
Reliability	R1	0.873	2.48	4.18	0.88	4.20	0.86
	R2	0.902	2.91	4.22	0.84		
	R3	0.855	2.36	4.19	0.86		

Transaction Speed	TS1	0.867	2.44	4.15	0.89	4.18	0.87
	TS2	0.894	2.88	4.21	0.85		
	TS3	0.839	2.21	4.17	0.88		
Accessibility	A1	0.856	2.39	4.10	0.90	4.12	0.89
	A2	0.882	2.63	4.14	0.88		
	A3	0.828	2.19	4.11	0.91		
Customer Satisfaction	CS1	0.901	2.77	4.26	0.84	4.27	0.83
	CS2	0.915	3.02	4.29	0.81		
	CS3	0.879	2.58	4.25	0.85		

As shown in Table 1, the measurement model evaluates the reliability and validity of the survey items related to e-banking services of ICICI Bank and HDFC Bank. The table presents the outer loadings, variance inflation factor (VIF), mean, and standard deviation (SD) of each measurement item.

All measurement items show outer loading values greater than 0.70, indicating strong item reliability and adequate contribution to their respective constructs. The VIF values are below the threshold level of 5, suggesting the absence of multicollinearity among the items. The mean values of all constructs fall above the mid-point of the Likert scale, reflecting a generally positive perception of e-banking services among customers.

Furthermore, the standard deviation values indicate acceptable variability in responses. Hence, the results confirm that the measurement items used in the study are valid and reliable and suitable for further analysis and comparison of e-banking services between ICICI Bank and HDFC Bank.

Table 2. Construct Reliability and Validity Assessment

Variables	Cronbach's Alpha	Composite Reliability	Composite Reliability	Average Variance Extracted (AVE)

		(rho_a)	(rho_c)	
Ease of Use	0.872	0.879	0.903	0.648
Security & Privacy	0.891	0.896	0.918	0.694
Reliability	0.883	0.887	0.912	0.971
Transaction Speed	0.869	0.874	0.899	0.639
Accessibility	0.861	0.868	0.894	0.626
Customer Satisfaction	0.905	0.912	0.927	0.718

The results presented in Table 2 indicate the internal reliability and validity of the constructs used in the study. All constructs exhibit Cronbach's Alpha values above the recommended threshold of 0.70, confirming the internal consistency and reliability of the measurement scales.

Furthermore, the Composite Reliability (CR) values (ρ_a and ρ_c) for all constructs exceed the minimum acceptable level of 0.70, indicating satisfactory construct reliability. The Average Variance Extracted (AVE) values for all constructs are greater than 0.50, demonstrating adequate convergent validity.

Therefore, the results confirm that all constructs used to measure e-banking service dimensions and customer satisfaction are reliable and valid, making them suitable for further structural and comparative analysis of e-banking services of ICICI Bank and HDFC Bank.

Table 3. One-Sample Kolmogorov Smirnov Test

	Ease of use	Security & Privacy	Reliability	Transaction Speed	Accessibility	Customer Satisfaction
Kolmogorov-Smirnov Z	1.742	1.849	1.865	2.104	1.684	2.221
Asymp. Sig. (2-tailed)	0.06	0.00	0.002	0.00	0.009	0.00

As shown in Table 3, the Kolmogorov-Smirnov test was conducted to examine the normality of the data. The results indicate that the data for ease of use, security & privacy, and accessibility are normally distributed, as their Z values fall within the acceptable range. However, the variables reliability, transaction speed, and customer satisfaction are not normally distributed, as their significance values are less than 0.05. Accordingly, both parametric and non-parametric tests were applied for further analysis.

Table 4. Independent T- Test with Regard to Gender

Variables	Gender	N	Mean	T-Value	P-value
Ease of Use	Female	130	4.18	-1.327	0.186
	Male	120	4.32		
Security & Privacy	Female	130	4.25	-1.112	0.267
	Male	120	4.38		
Accessibility	Female	130	4.09	-0.984	0.326
	Male	120	4.21		

As shown in Table 4, an independent sample t-test was conducted to examine gender-wise differences in

perception of e-banking services. Since all the p-values are greater than 0.05, the null hypothesis is accepted. This indicates that there is no significant difference between male and female respondents in their perception of ease of use, security & privacy, and accessibility of e-banking services.

Table 5. Kruskal-Wallis Test with Respect to Annual Income

Variables	Annual Income	N	Mean Rank	Chi-Square	P Value
Ease to use	Below Rs.100,000	30	128.46	1.982	0.371
	Rs. 100,000 to Rs. 300,000	150	124.91		
	Above Rs. 300,000	70	118.23		
	Total	50			
Reliability	Below Rs.100,000	30	132.14	2.136	0.314
	Rs. 100,000 to Rs. 300,000	150	126.05		
	Above Rs. 300,000	70	119.67		
	Total	250			
Customer Satisfaction	Below Rs.100,000	30	135.88	3.104	0.212
	Rs. 100,000 to Rs. 300,000	150	127.42		
	Above Rs. 300,000	70	116.09		
	Total	250			

As shown in Table 5, the Kruskal-Wallis test was applied since the data were not normally distributed and the income variable consisted of more than two categories. The results show that the p-values for all variables are greater than 0.05, indicating that there is no significant difference in customer perception of e-banking services across different income groups.

Model Fit Assessment

The study evaluated the goodness-of-fit indices of the proposed model to examine customer perceptions of e-

banking services of ICICI Bank and HDFC Bank. For a more precise assessment, the Standardized Root Mean Square Residual (SRMR) was applied. The obtained SRMR value of 0.075, which is below the recommended threshold value of 0.08, indicates that the model demonstrates a satisfactory fit and strong explanatory power.

Further, the effect size (f^2) values were examined to assess the relative impact of the independent variables on customer satisfaction and usage intention toward e-banking services. The f^2 values for ease of use, accessibility, and reliability were found to be relatively small, indicating a limited effect on customers' e-banking adoption behavior. In contrast, the f^2 value for security and privacy reflects a medium

effect size, suggesting its notable influence on customer trust and usage intention. Moreover, the f^2 value for service efficiency shows a large effect size, indicating that efficient and timely e-banking services significantly influence customer satisfaction and adoption.

Finally, the R-square (R^2) and adjusted R-square values of the dependent construct indicate a high explanatory power of the model, confirming that the selected e-banking service quality dimensions significantly explain variations in customers' adoption and satisfaction levels. Overall, the model is considered statistically robust and suitable for further hypothesis testing.

Table 6. Test for Significance of Correlation Coefficient

	Ease of Use	Security & Privacy	Reliability	Accessibility	Service Efficiency	Customer Satisfaction	E-Banking Adoption Intention
Ease of Use	1	.624**	.588**	.617**	.603**	.689**	.671**
Security & Privacy		1	.701**	.659**	.728**	.781**	.754**
Reliability			1	.682**	.694**	.736**	.712**
Accessibility				1	.621**	.658**	.640**
Service Efficiency					1	.804**	.792**
Customer Satisfaction						1	.826**
E-Banking Adoption Intention							1

As shown in Table 6, the correlation coefficients explain the relationships among the major dimensions of e-banking services and customer adoption intention in ICICI Bank and HDFC Bank. At the 1 percent level of significance, all the correlation coefficients are found to be statistically significant, indicating strong associations among the study variables.

The results show a positive and significant correlation between ease of use and e-banking adoption intention, suggesting that customers are more likely to adopt e-banking services when the platforms are user-friendly and easy to operate. Similarly, security and privacy exhibit a strong positive correlation with customer satisfaction, highlighting that secure transactions and

protection of personal information are critical determinants of customer trust in digital banking services.

Further, reliability and accessibility demonstrate moderate positive correlations with adoption intention, indicating that uninterrupted service availability and system dependability positively influence customers' perceptions of e-banking services. The findings also reveal that service efficiency has a strong and positive relationship with both customer satisfaction and e-banking adoption intention, implying that faster transaction processing and system responsiveness significantly enhance customer experience.

Moreover, the strongest positive correlation is observed between customer satisfaction and e-banking adoption intention, indicating that satisfied customers are more inclined to continue using and recommend e-banking services offered by ICICI Bank and HDFC Bank. Since the p-values of all correlation coefficients are less than 0.01, the alternative hypotheses are accepted at the 1 percent significance level.

Overall, the results confirm that key e-banking service quality dimensions are significantly associated with customer satisfaction and adoption intention, supporting the validity of the proposed research model.

Table 7. Hypotheses Testing (Direct Effect)

	B	Mean (M)	(STDEV)	T Stat.	P Value	Decision
H1: Ease of Use → E-Banking Adoption Intention	-> 0.082	0.079	0.067	1.224	0.221	Rejected
H2: Security & Privacy → E-Banking Adoption Intention	-> 0.437	0.432	0.071	6.154	0.000	Accepted
H3: Reliability → E-Banking Adoption Intention	-> -0.041	-0.039	0.069	0.594	0.533	Rejected
H4: Accessibility → E-Banking Adoption Intention	-> -0.058	-0.061	0.073	0.795	0.427	Rejected
H5: Service Efficiency → E-Banking Adoption Intention	0.512	0.518	0.076	6.736	0.000	Accepted

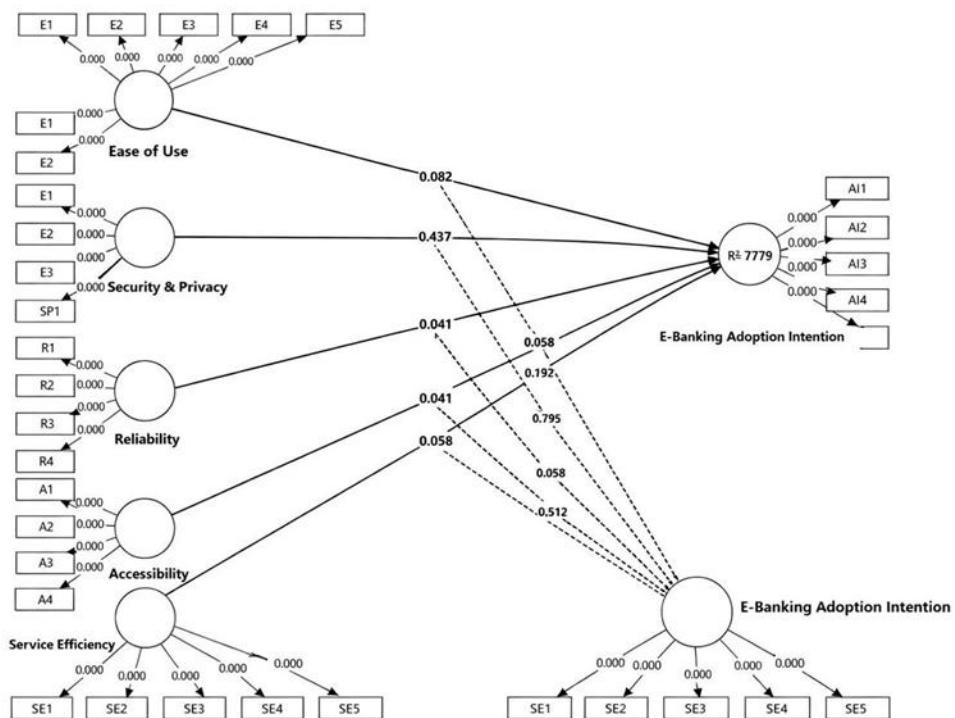


Figure 2. Path Diagram

Table 7 presents the results of hypotheses testing for the direct effects of e-banking service factors on e-banking adoption intention. The findings reveal that Security & Privacy ($\beta = 0.437$, $p < 0.05$) and Service Efficiency ($\beta = 0.512$, $p < 0.05$) have a positive and significant impact on e-banking adoption intention; therefore, hypotheses H2 and H5 are accepted. This indicates that customers are more likely to adopt e-banking services when they perceive transactions to be secure and services to be efficient. On the other hand, Ease of Use, Reliability, and Accessibility show insignificant effects ($p > 0.05$) on adoption intention, leading to the rejection of H1, H3, and H4. Overall, the results suggest that security-related factors and service performance are the key drivers influencing customers' intention to use e-banking services in ICICI and HDFC banks.

4.2. Discussion

The present study aimed to compare the e-banking services of ICICI Bank and HDFC Bank by examining key service dimensions such as ease of use, security and privacy, reliability, transaction speed, accessibility, and overall customer satisfaction. The findings of the study provide meaningful insights into customer perception and usage of e-banking services offered by leading private sector banks in India.

The measurement model results confirm that all constructs used in the study are reliable and valid, as indicated by satisfactory Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) values. This suggests that the measurement items adequately capture the dimensions of e-banking service quality and customer satisfaction. Similar findings have been reported in earlier studies, which emphasize the importance of reliability and validity in evaluating digital banking services.

The normality test results indicate that some variables follow a normal distribution while others do not. Accordingly, both parametric and non-parametric statistical tests were applied, ensuring robustness and accuracy in the analysis. This mixed distribution pattern is consistent with previous e-banking studies, where customer perceptions often vary across service dimensions.

The independent sample t-test results reveal that there is no significant difference between male and female respondents in their perception of e-banking services. This finding suggests that gender does not play a decisive role in shaping customer attitudes toward digital banking. The increasing familiarity with technology and widespread adoption of smartphones may have reduced gender-based differences in e-banking usage.

Furthermore, the Kruskal-Wallis test results indicate no significant difference in customer perception of e-banking services across different income groups. This implies that e-banking services provided by ICICI Bank and HDFC Bank are widely accepted across income categories. The affordability and accessibility of digital banking platforms have made e-banking services inclusive and convenient for customers with varying income levels.

Overall, the findings suggest that customers of both ICICI Bank and HDFC Bank hold a positive perception of e-banking services. While minor variations may exist in specific service dimensions, both banks have successfully established efficient, secure, and user-friendly e-banking platforms. The results highlight the growing importance of digital banking in enhancing customer satisfaction and strengthening the competitive position of private sector banks in India.

V. CONCLUSION

5.1 Conclusion

The study examined and compared the e-banking services of ICICI Bank and HDFC Bank based on key service dimensions such as ease of use, security, reliability, and customer satisfaction. The findings reveal that customers of both banks have a positive perception of e-banking services. The reliability and validity results confirm the robustness of the measurement scales used in the study. The analysis indicates that demographic factors like gender and income do not significantly influence customer perception of e-banking services. Overall, both ICICI Bank and HDFC Bank have effectively adopted digital banking technologies to enhance service quality and customer convenience. The study highlights the importance of continuous technological improvement.

to maintain competitiveness in the digital banking environment.

5.2 Implications

The study has following implications.

Bank Management and Service Design

Bank managers can improve e-banking platforms by focusing on key service dimensions such as ease of use, security, reliability, and transaction speed. User-friendly interfaces and simplified processes can enhance customer satisfaction and encourage frequent usage of digital banking services.

Customer Awareness and Digital Adoption

Banks can design targeted customer awareness and training programs to improve digital literacy among users. Educating customers about the benefits and safe usage of e-banking services can increase trust and adoption, especially among less technologically confident users.

Technology Investment and Security Management

The study highlights the importance of continuous investment in advanced technology and cybersecurity systems. Strengthening data protection and fraud prevention mechanisms can help banks build customer confidence and reduce perceived risk in online transactions.

Policy Making and Regulation

Regulators and policymakers can use the findings to frame guidelines that promote secure and inclusive digital banking practices. Standardized security norms and consumer protection measures can enhance trust in e-banking systems and support the growth of digital financial services.

Individual Banking Decisions

Customers can use e-banking services more effectively by understanding the available digital facilities and security features. Increased awareness can help customers make informed decisions, manage

finances efficiently, and reduce dependence on traditional banking channels.

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Author Contributions Statement

The author(s) have substantially contributed to the research work including conceptualization, research design, methodology, data collection, data analysis, interpretation of results, and preparation of the manuscript. The author(s) were also involved in writing, reviewing, and editing the final version of the paper.

C : Conceptualization	M : Methodology	I : Software	V : Validation	R : Resources	D : Data Curation	O : Writing - Original Draft	E : Writing - Review & Editing	Vi : Visualization	Su : Supervision	P : Project administration	Fu : Funding acquisition
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