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E-Governance in Kerala Analysis of User Perceptions, Service Quality, and Implementation Challenges

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Abstract

The current research focuses on investigating the perspectives of users about e-governance as well as issues relating to service quality and implementation in the state of Kerala. For analyzing the perception of users about service quality, five dimensions, namely Information Quality, System Quality, Service Delivery, Accessibility, and Security & Privacy, were measured. The results of this study suggest that user satisfaction with service quality is moderately high (mean = 3.62/5, 72.4%), with the highest contribution coming from Information Quality (3.89) and Service Delivery (3.51). It has been found that service quality dimensions account for 68.2% variation in satisfaction level ($R^2 = 0.682$, $F = 82.456$, $p < 0.001$). It is observed that User Trust plays a significant mediating role in explaining 30.2% of the service quality satisfaction relationship ($c' = 0.546$, $a = 0.654$, indirect effect = 0.182, $t = 11.428$, $p < 0.001$). Age, education, and demographic variables had an impact on the level of satisfaction, whereby people in urban areas, younger generations, and those with high levels of education indicated higher satisfaction, whereas those in rural areas, aged persons, and poorly educated individuals experienced difficulties accessing the website. Moreover, the results of the study reveal the most pressing implementation problems associated with poor internet connection (3.84/5) and system errors (3.72/5). This study emphasizes the necessity to address the existing digital divide and make necessary improvements regarding internet access, multiplatform availability, digital literacy, and trust-building measures.

Keywords: E-governance, Service Quality, User Satisfaction, Digital Divide, User Trust, Accessibility, Implementation Barriers.

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Introduction and Background

E-governance characterizes a radical change in service delivery and interactions between the government and the people by the use of Information and Communication Technology (ICT) (Suri & Sushil, 2016). It is a digital way of doing business in delivering the services of the government which is offering better accessibility (eliminate geographic and random time communication), more transparency (Disclose information and make it accountable), a lot more citizen engagement in governance, streamlined administrative operations lessening the processing time and cost, less corruption (digital audit trails and minimized discretionary power) and finally, more trust by the citizen to the government institutions (Surya Bahadur et al., 2024).

The very explosive increase in the use of digital technologies in the Indian scenario, alongside the rising internet access and the rising citizen expectations of easy access to services, has provided an opportunity and a necessity to adopt comprehensive e-governance implementation (Hakeem & Sulphey, 2026). In 2006, the Indian government introduced the National e-Governance Plan, which presented a strategic approach to the implementation of digital governance at the central, state, and local levels, with the vision of ensuring that citizens had minimal interaction with the government through the efficient use of digital platforms (Sharma & Maurya, 2024). Various states across India however have achieved varying levels of success based on the technological infrastructure available, governance capacity, the level of digital literacy of its citizens and the input of leadership dedication (Singh, 2023).

Kerala is a unique pioneer in the context of digital governance in India having made its mark through a series of complete e-governance undertakings in numerous service sectors (Karpagavalli & Mohanasoundari, 2017).

This study directly fills these broad gaps by systematically studying citizen perceptions and experience of e-governance services in Kerala, evaluating dimensions of service quality using an adapted SERVQUAL (Uthaman & Vasanthagopal, 2017) framework, exploring the mediating effect of trust in service quality-satisfaction relationship and presenting as specific as possible the barriers to implementation to inform a targeted policy response.

This study aim was to examine the correlation between the service quality dimension (Information Quality, System Quality, Service Delivery, Accessibility, and Security and Privacy) and the overall user satisfaction with the service e-governance in Kerala.

Service Quality Theory and Frameworks

The idea of service quality is a paradigm shift between quality control grounded in manufacturing to the discovery of the less tangible and more experiential facets of professional service delivery. The groundbreaking research surfaced the field with the discovery of the main origin of service quality as the difference between customer expectations of service and perceptions of actual service delivery (Uthaman & Vasanthagopal, 2023). Their expectancy-gap model has shown that the objective service quality measures are very different as compared to perceived quality- how customers subjectively perceive services is more important than the technical quality characteristics. Their vast research in various service sectors, such as the banking sector, insurance sector, telecommunications sector, and repair service sector, found ten original service quality dimensions, which were later narrowed into the well-known SERVQUAL five dimensions in the course of further research.

The five main SERVQUAL dimensions include tangibles which deals with physical evidence which includes facility appearance and grooming of personnel; reliability which deals with the dependability and accuracy with which a service is delivered; responsiveness which deals with the willingness to serve and offer prompt services; assurance which deals with knowledge of employees and their capacity to instill trust and confidence; and empathy which deals with personalized attention and concern towards the welfare of the customer.

The understanding that electronic service delivery introduces dimensions of quality distinctiveness resulted in changes in frameworks. The E-S-QUAL framework specifically to the science of internet-based services including efficiency which is a measure of speed and easy navigation, system availability and fulfilment which is a measure of web reliability and deliver services correctly, privacy which is protection of customer information and facilitates secure transactions, and responsiveness which is a measure of service recovery in case of a problem (Singh Kalsi & Kiran, 2013). This evolution realised that, the quality of digital services is not only in traditional service dimensions to consider, but also in the architectural system, information system performance, cyber security provisions and reliability of technology infrastructure.

A detailed study surveyed customers who had used the various European government websites creating the special E-GovQual model which was based on the conventional SERVQual dimensions and added technology-related and government-specific considerations (Kulkarni, 2012).

Digital Divide and Equity in E-Governance

The digital divide, which is the difference in technology source and digital capacity based on demographic groups, remains a long-standing obstacle to achieving fair results in e-governance (Sapru & Sapru, 2014). The digital divide in four progressive dimensions including the access divide which has physical access to technology and internet connectivity (Vinod Kumar & Bimal, 2014); the skills divide which has technological literacy and technical competence to use technology; the use divide which has the level of sophistication of technology application and quality of usage; and outcome divide which has different benefits accrued by the use of technology by different populations. When applied to e-governance, these dimensions appear as layers of barriers with people who do not have an internet connection simply not being able to use digital services, people who have internet access but lack digital literacy not being able to navigate the interface, people with basic digital literacy not being able to find advanced features, and the access and ability differences introduced by inequitable distribution of access to platforms and people translate into surface inequality in the quality of public services experienced across demographic (Khurana et al., 2014).

Trust in Digital Government Services

Trust is a very important, but often neglected factor in both e-governance adoption and e-governance satisfaction (Mejail, 2024). Although technological capability and service quality are the parameters of e-governance success, they cannot work without the trust of citizens in digital systems and government institutions (Suri, 2022). Trust has been defined as a willingness to be vulnerable to the actions of another party based on the expectation that the other will perform actions important to the trustor.

Implementation Barriers in E-Governance

Studies in various settings have established similar types of barriers that have impact on the use of e-governance services (Jamil & Dhakal, 2012). Technical reasons such as reliability problems with systems, poor performance, and technical issues are the major barriers with users encountering issues of system errors, long processing time, or technical problems frequently use the traditional avenues of service even though the digital platforms claim to be convenient (Naik et al., 2021). Low bandwidth and high downtimes of the system are major barriers to the integration of e-government in contexts with a limited supply of resources. Barriers to awareness and accessibility are especially important, and there are always large numbers of citizens who are not aware of digital governmental services despite large-scale government communications activities. Language barriers are significant barriers to access and the government digital platforms can often be found in English and Hindi, not accessible to citizens whose native language is another Indian language.

Research Objective

RO1: This study aims to analyse the link between various dimensions of service quality (information quality, system quality, service delivery, accessibility, and security and privacy) and the level of satisfaction experienced by the users of the e-governance services provided in Kerala.

RO2: The second objective is to explore how user trust mediates the effect of service quality on user satisfaction.

RO3: Finally, the implementation barriers are to be studied, along with their impact on the accessibility of e-governance services.

Research Question

RQ1: How do the various aspects of service quality (information quality, system quality, service delivery, accessibility, and security & privacy) impact user satisfaction with e-governance services offered in Kerala?

RQ2: How does the role of trust play a mediator between service quality and user satisfaction with regard to e-governance services in Kerala?

RQ3: What are the main constraints of technological, infrastructural, and demographic nature in terms of e-governance usage in Kerala?

The structure of the paper ensures an effective assessment of e-governance in the state of Kerala. The first section sets the stage for the study by explaining the importance of digital governance in the Indian context, highlighting the aims and questions of the study. Section 2 explains the methods and procedures adopted in the research process, such as the sampling procedure, data collection, and survey construction techniques used. The third section includes the results, which encompass demographic profiles, usage rates, service quality, influence of demographics on use, correlation

and regression analysis, mediation, and obstacles to implementation. Section 4 provides an interpretation of the findings against the backdrop of service quality, trust, and the digital divide. Section 5 provides recommendations for improving access, reliability, and building trust.

Research Methodology

The chosen research design of the study was a descriptive-analytical research design with the combination of quantitative research and initial qualitative research in terms of the answers to open-ended questions. The descriptive element is a systematic documentation of user perception, dimensions of service quality and implementation obstacles as perceived by users of e-governance services in Kerala.

There are several reasons why quantitative survey methodology was chosen, as opposed to other approaches. Targeted survey techniques are cost effective, underpinning a well-organized data gathered among 250 respondents which is spread at geographic locations of Kerala. The questionnaire is a structured questionnaire, which provides its regular measurement of respondents and allows aggregation and valid comparison. The strategy offers scope that facilitates holistic coverage of the various geographic area, demographic, and e-governance type of services in Kerala.

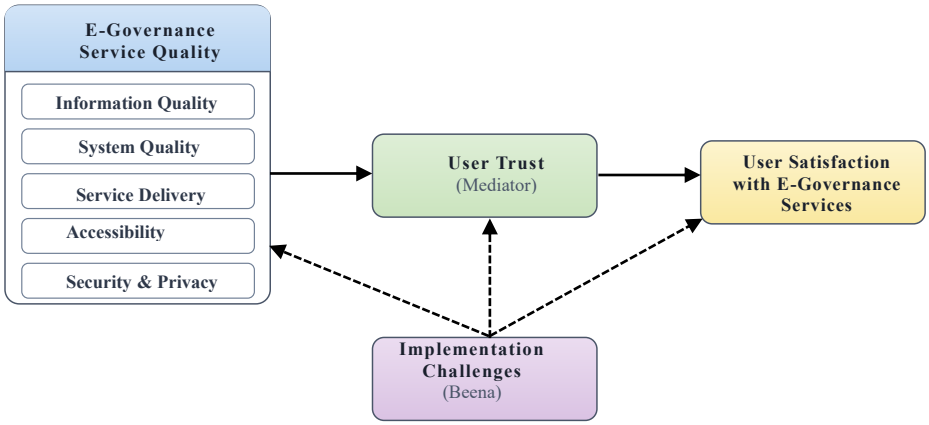


Fig. 1: Conceptual Framework of E-Governance in Kerala

Fig. 1 shows the connection between the different service quality dimensions and the extent to which users are satisfied with those services, with user trust as a mediator and implementation challenges (including technical, infrastructure, and demographic barriers) affecting satisfaction as well.

Population, Sampling Strategy, and Sample Selection

The sample size will be 500 residents of Kerala aged 18 years and above who used services of government e-governance in the 12 months before the data collection dates. This definition is based on those individuals who have experienced e-governance recently, allowing them to recall the experience of the services provided by the system, its functionality, and the obstacles faced.

The sampling methodology of stratified random sampling based on probability was used, so that representative sampling in the sample can be both representative of the target population and valid statistical inferences can be made. Stratified random sampling was chosen instead of simple random or convenience sampling since this is known to provide representation of major demographic and geographic subgroups, minimize sampling error based on differences among strata, and adequately represent demographic subgroups, which are viewed as potentially disadvantaged, through strategic oversampling.

Primary stratification variables were geographic location divided into urban areas including Kerala's major cities, semi-urban areas including taluk headquarters and growth centres, and rural areas including rural villages and small towns; age stratified into 18-30 years representing young adults generally digitally native, 31-45 years representing middle-aged individuals established in careers, 46-60 years representing individuals approaching retirement with variable digital literacy, and above 60 years representing senior citizens typically showing lower digital adoption; education stratified into high school and below, undergraduate bachelor's degree, and postgraduate master's degree and above; and gender represented as male and female.

Data Collection Methods and Process

Several data collection methods were used to maximize on the response and adapt to the various preferences of respondents. A survey conducted online using the Qualtrics platform achieved a respondent distribution of 40 percent (n=100) of respondents through distribution using email to government employees, official government channels, and social media, which allowed independent completion using their personal computers, with an average of 12-15 minutes to complete the questionnaire. Face-to-face surveys in government service centers were used to reach 35 percent of the respondents (n=87) by use of trained researchers who administered the questionnaires in Akshaya e-Kendras and government service centers, where they also offered researcher assistance, especially to respondents who had a low level of education, and the average time taken was 20- 25 minutes. Face-to-face surveys at the general places involved 15 percent of respondents (n=38), who were administered surveys at markets, bus stations, and community halls, and the study took an average time of 18-22 minutes. Mixed telephone and email follow-up: Respondents who used hybrids of telephone and email follow-up were 10 percent (n=25) who were contacted by telephone or filled out an email by the researcher.

The total number of respondents approached was 287 people, out of whom 250 people filled the questionnaires, with an overall response rate of 87.1 percent. The analysis of non-response was done in control of non-respondents (37 people) against respondents in all available demographic data e.g. age and general geographic region where respondents would be located but the analysis did not show statistically significant differences indicating the possibility of minimal response biasing. Missing data analysis of questionnaires completed showed that there were few missing values (below 1.2 percent with all items), and that missing values were distributed randomly, not being attached to certain items or respondents. Data gaps were addressed using case-wise deletions in analyses where the affected variables were used, which was a conservative method but had the same statistical validity.

Results and Findings

Demographic Profile of Respondents

table 1 below illustrates the demographics of the respondents surveyed in relation to e-governance in the state of Kerala. These demographics include the age groups, gender, education, location, occupations, income, and ownership of devices. The sample appears to be demographically representative as evidenced by the variety of people from urban, semi-urban, and rural locations. From the data provided in the table above, there appears to be a relatively youthful demographic with a good educational background as well as balanced occupations and income levels.

Table 1: Demographic Profile of E-Governance Respondents in Kerala

Demographic Category	Sub-category / Range	Percentage (%)
Age	18–30 years	27.2
	31–45 years	36.8
	46–60 years	24.8
	Above 60 years	11.2
Gender	Male	59.2
	Female	40.8
Education	High school or below	18.0
	Undergraduate / Bachelor's	82.0
	Postgraduate / Master's and above	82.0*
Geographic Location	Urban	39.2
	Semi-Urban	37.6
	Rural	23.2
Occupation	Private Sector	41.6
	Government Employee	24.8
	Self-Employed	19.2
	Student	11.2
	Other	3.2
Monthly Income (INR)	< 25,000	19.2
	25,001–50,000	39.2
	50,001–75,000	24.8
	> 75,000	16.8
Device Ownership	Computer / Laptop only	47.2
	Smartphone only	33.6
	Both Computer / Laptop and Smartphone	19.2

Service Utilization Patterns and Usage Frequency

Use of e-governance in Kerala is mainly oriented towards revenue and transport services, as indicated by 74.8% usage for revenue services, such as land record and certificate services, and 62.4% usage of transportation services, which include services like obtaining a driving license and registering a vehicle. The high usage rate of these two services indicates their importance in carrying out important administrative work such as buying or selling property, education applications, and transport related services. Utility services had 56.8% usage, civic services had 39.2%, educational services 33.6%, and least usage was reported for health services, at 24.8%. It can be seen that people give preference to time-bound services that require frequent contact. The average usage of e-governance services by individuals was 2.84, varying between 1 and 7.

Customer satisfaction differed based on category with revenue services being the most highly rated at 3.74 out of 5 compared to transport services which scored 3.68, indicating familiarity and ease of accessibility. Satisfaction for utility payments was moderately high at 3.52 while that of health services was the least with 3.42 possibly because of complicated administrative processes. Service usage frequency was daily 18.4%, weekly 34.8%, monthly 32%, and occasionally 14.8%. The frequent users had higher satisfaction ratings ($r=0.756$, $p<0.001$).

Service Quality Dimensions and Assessment

Information Quality emerged as the highest-ranked aspect of service quality of e-governance in Kerala with an average rating of 3.89 (SD = 0.94). The perception of accuracy, completeness, relevance, and timeliness of information contributed to the highest rating in Information Quality. System Quality, with a value of 3.67 (SD = 1.08), is the second-best aspect and is a good indicator of its reliability of operation. The Service Delivery aspect scored 3.51 (SD = 1.15), and more needs to be done to improve on service responsiveness and efficient user problem solving. Accessibility proved to be the worst performing aspect in this study with a score of 3.24 (SD = 1.28), and multiplatform accessibility should be prioritized by the administration of Kerala. Lastly, Security & Privacy obtained a value of 3.42 (SD = 1.19).

Demographic Influences on User Satisfaction

Fig. 2 represents the average satisfaction rating of 250 respondents based on demographic variables in Kerala state. The Age variable includes 31 to 45 years rating 3.78, and >60 years rating 3.12. On Education, Post Graduate ratings 3.92, Undergraduate rating 3.64, and High School rating 3.18 were observed. For Location, the results were Urban with a rating of 3.88, Semi-Urban rating 3.62, and Rural 2.84. Usage rate was Daily 3.94, Weekly 3.78, Monthly 3.42, and Occasional 2.68. Gender revealed minor variations such that males rated 3.64 while Females rated 3.58.

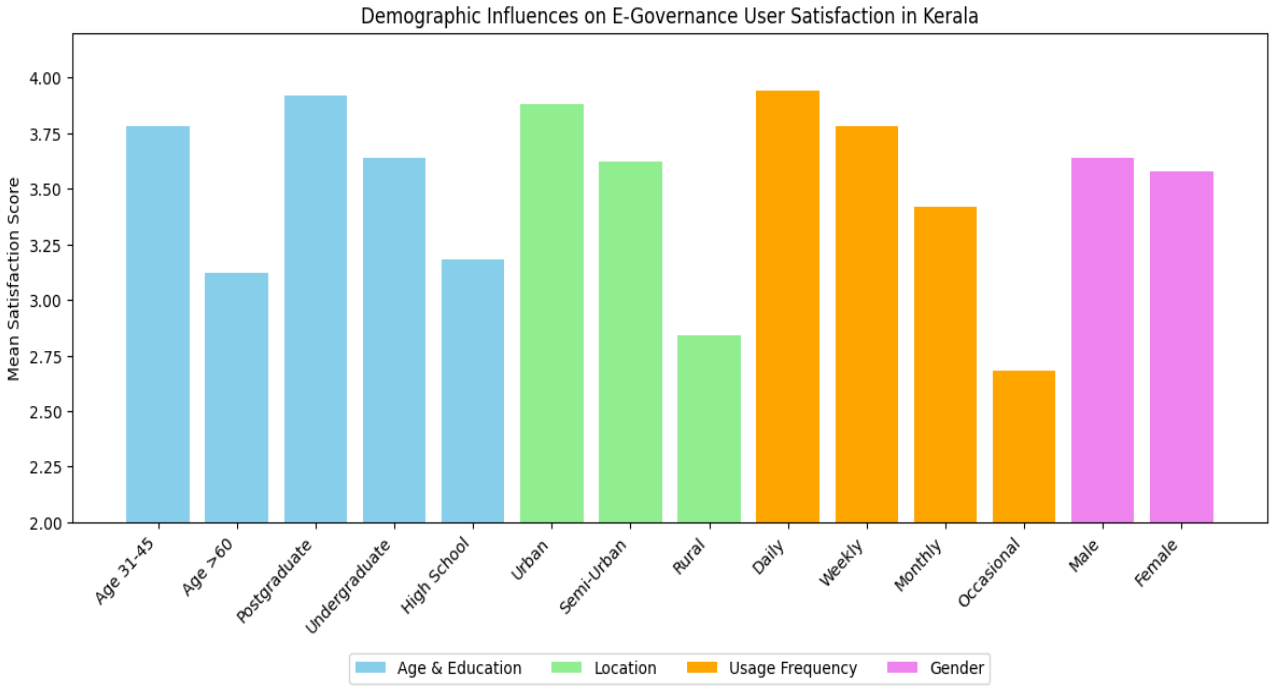


Fig. 2: Demographic Influences on E-Governance User Satisfaction in Kerala

Correlation Analysis of Service Quality Dimensions

Table 2 below shows the relationship between dimensions of service quality and user satisfaction. All dimensions were found to be positively related to user satisfaction at $p < 0.001$. The Information Quality category exhibited the highest correlation coefficient of $r = 0.764$, indicating that the aspects of accuracy, completeness, and timeliness of information exerted significant influence on user satisfaction. The Service Delivery category ($r = 0.756$) and the System Quality category ($r = 0.748$) showed high correlations as well, which highlighted the importance of effective services and systems. Meanwhile, accessibility had a moderate correlation with user satisfaction ($r = 0.692$). Lastly, security and privacy exhibited the weakest correlation ($r = 0.618$).

Table 2: Correlation between Service Quality Dimensions and User Satisfaction

Variables	User Satisfaction (r)	p-value
Information Quality	0.764	< 0.001
Service Delivery	0.756	< 0.001
System Quality	0.748	< 0.001
Accessibility	0.692	< 0.001
Security & Privacy	0.618	0.001

Table 3: Inter-Correlations Among Service Quality Dimensions

Dimensions Compared	Correlation Coefficient (r)
System Quality – Service Delivery	0.742
Information Quality – Service Delivery	0.658
Accessibility – Other Dimensions	0.584 – 0.698
Overall Range of Inter-Correlations	0.532 – 0.742

Table 3 shows that there exists an inter-relationship among various dimensions of service quality. All the dimensions were positively correlated with one another, ranging from 0.532 to 0.742, suggesting that there is a high level of positivity between the dimensions while still being different in their own respects. The highest level of correlation was found to exist between System Quality and Service Delivery, with r=0.742. This implies that system quality plays an important role in ensuring efficient service delivery. On the other hand, there was another high level of correlation found to exist between Information Quality and Service Delivery (r=0.658). On the contrary, the accessibility dimension had weaker levels of correlation with the rest of the dimensions (r=0.584-0.698). This suggests that this dimension is unique in its nature.

Multiple Regression Analysis: Predictors of User Satisfaction

Table 4 and table 5 show a highly significant model Khanra & Joseph, (2019) was found to predict user satisfaction using multiple dimensions of service quality, yielding a model of the highest significance ($F = 82.456$, $p < 0.001$) that explained 68.2 per cent of the variance in user satisfaction ($R2 = 0.682$, Adjusted $R2 = 0.674$). The very high R2 value clearly indicates that the factor of quality of service is a good predictor of the level of customer satisfaction when put together. Information Quality was identified as the strongest factor having the standardized coefficient value $\beta = 0.249$ ($t = 3.558$, $p = 0.001$). This means that the more the quality of information and its completeness and relevance increases, the more will the level of satisfaction increase. Service Delivery proved to have a standardized coefficient value of 0.246 ($t = 3.719$, $p < 0.001$). This means that responsiveness to citizens' demands and the provision of appropriate solutions have an effect on their level of satisfaction.

Table 4: Multiple Regression Analysis Predicting User Satisfaction from Service Quality Dimensions

Predictor Variable	Standardized Coefficient (β)	t-value	p-value	Significance
Information Quality	0.249	3.558	0.001	Significant
Service Delivery	0.246	3.719	< 0.001	Significant
System Quality	0.186	2.706	0.007	Significant

Table 5: Model Summary

Model Statistic	Value
F-value	82.456
p-value	< 0.001
R^2	0.682
Adjusted R^2	0.674

Mediation Analysis: Trust as a Mediator Between Service Quality and Satisfaction

Table 6 shows the mediating relationship between Service Quality and User Satisfaction was examined using mediation analysis to test the theoretical hypothesis that trust mechanisms are important in translating service improvements into satisfaction. This was analysed in three consecutive stages using regression (Mathur & Vyas, 2023). Model 1 analysed the overall effect, in which Service Quality was the direct predictor of User Satisfaction, with c = 0.782 ($t = 13.256$, $p < 0.001$), a significant predictor with a large effect size. Model 2 evaluated whether the proposed mediator, User Trust, was founded on Service Quality, with a coefficient a = 0.654 ($t = 11.428$, $p < 0.001$), indicating that service quality mostly forecasted trust with a high level of effect.

Table 6: Mediation Analysis of User Trust Between Service Quality and User Satisfaction

Model	Predictor / Mediator	Outcome	Coefficient (β / c / a)	t-value	p-value
1	Service Quality	User Satisfaction	c = 0.782	13.256	<0.001
2	Service Quality	User Trust	a = 0.654	11.428	<0.001

Implementation Challenges and Barriers

Citizens claimed to have encountered several types of obstacles that do not enable or restrict the use of e-governance services. The greatest technical obstacle was internet connectivity issues, with a mean score of 3.84 out of 5.00 (SD = 1.28), which is considered especially problematic for rural populations due to less reliable broadband. System errors and crashes were closely behind, with a mean score of 3.72 (SD = 1.24), indicating that issues of platform reliability significantly impact user frustration and lead users to the old service channels. A slow processing speed, measured at 3.64 (SD = 1.32), indicates that performance issues significantly impact the user experience. The navigation complexity was 3.42 (SD = 1.18), indicating that some users found the interface difficult to navigate. Still, this obstacle is not as severe as technical infrastructure problems for populations.

Urban-Rural Digital Divide

The overall city-country comparisons showed sharp differences in service quality and in experiences of implementation barriers. The smallest gap was recorded in System Quality, where the urban mean of 4.02 was compared with the rural mean of 2.94 ($t = 6.428$, $p < 0.001$), resulting in a difference of 1.08. Information Quality urban mean was 4.18, rural 3.24 ($t = 7.156$, $p = 0.001$), a difference of 0.94 points, indicating that urban inhabitants have a better perception of complete information or interpret it more easily than rural inhabitants. Service Delivery indicated an urban mean of 3.89 compared to a rural mean of 2.84 ($t = 5.892$, $p < 0.001$), a difference of 1.05 points, indicating that rural populations experience less responsive service delivery. Accessibility was the most differentiated dimension, with an urban mean of 3.74 and a rural mean of 2.12 ($t = 8.456$, $p < 0.001$), with a gap of 1.62 points, the biggest disparity of all dimensions, suggesting that the rural populations are particularly most adversely affected by accessibility barriers in accessing services.

Analysis of Implementation Barriers by Demographic Groups

Analysis of demographic groups showed that populations are impacted by implementation barriers in different ways. Seniors aged over 60 years had the highest severity in both digital literacy constraints (difficulty understanding the interface, mean = 4.12; limited computer skills, mean = 4.28) than young adults (interface difficulty, mean = 2.84; limited skills, mean = 2.92). Analysis of education revealed that respondents with a high school education reported greater severity of barriers (interface difficulty mean = 4.18) than those with postgraduate education (mean = 2.34), a difference of 1.84, indicating a schooling difference in computer confidence. Infrastructure-related barriers were more severe in rural populations, with limited access points: mean = 4.24 in rural locations compared with 2.84 in urban locations, a gap of 1.40, indicating that rural populations already find infrastructure barriers a real menace.

Discussion of Findings

Service Quality Dimensions and Satisfaction Relationships

The observation that Information Quality is the best service quality predictor (0.249) aligns with and generalises previous research, which finds that content accuracy and completeness are key factors determining e-government satisfaction across a variety of settings. The fact that 68.2 per cent of the variance in satisfaction is accounted for by service quality dimensions justifies the applicability of the SERVQUAL framework to the context of e-governance. It provides empirical evidence that multi-dimensional service quality measurement is more informative than one-item measures of satisfaction. The comparatively high score of Information Quality (mean = 3.89) in relation to Accessibility (mean = 3.24) could indicate that the government of Kerala is thoughtfully making sure that such

variables as the elaboration of the content and the accuracy of the information are taken care of, yet possibly not putting much effort into the optimization of the interface design and the accessibility to the wide range of user groups.

The fact that Service Delivery has strong predictive power (β = 0.246) implies that citizens place a high value on government responsiveness and problem resolution, which suggests that the help desk support service and complaint redress systems should be significantly invested in in terms of resources. The average effect of Accessibility (β = 0.128) when absolute scores are low indicates that although accessibility receives insufficient attention now, improving this aspect would yield significant gains in satisfaction. The near-significant Security & Privacy effects (β = 0.104, p = 0.272) indicate that the data protection that occurs has impacts on satisfaction, but perhaps has less direct impact than was thought, simply because the security concerns are necessary conditions that need to be met satisfactorily, but do not necessarily affect satisfaction in the same way as quality information or responsive service.

Trust as Mediating Mechanism

The discovery that 30.2 percent of the relationship between Service Quality and Satisfaction is mediated by trust is a valuable addition to the existing body of research in the e-governance setting. This mediation shows that service quality improvement affects satisfaction both directly (direct effect) and indirectly, by developing trust in systems among users (Vinod Kumar, 2014) (indirect effect). The value of the direct effect (c' = 0.546) is large, and it is a strong predictor of satisfaction that is not contingent upon trust mechanisms, so the quality improvement results in the benefits of satisfaction, irrespective of the ability to build trust. The significant indirect effect (0.182) via trust does indicate, however, that about one-third of the positive impacts of service quality are mediated by increased trust. Thus, policymakers ought to capitalise strategically on the potential to deliver quality improvements to services as a means of increasing citizen trust in government systems.

The high correlation of Service Quality/Trust (a = 0.654) implies that people obtain a higher degree of trust by default due to system quality services, meaning that improvements in quality will automatically bring at least some trust in return. The Trust → Satisfaction connection, being moderate (b = 0.278), signifies that the role of trust cannot be neglected, as it is important as an intermediate variable for mediating citizens' satisfaction with the services. At the same time, trust should be considered both as an intermediate point of the contact and a determinant factor influencing satisfaction to some extent independently. Thus, the results support the hypothesis concerning the presence of such a chain of positive interactions, which starts from citizen positive experiences connected with service quality improvements and leads to trust in the system and further satisfaction, which is gained due to trust rather than service quality.

Digital Divide and Equity Implications

One of the basic issues regarding equity in the implementation of e-governance in the state of Kerala includes a difference of 1.04 points of satisfaction of 3.88 in urban areas and 2.84 in rural areas. It means that individuals who reside in rural areas have one category less compared to those from urban areas in terms of satisfaction level. The largest disparity was a 1.62-point accessibility gap, indicating that accessibility obstacles are concentrated in rural regions. Though this observation is consistent with existing studies showing that urban-rural digital gaps exist, the size of the gap in Kerala (a relatively progressive state on e-governance) suggests that, even when conditions are favourable for implementation, significant rural disadvantage remains.

The accessibility gap is probably a combination of several compounding factors: less connectivity to broadbanding in rural areas leading to frustrating user experience due to slowness in loading complex interfaces, fewer physical service centres with the high travel distance to access them, lower computer ownership as many rural respondents only use smartphones to access complex transaction interfaces, and less tailored interfaces to less-digitally-literate populations that are concentrated in rural areas That the rural disadvantage is consistent across all dimensions of service quality implies that there were not accessibility problems in isolation but instead architectural problems to the design and implementation of e-governance services which lacked concern regarding rural and less-educated user groups.

Demographic Influences and Digital Literacy Challenges

Age is an important dimension of the digital divide, with a 0.66 difference between the age groups 31-45 (3.78) and those above 60 (3.12). The reported especially sharp digital literacy barriers among senior citizens (mean of interface understanding 4.12 among people over 60 years old and 2.84 among those older between 18 and 30 years) indicate that even older citizens with arguably stable incomes, motivation to receive government benefits, and access to time to interact with services have not yet surmounted the barriers to technology adoption. The education-based difference in satisfaction between postgraduate- and high school-educated respondents (0.74 points) indicates that educational differences in digital literacy significantly affect the e-governance experience. These demographics imply that

population segmentation policies targeting specific demographic segments, such as a less-educated population, a user-friendly interface, digital literacy training for seniors, and multilingual assistance for non-English-speaking users, constitute crucial elements of inclusive e-governance policy.

Gender neutral satisfaction level (male 3.64, female 3.58, $p = 0.211$) in Kerala seems to run counter to the gender digital inequality noted in other parts of India, perhaps owing to the liberal gender profile of education and occupation in the state. From this finding, we can infer that gender-based intervention in dealing with the digital divide may not have much significance when it comes to cases of sufficient overall development. On the other hand, age- and education-based intervention will have more weight. High correlation between usage frequency and satisfaction level ($r = 0.756$) suggests that once an individual passes through the hurdles associated with adopting the system, continued use makes him or her familiar and confident with the system, hence a repeat user has greater satisfaction level.

Implementation Barriers as Systematic Obstacles

In the analysis of implementation barriers, they exist at multiple levels of the system rather than as individual technical problems. Constraints, which are related to infrastructure (the system is infrastructure-based), which restrict the use of services irrespective of their quality, include infrastructure-based constraints (lack of connectivity, few access points, inadequate service centres, etc). Awareness constraints do not enable the citizens to take any initiative in using the services since they are not even aware of such services. Technical constraints like malfunctioning and slowness of the systems irritate the users who have managed to overcome these constraints. Illiterate people find it hard to operate the complicated interfaces. The lack of sufficient support does not help in solving problems faced by users. These layered barriers mean that the challenge of e-governance can only be dealt with through multi-layered approaches to overcome the infrastructure, awareness, quality, literacy, and support challenges together to transform the scenario on a multi-dimensional level.

The truth of the fact that limited access to rural facilities (mean = 3.92) is the biggest barrier to the notion of the infrastructure being the primary constraint to the implementation of e-governance. The lack of broadband access and physical proximity to a point of service mean that citizens are unable to access digital services, regardless of their level of digital literacy or the quality of their system. This realisation indicates that the development of rural broadband infrastructure should be a precursor to the successful exploitation of e-governance in rural regions, rather than assuming that digital acquisition will proceed despite current infrastructure shortages (Table 7).

Table 7: Service Quality Dimensions and Satisfaction Relationship

Analysis Area	Finding	Implication/Detail
Service Utilization	Highest usage in Revenue (74.8%) & Transport (62.4%) services.	Used for essential, time-critical administrative tasks.
	Lowest usage in Health services (24.8%).	
Service Quality Dimensions	Ranking (Mean Score /5): 1. Info Quality (3.89) 2. System Quality (3.67) 3. Service Delivery (3.51) 4. Security (3.42) 5. Accessibility (3.24)	Strength: Content accuracy. Important Gap: Accessibility, particularly to rural/less-educated users.
Predictors of Satisfaction	Strongest Correlates: Info Quality ($r=0.764$) & Usage Frequency ($r=0.756$).	Familiarity and accurate information drive satisfaction.
	Regression: Service quality dimensions explain 68.2% ($R^2=0.682$) of satisfaction variance.	Info Quality ($\beta = 0.249$) and Service Delivery ($\beta = 0.246$) are the strongest predictors.
Mediating Role of Trust	Trust mediates 30.2% of the relationship between Service Quality and Satisfaction.	An essential test for translating service improvements into user satisfaction is establishing trust.
Major Implementation Barriers	1. Internet Connectivity (3.84/5) 2. System Errors/Crashes (3.72) 3. Slow Processing (3.64)	Rural areas are most gravely affected due to technical and infrastructure barriers.
Urban-Rural Digital Divide	Largest gap in Accessibility (Urban 3.74 vs. Rural 2.12 = 1.62-point gap).	Challenge to the architectural system, and not a single issue. The overall rural satisfaction level is 1.04 points below.
Demographic Influences	Significant: Age, Education, Location, Usage Frequency. Not Significant: Gender.	Age, education, and geography determine the digital divide, although the gender disparity seems to be minimised in Kerala.

Recommendations

This is based on a survey sample of 250 in Kerala that shows intermediate-high satisfaction with e-governance services (72.4%, mean=3.62/5), which represents rather good progress, though with many areas for improvement. The study

supports the claim that the five major dimensions of service quality (Information, System, Delivery, Accessibility, and Security) account for 68.2% of user satisfaction, and thus the SERVQUAL model can be applied to digital government.

Determinants of Satisfaction

Information Quality proved to be the best predictor of satisfaction because it reflects the relevance of correct information. On the other hand, the weakest dimension was Accessibility, with a critical gap evident in multi-platform availability and simplicity. One significant conclusion is that User Trust mediates 30.2% of the correlation between service quality and satisfaction, i.e., when citizen confidence is gained, it translates into a significant increase in satisfaction.

The Persistent Digital Divide

The comparison reveals a high level of the urban-rural digital divide, with urban users expressing greater satisfaction by 1.04 points than rural users. There are huge disparities between the groups in terms of Accessibility, with 1.62 being the largest margin. This shows that the effects of infrastructure or design limitations disproportionately affect the countryside communities. Demographic characteristics play a significant role in determining satisfaction; however, gender plays no role whatsoever, thus implying that access and literacy, and not gender, fuel the digital divide in the state of Kerala.

Primary Barriers to Adoption

Technical: The biggest hindrances to adoption come from technology: system errors/crashes, internet problems. Other factors, such as a critical lack of awareness and digital literacy rates, especially among older people and less educated individuals, are also present. The utilisation of services focuses on the key administrative areas, and the most used are the Revenue and Transportation services.

Strategic Recommendations - Infrastructure and Inclusion

The policy on the infrastructure gap should be implemented at once. This involves increasing broadband connectivity more quickly in rural communities and expanding physical service centres (e.g., Akshaya e-Kendras). At the same time, it is critical to implement specific digital literacy programs, particularly simplified training lessons in local languages, for senior citizens and less-informed users to overcome the confidence barrier.

Strategic Recommendations - System Quality and Trust

The technical advances should be aimed at achieving complete system reliability (99.5% uptime) and at making user interfaces easier, with testing across a variety of populations. Most importantly, the government should also adopt specific trust-building strategies, including clear messages on security arrangements and a performance dashboard for the people, to capitalise on the fact that trust is one of the most important mediators of satisfaction.

Implementation Roadmap and Conclusion

It is suggested that it be implemented over three years: the first year involves reinforcing the underlying infrastructure and literacy; the second year aims to increase service quality and integration; and the third year focuses on closing equity gaps. To conclude, although e-governance in Kerala is promising, to achieve its potential, there must be a two-pronged approach: vigorous technical and specific, equity-oriented paths that build trust and involve all citizens, especially the most vulnerable, in the process.

Conclusions

E-governance of Kerala indicates a good performance through moderate to high level of satisfaction among users, as evident from mean satisfaction score being 3.62/5 (72.4%). Factors like Information Quality (3.89), System Quality (3.67), Service Delivery (3.51), Accessibility (3.24), and Security & Privacy (3.42) together accounted for 68.2% of the variance in satisfaction ($R^2 = 0.682$, $F = 82.456$, $p < 0.001$). Among those factors, Information Quality ($\beta = 0.249$, $t = 3.558$, $p = 0.001$) and Service Delivery ($\beta = 0.246$, $t = 3.719$, $p < 0.001$) were the best predictors of user satisfaction. In demographic analyses, age, education, urbanity of location, and frequency of use emerged as significant variables, where older people and illiterate or less educated rural population showed lesser satisfaction scores. The urban-rural gap in terms of accessibility had the highest score difference of 1.

User Trust emerged as an important mediator that explained 30.2% of the relationship between service quality and satisfaction ($c' = 0.546$; direct effect, indirect effect = 0.182; $a = 0.654$; $t = 11.428$; $p < 0.001$). Hence, technological developments alone are not enough; establishing trust through good communication and services provided is necessary for improving the engagement of citizens. Implementation challenges, such as Internet connection issues (mean =

3.84), computer difficulties (3.72), and time lag (3.64), significantly affected users from the rural population and senior citizens, highlighting the need for technological improvement and user-friendly interfaces.

More research should focus on exploring the long-term effects of particular policy decisions in order to solve the urban-rural gap issue. The consequences of the accessibility of the Internet in rural areas, on various platforms, as well as special digital literacy programs targeting the elderly population, could be examined. Comparing various states or other developing countries would provide insights into whether or not the policy adopted by the Kerala state government can be expanded. Additional qualitative analysis should be conducted in order to investigate the behaviors of the users apart from the technical capabilities of the utilized platform.

Abbreviations

ICT- Information and Communication Technology, SERVQUAL –Service Quality Framework

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