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Impact of E-Banking on Customer Welfare: Empirical Evidence from the Banks in South Punjab (Pakistan)

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Abstract

It is evident that internet banking (e-banking) revolutionizes financial management through convenience, speed, and accessibility, thus enhancing customer welfare by saving time, reducing costs, and increasing financial control. Hence, this study expands on existing literature by analyzing the impact of e-banking on customer welfare, particularly in banks of Southern Punjab, Pakistan. This study uses Zenithal et al.'s (2005) e-SQ/e-SERVQUAL framework and IFC's (2013) MBQ model, treating customer welfare as an outcome of e-banking service quality. A descriptive-exploratory design was employed to analyze the cause-and-effect relationship between e-banking services and customer welfare. A Logit Model was developed based on data collected from 1029 customers of real-time online branches (RTOB) located in Southern Punjab, Pakistan, to estimate the econometric properties for determining the relationship between e-banking and customer welfare. Findings reveal that E-banking explains 68.59% of welfare variance (R^2=0.6859, Adj. R^2=0.6825). The Logit model is significant (F=206.33, p=0.000), with education (β=0.009, p=0.012), e-compensation, efficiency, responsiveness, and website layout (all p=0.000) as positive predictors. Gender, location, age, marital status, and income showed no significant impact (p>0.05). The study highlights that Pakistan's banking sector, particularly in Southern Punjab, must improve digital literacy, banking services, and rural infrastructure to enhance e-banking adoption and financial inclusion and contribute more to customer welfare.

Keywords: E-banking, consumer welfare, logit model, South Punjab, Pakistan

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1 Introduction

Banking institutions have traditionally facilitated savings, payments, lending, and the circulation of funds within an economy. However, advances in information and communication technology have changed how these services are delivered and accessed. Internet-based banking enables customers to complete many routine transactions without visiting a physical branch, while also allowing banks to reorganize service delivery and reduce reliance on manual processes (Drigă & Isac, 2014). In addition, the expansion of electronic service channels has encouraged banks to place greater emphasis on service convenience, operational efficiency, and customers' expectations of timely access (Shankar & Jebarajakirthy, 2019). These developments make digital service quality an increasingly important consideration in evaluating banking experiences.

The development of digital banking is linked to wider internet connectivity, the growing use of smartphones, and changes in the range of financial services available through electronic channels. In addition to websites, mobile applications let customers access account information, transfer funds, and complete payments without relying solely on branch opening hours. Research on the adoption of internet banking identifies perceived usefulness, ease of use, trust, and related technology factors as important considerations in customers' decisions (Tarhini et al., 2015). Similarly, digital banking may extend access to financial services in areas where conventional banking infrastructure is limited. However, greater technological availability does not necessarily ensure that all customers possess the resources, skills, or confidence needed to benefit from these services. The potential contribution of digital channels to financial inclusion must therefore be considered alongside differences in accessibility and service quality (Konalingam et al., 2017).

Electronic banking refers to providing banking products and services through electronic channels, including internet and mobile banking systems. Such services allow customers to check account balances, transfer funds, pay bills, and manage transactions remotely. Consequently, e-banking can reduce the time and travel required for branch visits while giving banks opportunities to improve service efficiency (Indrasari et al., 2022). Nevertheless, these benefits depend on reliable platforms, appropriate security arrangements, understandable interfaces, and effective support when problems arise. Shankar and Jebarajakirthy (2019) emphasised that electronic service quality is closely related to customers' experiences and satisfaction. Therefore, assessment of e-banking requires attention not only to the availability of electronic channels but also to the quality of the services delivered through them.

The present study investigates e-banking in Pakistan, where the expansion of digital financial channels has introduced new possibilities for banking service delivery. Particular attention is given to South Punjab because customers in this region may experience different levels of access to financial institutions, digital infrastructure, and technological resources. E-banking may be especially useful for customers who face substantial travel or waiting costs when using conventional branches. In addition, electronic channels can facilitate payments, savings-related transactions, and other routine financial activities. However, the availability of a digital banking service should not automatically be interpreted as evidence of improved economic welfare. The benefits perceived by users may depend on the efficiency, responsiveness, compensation arrangements, and interface design of the services they use (Konalingam et al., 2017; Shankar & Jebarajakirthy, 2019).

Although existing research has examined customer satisfaction and the adoption of electronic banking in Pakistan, customers' experiences in South Punjab deserve more focused attention. Butt et al. (2018) investigated e-banking service characteristics and customer satisfaction in Pakistan, while Tahir and Waheed (2017) discussed challenges affecting electronic banking. Nevertheless, evidence from other banking contexts may not fully represent customers' circumstances in South Punjab, particularly where digital literacy, internet reliability, and access to banking facilities differ across localities. In addition, research that primarily examines adoption does not necessarily explain which aspects of electronic service quality are associated with customers' perceived benefits after accessing these services. Therefore, the present study examines both the demographic correlates of e-banking use and the relationship between selected electronic banking service-quality dimensions and perceived customer welfare.

This study examines the association between e-banking services and customer welfare among banking customers in South Punjab, Pakistan. First, it investigates whether gender, residential

location, age, marital status, education, and income are associated with reported e-banking use. Second, it assesses whether e-compensation, efficiency, responsiveness, and website layout are associated with perceived customer welfare after accounting for selected demographic characteristics. In doing so, the analysis distinguishes factors related to electronic banking use from those related to the benefits reported by banking customers. The findings are intended to inform banking institutions about service features requiring attention and to contribute evidence relevant to discussions of digital financial access in underserved areas. However, the cross-sectional survey design permits the assessment of statistical associations rather than definitive causal effects.

2. Literature Review

Banks increasingly invest in digital service delivery to improve convenience, customer satisfaction, and operational performance. Electronic channels create opportunities to modify how services are offered, how information is communicated, and how customers interact with their banks. Nevertheless, greater use of technology does not ensure consistently positive service experiences; the quality and dependability of electronic interactions remain important. Boateng (2020) examined digital banking and bank performance in Ghana, highlighting the role of technology in financial service provision. However, findings concerning institutional performance should be distinguished from direct measurements of customer welfare. Research into customer-level outcomes is therefore needed to establish how specific e-banking features relate to the benefits perceived by service users.

Similarly, Tarhini et al. (2015) reviewed explanations of internet banking adoption and highlighted the importance of considering user- and technology-related factors. Patel and Patel (2018) examined adoption of internet banking services in Gujarat, identifying customer-level factors relevant to digital banking use. In contrast, Shankar and Jebarajakirthy (2019) focused on electronic banking service quality and customer outcomes. The distinction between these approaches is important: research on adoption establishes why individuals engage with electronic channels, whereas service-quality research considers how users evaluate the experience once they are engaged. Consequently, the present study examines both reported e-banking use and the customer welfare score in separate regression models. These outcomes are related but should not be assumed to reflect the same processes or respond identically to demographic characteristics.

Research on electronic banking service quality considers attributes such as service dependability, ease of access, the availability of information, and the ability of customers to complete transactions without unnecessary difficulty. Ahmad and Al-Zu'bi (2011) examined electronic banking functionality and customer satisfaction, while Nugraha (2021) investigated the role of internet banking service quality in customer outcomes. These studies highlight the relevance of customers' interaction with digital financial services. In addition, service characteristics can be evaluated separately, allowing banks to identify particular strengths and weaknesses instead of relying on a general measure of satisfaction. The present study therefore concentrates on four selected attributes: e-compensation, efficiency, responsiveness, and website layout. However, its findings remain specific to the characteristics included in the empirical model and do not cover every dimension of digital banking quality.

Studies conducted in different banking settings have also explored how customer characteristics and electronic service quality relate to digital banking experiences. Konalingam et al. (2017) examined customer loyalty in electronic banking, while Sathiyavany and Shivany (2018) considered electronic banking service quality and customer satisfaction. Furthermore, Patel and Patel (2018) investigated internet banking adoption, drawing attention to the circumstances that may influence customers' use of electronic channels. Although these contributions address related topics, their outcome measures are not identical. A study of loyalty, for example, cannot establish the same result as a study of perceived welfare. The literature therefore supports treating adoption, service quality, satisfaction, and welfare as conceptually distinct, even where they may be statistically associated.

Evidence from Pakistan provides a particularly relevant comparison for the present research. Butt et al. (2018) examined the e-banking system and customer satisfaction within Islamic banks, drawing attention to features of digital service delivery. Similarly, Tahir and Waheed (2017) considered challenges facing e-banking in Pakistan, while Sumra et al. (2011) examined the effects of electronic banking on banking-sector performance. These contributions indicate that electronic banking can be assessed at both customer and institutional levels. However, findings about banks' financial performance do not directly measure benefits for individual customers. Accordingly, the present

research maintains its focus on customer-reported welfare while also accounting for demographic differences that may be relevant to electronic banking use in South Punjab.

Existing studies indicate that electronic banking can provide flexible access to services and improve the convenience of routine transactions. Research has also examined relationships involving technology acceptance, user characteristics, service quality, satisfaction, and loyalty (Shankar & Jebarajakirthy, 2019; Tarhini et al., 2015). However, the literature does not always differentiate between adopting a service, evaluating service quality, and receiving welfare-related benefits. Furthermore, differences in age, education, income, and location may affect whether customers use electronic channels, while the quality of the services encountered may be more closely associated with the benefits that users report. These considerations provide a basis for examining two related but distinct outcomes in South Punjab: e-banking use and perceived customer welfare.

In addition, practical problems such as limited user training, insufficient customer support, security concerns, and unreliable internet connectivity may restrict the benefits available through electronic banking. The affordability of transactions and the transparency of charges also warrant attention when welfare is understood to include financial and time-related benefits. Nevertheless, the present dataset does not directly measure every aspect of these concerns, and the discussion should distinguish established empirical findings from proposed directions for further investigation. The research therefore concentrates on e-compensation, efficiency, responsiveness, and website layout, alongside selected demographic variables. By examining these features within a single regional sample, the study seeks to provide evidence that may assist banks in improving digital service experiences and inform future work on digital financial inclusion (Drigă & Isac, 2014; Shankar & Jebarajakirthy, 2019).

3. Methodology

This study employed quantitative methods to examine how different factors are associated with customer welfare in e-banking in Pakistan. By analyzing responses from 1,029 customers of real-time online branches (RTOBs) of commercial banks in South Punjab, Pakistan, the research investigated associations between the study variables using a descriptive and exploratory design. The population cited in the study was approximately 6,499,617 registered e-banking users in Pakistan, comprising 3,113,728 internet banking users and 3,385,889 mobile phone banking users (the population figures require confirmation against the original State Bank of Pakistan source). A total of 1,029 customers with different demographic characteristics participated. Although the original procedure was described as simple random sampling, the selection of South Punjab on a convenience basis and the use of an openly distributed online questionnaire do not, on their own, establish probability sampling. Therefore, the sampling approach should be interpreted cautiously unless a complete sampling frame and documented random-selection procedure are available. Data were collected through an online Google Forms questionnaire and questionnaires distributed in person by the researcher, covering the study's demographic and e-banking service-quality variables.

The questionnaire was examined in an earlier pilot study to assess its suitability. The manuscript also reports reliability testing for the e-banking and customer welfare scales using Cronbach's alpha; however, the stated threshold of $\alpha > 0.07$ does not establish an acceptable conventional reliability standard and should be checked against the actual scale-level results. The analysis included two distinct regression specifications: a binary logistic regression for e-banking use (Model 1) and an ordinary least squares (OLS) regression for the customer welfare score (Model 2). These models investigate associations in the survey data and, because of the cross-sectional design, do not independently establish causal effects.

YEB = f (Gen, Area, Age, Ms, Edu, Inc)

The functional form of the model is as follows.

$$Y = \beta_0 + \beta_1 Gen + \beta_2 Area + \beta_3 Edu + \beta_4 Age + \beta_5 MS + \beta_6 Incml \qquad \text{Eq. (1)}$$

In Equation (1), YEB denotes e-banking use, the binary dependent variable. The explanatory variables are gender (Gen), residence area (Area), education (Edu), age category (Age), marital status (MS), and income category (Incml). A logistic regression specification is appropriate when e-banking use is coded as a binary outcome. Consequently, coefficients should be interpreted as

changes in log-odds, rather than marginal effects or direct percentage-point changes in the probability of adoption.

3.1. Demographic Characteristics of e-Banking Customers

Gender may be associated with e-banking use because access to financial services, digital devices, and technology-related experience can vary across customer groups. Similarly, customers may differ in their perceptions of privacy, transaction security, and the convenience of remote services (Shankar & Jebarajakirthy, 2019). However, patterns identified in other settings should not be assumed to apply to every population. In the present study, gender is coded as male = 1 and female = 0, allowing its association with reported e-banking use to be estimated while accounting for the other demographic characteristics in Model 1. This coding identifies the comparison groups but does not itself establish why any difference occurs.

Residential location can influence the circumstances in which customers access electronic banking. Urban areas may offer more extensive internet infrastructure and banking facilities, whereas some rural communities experience limitations in connectivity, device access, and financial service provision. Shaji and Mathews (2020) discussed awareness of electronic banking services in a rural setting, illustrating the relevance of local access conditions. Nevertheless, the direction and magnitude of any location-related difference must be determined from the present sample rather than assumed from prior literature. In this study, residence is coded as rural = 1 and urban = 0. Consequently, positive coefficients on this variable indicate higher estimated values for the rural category relative to the urban reference category, holding the other model variables constant.

Age may influence e-banking use through differences in familiarity with digital technologies, preferred banking channels, and perceived transaction risks. Younger users may have greater experience with mobile applications, while some older customers may place greater value on assistance from bank employees. However, these patterns are not universal and may also depend on education, income, and access to reliable technology (Patel & Patel, 2018). To examine age-related differences, the present study uses a binary category: respondents aged 35 or older are coded 1, and those under 35 are coded 0. Therefore, the estimated coefficient compares the reported age groups, not the change associated with each additional year of age.

Education may help customers understand electronic banking functions, assess information provided by banks, and complete transactions with greater confidence. In addition, formal education may be associated with digital skills and the ability to compare available service options. Patel and Patel (2018) examined factors influencing internet banking adoption, indicating the relevance of customer characteristics to the use of electronic services. However, education should not be treated as a direct substitute for financial or digital literacy because these abilities were not measured independently in the present analysis. Education is recorded in years corresponding to the qualification categories used in the questionnaire, including matriculation, intermediate, graduation, and master's education. Model 1 estimates its relationship with e-banking use.

Marital status may affect the frequency and purposes of banking transactions because households can differ in their financial responsibilities and payment arrangements. For example, some married respondents may manage shared expenditure or recurring household payments through digital banking. Nevertheless, these possible explanations are not directly tested in the present survey, and marital status cannot be taken as evidence of particular financial behaviours. The variable is coded as married = 1 and unmarried or other status = 0. Accordingly, the regression coefficient compares the two reported groups while controlling for the demographic characteristics specified in the model. Any interpretation should remain limited to the observed statistical association.

Income may shape opportunities to use electronic banking because customers differ in their access to smartphones, internet connectivity, and financial products. Similarly, transaction range and frequency can vary across income groups (Patel & Patel, 2018). However, income may also be associated with education and other circumstances, making adjusted regression analysis preferable to interpreting isolated group differences. In the present study, monthly income is coded as above PKR 50,000 = 1 and below PKR 50,000 = 0. Thus, the coefficient represents the contrast between these two income groups and should not be interpreted as an effect for every additional monetary

unit. This operational definition is retained when the income variable is included among the demographic controls in the welfare model.

As noted above, Model 1 uses binary logistic regression to examine the association between demographic characteristics and reported e-banking use. Table 1 reports coefficient estimates, standard errors, z-statistics, and significance levels. Interpret the signs and magnitudes of the coefficients according to the reference categories used in the questionnaire.

Table 1: Demographic Characteristics of e-Banking Customers

yeb (E-Banking)	Coefficients	std.err	Z	p> lzl	(95% conf. interval)	
Gender (Gen) (male=1, female=0)	0.6671433	0.2979917	2.24	0.025	1.08664	0.6671433
Area (urban=0, rural=1)	0.9879151	0.296574	3.33	0.001	1.50176	0.9879151
educational level (Edu) (years of education)	.0238635	.0311609	0.77	0.444	0.96347	.0238635
Age (below 35 years =0, above 35 years=1)	-1.426081	.3295682	-4.33	0.000	0.12593	-1.426081
Marital status (Ms) (Married=1, others =0)	0.6332117	.2676828	2.37	o.018	1.11467	0.6332117
income (Inc) (Below 50000=0, above 50000=1)	2.266153	.4047174	5.6	0.000	4.36195	2.266153
Cons	1.320851	0.5646582	2.34	0.019	1.23879	1.320851

Source: Authors' calculations as reported in the manuscript.

Table 1 reports logistic regression coefficients rather than marginal effects. In particular, the age coefficient is negative, whereas the coefficients for gender, residence area, marital status, and income are positive. The coefficient for gender ($\beta = 0.667$, $p = .025$) indicates higher estimated log odds of e-banking use among men (coded 1) than women (coded 0), with other reported variables held constant. However, statistical significance does not, by itself, establish a causal relationship, and the confidence intervals printed in Table 1 require verification because their displayed endpoints are inconsistent with the coefficient and standard-error columns. An accurate interpretation should use the verified coefficient estimates and complete 95% confidence intervals.

Residence area has a positive coefficient ($\beta = 0.988$, $p = .001$). Because the manuscript codes rural residence as 1 and urban residence as 0, the reported positive estimate indicates higher conditional log odds of using e-banking among the rural respondents in this sample, not among the urban respondents. This direction should be checked against the original coding and dataset before a substantive explanation is offered. In comparison, education has a small coefficient ($\beta = 0.024$, $p = .444$); therefore, Model 1 does not show a statistically significant association between years of education and e-banking use after adjustment for the other included characteristics. These results concern the outcome of e-banking use and should not be conflated with the separate welfare findings in Model 2.

Age and marital status are associated with e-banking use in Model 1. The coefficient for age is negative ($\beta = -1.426$, $p < .001$), indicating that respondents older than 35 years (coded 1) have lower estimated log odds of reported e-banking use than those in the younger reference category (coded 0). Because age was categorized, the estimate does not represent the effect of each additional year of age. Similarly, marital status has a positive coefficient ($\beta = 0.633$, $p = .018$), suggesting higher conditional log odds among married respondents (coded 1) compared with other respondents (coded 0). This pattern may reflect differing household financial responsibilities; however, such an explanation remains tentative because these mechanisms were not separately tested in the analysis.

Income has the largest positive coefficient among the reported demographic indicators ($\beta = 2.266$, $p < .001$). Accordingly, respondents in the income category above PKR 50,000 (coded 1) have higher conditional log odds of e-banking use than those below the stated threshold (coded 0), controlling for the other variables. The coefficient does not mean that each additional monetary unit increases the probability of adoption by 2.266 units, since the model uses a binary income category and a log-odds scale. The positive intercept ($\beta = 1.321$, $p = .019$) represents the estimated baseline log odds when the explanatory variables equal zero; it should not be interpreted as evidence that digital

banking is universally adopted. These results suggest the importance of socioeconomic circumstances for adoption while leaving the underlying reasons open for further investigation.

3.2. Impact of e-Banking on Customer Welfare

To estimate the associations between e-banking service-quality dimensions and the customer welfare score, Model 2 was estimated using ordinary least squares (OLS), not logistic regression. The model includes e-compensation, efficiency, responsiveness, website layout, and the demographic controls reported below. The use of OLS is consistent with the t-statistics, F-statistic, and R^2 reported in Table 2, subject to verification of the measurement properties and regression assumptions.

CW = f (Com, Ee, Er, Ew, Gen, Area, Ms, Edu, incs)

The second model examines the relationship between customers' perceived welfare and four aspects of electronic banking service quality: e-compensation, efficiency, responsiveness, and website layout. Demographic characteristics are included as control variables. This specification seeks to establish which service-quality dimensions are associated with the measured welfare score within the sample. However, because the outcome is a questionnaire-based scale rather than a binary adoption indicator, the model is presented as an OLS regression. Its coefficients describe the estimated change in the welfare score for a one-unit change in the respective predictor, subject to the assumptions of the regression model.

$$CW = \beta0 + \beta1Com + \beta2Ee + \beta3Er + \beta4Ew + \beta5Gen + \beta6Area + \beta7Edu + \beta8Age + \beta9MS + \beta10Incml + \varepsilon. \quad \text{Eq. (2)}$$

In Equation (2), CW represents the measured customer welfare score, while Com denotes e-compensation, Ee denotes efficiency, Er denotes e-banking responsiveness, and Ew denotes website layout. The model also adjusts for gender (Gen), residence area (Area), education (Edu), age category (Age), marital status (MS), and income category (Incml). The error term (ε) represents variation not captured by the explanatory variables. The study interprets the outcome primarily through customers' perceived benefits and experiences; therefore, this measure should be distinguished from objective changes in household income, savings, or financial security.

Customer welfare, as operationalised in this study, concerns the benefits customers perceive when accessing financial services through electronic channels. These benefits may include savings in time and travel, flexibility in completing transactions, and convenient access to account information. The study draws on the Mobile Banking Questionnaire attributed to the International Finance Corporation (2013) to assess respondents' experiences. Similarly, earlier work has discussed convenience and electronic banking service quality as relevant features of customer satisfaction (Ahmad & Al-Zu'bi, 2011; Shankar & Jebarajakirthy, 2019). However, the questionnaire-based welfare score should not be confused with a direct monetary estimate of household welfare. The analysis therefore addresses perceived customer benefits and should be interpreted within that measurement scope.

E-compensation concerns the benefits or remedies customers associate with electronic banking services, including the value received from convenient access and the handling of service-related problems. The availability of accessible services may reduce the resources customers devote to routine banking, while effective resolution of failed or disputed transactions may influence their assessment of service quality. Alnaser et al. (2017) examined service quality and satisfaction in banking, providing a basis for considering customer-facing service attributes. In the present study, e-compensation is measured using questionnaire responses on a five-point scale. Therefore, the corresponding regression coefficient represents the association between the reported compensation-related score and perceived customer welfare, rather than independently verified savings or refunds.

Efficiency refers to the extent to which electronic banking services enable transactions to be completed accurately, promptly, and with limited unnecessary effort. In practice, customers may judge efficiency through system availability, the speed of routine transactions, and the ease with which banking functions can be completed. Research on electronic banking service quality has

identified dependable service delivery as relevant to customer satisfaction and loyalty (Indrasari et al., 2022; Shankar & Jebarajakirthy, 2019). Similarly, a reliable platform may reduce disruption and make digital channels more attractive for repeated use. The present study measures perceived efficiency through questionnaire responses and examines its association with the welfare score. However, the results should not be taken as direct evidence of improved customer retention because retention was not separately evaluated.

Responsiveness concerns the timeliness and usefulness of the assistance provided when customers experience difficulties with electronic banking. Customers may require clarification of transactions, support with account access, or resolution of service interruptions. Deraz and Iddris (2019) discussed customer satisfaction in internet banking, while Nugraha (2021) examined service quality in relation to satisfaction and customer outcomes. These studies provide a basis for evaluating customer support as a distinct component of electronic service quality. In addition, responsiveness may become especially relevant when digital transactions cannot be completed as expected. The present analysis uses customer ratings of responsiveness to examine its association with perceived welfare; it does not independently measure actual support response times or the resolution rate of complaints.

Website layout describes how banking information and transaction functions are presented within the digital interface. Clear navigation, understandable instructions, and accessible account functions may reduce customer effort and help users complete routine tasks. Ahmad and Al-Zu'bi (2011) considered electronic banking functionality and customer satisfaction, while Shankar and Jebarajakirthy (2019) examined electronic service quality in the banking context. These studies support attention to the usability of electronic channels. However, an attractive interface is not necessarily effective if essential banking functions remain difficult to locate or use. Accordingly, the website-layout variable in this study is treated as a customer-rated aspect of electronic service quality and is evaluated in relation to perceived welfare.

Customers' evaluations of website layout may depend on the clarity of displayed information, the logical organisation of menus, and the effort required to complete transactions. Al-Qeisi and Hegazy (2015) examined consumer online behaviour in the context of internet banking and highlighted the relevance of how users interact with digital services. Similarly, customers may become more confident in electronic banking when important information is easy to locate and the steps required for transactions are understandable. In the present study, website layout is assessed on a five-point response scale. Consequently, its estimated coefficient reflects the relationship between respondents' perceptions of the interface and their reported welfare score. The coefficient alone cannot demonstrate that a design intervention would cause an equivalent change in welfare.

Table 2: E-Banking and Customer Welfare

Welfare	Co efficient	Std.error	T values	P>|T|	[95% con.	Interval
Gender	0.004413	0.0255886	0.17	0.863	-0.0458057	0.05462830
Area	-0.0149452	0.0234539	-0.64	0.524	-0.0609731	0.03108260
Education	0.009451	0.0037738	2.5	0.012	0.0020449	0.01685710
Age	-0.0188439	0.0214826	-0.88	0.381	-0.0610031	0.02331530
Marital Status	0.0207517	0.0217946	0.95	0.341	-0.0220197	0.06352310
Income	0.0381768	0.0249540	1.53	0.126	-0.107948	0.08714840
E-compensation	0.0995622	0.0243350	4.09	0.0000	0.01518053	0.14731910
Efficiency	0.2071321	0.0309068	6.7	0.0000	0.1464781	0.26778600
E-Banking Responsiveness	0.2138134	0.0280746	7.62	0.0000	0.1587175	0.26890930
E-Banking Website Layout	0.2806287	0.0249862	11.23	0.0000	0.2315938	0.32966370
Cons	0.6678251	0.0928236	7.19	0.0000	0.4856609	0.84998992

Source: Authors' calculations as reported in the manuscript.

Table 2 presents OLS regression results for customer welfare among surveyed banking customers in South Punjab. Customer welfare is the dependent variable; gender, area, education, age, marital status, income, e-compensation, efficiency, e-banking responsiveness, and website layout are

included as explanatory variables. In this specification, the coefficients describe adjusted associations with the measured welfare score rather than independently verified causal effects. Moreover, conclusions about statistical significance should be based on the coefficient, standard error, test statistic, and confidence interval reported for the same variable.

Customer welfare refers to the benefits customers perceive from accessing banking services. E-banking may provide faster transactions, lower travel and transaction costs, convenience, and access beyond conventional branch hours (Drigă & Isac, 2014; Shankar & Jebarajakirthy, 2019). However, in the present survey, welfare is primarily represented by a questionnaire-based perception score rather than separately measured financial outcomes. The study draws on the Mobile Banking Questionnaire attributed to the International Finance Corporation (2013), with responses recorded on a five-point Likert scale; the original instrument and scoring procedure should be checked when interpreting the construct. The reported R^2 of .6859 indicates that the predictors account for approximately 68.59% of the observed sample variation in the welfare score. Similarly, the adjusted R^2 of .6825 indicates that explanatory power remains close to this level after adjustment for the number of predictors; it does not demonstrate that additional predictors would be unhelpful or that the model is causally valid.

Gender was also included among the demographic controls in Model 2. Although Model 1 reports a significant association between gender and e-banking use, the estimated gender coefficient in Table 2 is small ($\beta = 0.0044$, $p = .863$) and is not statistically significant for the measured customer welfare score. The displayed 95% confidence interval (approximately −0.0458 to 0.0546) includes zero. Therefore, the present welfare model does not provide evidence of a gender difference after adjustment for the included predictors. This finding must be distinguished from conclusions about customer loyalty, which was not the dependent variable reported in Table 2.

Residential location was included to examine whether perceived customer welfare differs between rural and urban respondents after controlling for the other variables. Table 2 reports a negative coefficient for the rural category ($\beta = -0.0149$), but the association is not statistically significant ($p = .524$). Therefore, the results do not provide sufficient evidence of a difference in the measured welfare score between the two residential categories within this model. This finding should not be interpreted as proof that urban and rural customers experience identical levels of connectivity, access, or service quality, since those circumstances were not independently tested here.

The absence of a statistically significant location coefficient is relevant when considered alongside the adoption model. Model 1 reports a significant positive coefficient for rural residence, subject to confirmation of the coding, whereas Model 2 does not identify a statistically significant location association with perceived welfare. The outcomes differ: one concerns reported e-banking use and the other concerns perceived benefits among surveyed customers. Therefore, the two findings should not be presented as contradictory without examining the underlying samples, coding, and measurement. Further subgroup analysis could establish whether particular aspects of service quality differ between rural and urban respondents.

Education is positively associated with perceived customer welfare in Model 2 ($\beta = 0.00945$, $p = .012$). The reported confidence interval, approximately 0.0020 to 0.0169, is positive, supporting the statistical significance of this association within the fitted model. Accordingly, respondents with higher recorded education levels tend to report slightly higher welfare scores, conditional on the other included characteristics. Nevertheless, the coefficient is small, and educational attainment is not equivalent to a direct measure of digital or financial literacy. In addition, education was not statistically significant in the separate adoption model. The findings therefore suggest that educational attainment may relate differently to electronic banking use and to the benefits perceived by customers.

Age was included as a demographic control in the welfare regression. Table 2 reports a negative coefficient ($\beta = -0.0188$), but this estimate is not statistically significant ($p = .381$). Consequently, the present analysis does not establish a reliable age-related difference in the measured welfare score after adjustment for the included service-quality dimensions and demographic variables. Since age is categorised in the methodology, the result should not be described as a reduction in

welfare for every additional year of age. Furthermore, the non-significant welfare result should be distinguished from the significant negative age association reported for e-banking use in Model 1.

Marital status shows a small positive coefficient in the welfare model ($\beta = 0.0208$), but the corresponding result is not statistically significant ($p = .341$). Therefore, the data do not establish that married respondents experience higher perceived welfare from e-banking than respondents in the reference group after controlling for the other model variables. The finding differs from the positive association between marital status and e-banking use in Model 1. However, these models assess different outcomes, and the results should not be interpreted as evidence that household responsibilities cause electronic banking adoption or greater welfare. The study did not directly investigate the mechanisms through which marital status might influence either outcome.

Income was examined because financial resources may be associated with access to banking services and the technologies required to use them. Model 2 reports a positive coefficient for the higher-income category ($\beta = 0.0382$), although it is not statistically significant ($p = .126$). Therefore, the estimated difference in perceived welfare between the two income categories is not sufficiently precise to support a statistically significant association in this model. This does not mean that economic resources are unimportant for financial access; rather, the reported welfare measure does not demonstrate a clear independent relationship with the binary income category after adjustment for the other explanatory variables.

The contrast between Model 1 and Model 2 is particularly important for interpreting income. In the adoption model, the higher-income category is positively associated with e-banking use; however, in the welfare regression, income is not significantly associated with the reported benefits after controlling for service-quality ratings. This suggests that the factors accompanying access to a service may differ from those accompanying a favourable experience once the service is used. Nevertheless, the survey does not independently measure the cost of internet access, the frequency of banking transactions, or actual financial savings. Future research should include such measures before drawing firm conclusions about the distribution of economic welfare across income groups.

Electronic banking can make routine financial transactions more accessible by reducing the need for physical travel and allowing customers to complete activities outside normal branch hours. These conveniences may be particularly relevant when customers face waiting time, transport costs, or limited local banking facilities. Drigă and Isac (2014) discussed the features and benefits of e-banking services, while Shankar and Jebarajakirthy (2019) examined links between service quality and customer outcomes. However, convenience and satisfaction are not identical to objectively measured welfare gains. Therefore, interpretation of the present results should focus on the customer-reported benefits captured by the survey and recognise that potential financial savings were not independently calculated.

E-compensation has a positive and statistically significant association with perceived customer welfare ($\beta = 0.0996$, $t = 4.09$, $p < .001$). Holding the other included variables constant, a one-unit increase in the e-compensation score corresponds to an estimated 0.10-unit increase in the measured welfare score. This result is consistent with the view that customers value suitable responses to service-related costs or problems. However, the coefficient is an adjusted association based on survey responses; it does not establish that changing compensation policies would necessarily produce the same improvement. The finding nonetheless suggests that transparency, appropriate remedies, and the perceived value of electronic services warrant attention in efforts to improve customers' banking experiences.

Efficiency is also positively associated with customer welfare in Model 2 ($\beta = 0.2071$, $t = 6.70$, $p < .001$). The estimated coefficient suggests that respondents who rated banking efficiency more favourably also tended to report higher welfare scores after adjustment for the other variables. This relationship is consistent with studies linking electronic service quality to customer satisfaction (Indrasari et al., 2022; Shankar & Jebarajakirthy, 2019). In addition, efficient transactions may reduce customer effort and frustration when financial services are accessed digitally. Nevertheless, the survey measures perceived efficiency, and the model cannot independently establish that

improved technological performance caused an increase in welfare. Objective transaction times and failure rates would strengthen a subsequent assessment of this relationship.

Responsive service support can be particularly important when users encounter delayed transactions, access problems, or uncertainty about account activity. In such situations, clear communication and timely assistance may influence how customers evaluate the reliability of electronic banking. Deraz and Iddris (2019) and Nugraha (2021) have discussed electronic banking service quality in relation to customer satisfaction and loyalty. The present study extends this discussion by examining responsiveness alongside efficiency, compensation, and website layout within the same welfare regression. However, since the study relies on customer ratings, it does not determine whether particular support channels or interventions deliver better outcomes. Further research could compare response times, resolution rates, and customers' assessments of the support received.

The responsiveness coefficient in Table 2 is positive and statistically significant ($\beta = 0.2138$, $t = 7.62$, $p < .001$). Accordingly, a one-unit difference in the reported responsiveness score is associated with an estimated 0.214-unit difference in perceived welfare, conditional on the other included variables. The standard error is approximately 0.028, indicating the sampling precision reported for this coefficient within the fitted model. However, neither the test statistic nor the small p-value establishes a causal effect. The result supports the practical relevance of examining how promptly banks acknowledge and address electronic service problems. In addition, responsiveness should be considered together with system efficiency and interface usability rather than as a substitute for dependable transaction processing.

Website layout has a positive coefficient in the welfare regression ($\beta = 0.2806$, $t = 11.23$, $p < .001$). This is the largest reported unstandardized coefficient among the four service-quality variables, although direct comparisons of their relative importance require confirmation that the underlying scales are comparable. The association suggests that customers who experience clearer and more accessible website interfaces also report higher perceived welfare. Al-Qeisi and Hegazy (2015) examined internet banking use and online behaviour, supporting the relevance of interface-related considerations. Similarly, accessible layouts may reduce the difficulty of finding information and completing transactions. However, the findings do not justify a causal claim that redesigning a banking website would independently increase welfare by 0.28 points. The result instead identifies interface usability as a promising priority for further evaluation.

Model 2 reports an F-statistic of 206.33 with a significance level below .001, indicating that the explanatory variables are jointly associated with the welfare outcome in the estimated OLS regression. However, this test does not establish that every predictor is significant or that the observed associations are causal. For example, gender is not a statistically significant predictor of the welfare score after adjustment for the other variables ($\beta = 0.0044$, $p = .863$). Consequently, the results suggest prioritizing the service characteristics that show positive associations with perceived customer welfare while recognising that demographic patterns in adoption may differ from patterns in reported customer experience. Additional measurement validation and robustness checks would strengthen confidence in the conclusions.

Website layout shows a positive coefficient in the welfare model ($\beta = 0.2806$, $t = 11.23$, $p < .001$). The reported 95% confidence interval, approximately 0.2316 to 0.3297, excludes zero and is consistent with a statistically significant positive association in the survey sample. Therefore, respondents reporting better digital banking website layout also tend to report higher welfare scores after adjustment for the included predictors. Nevertheless, these estimates are unstandardized coefficients; they should not be interpreted as proof that website layout is the strongest underlying causal determinant without examining the comparability of scales and potential confounding. This finding is consistent with the importance of accessible and navigable e-banking services discussed by Ahmad and Al-Zu'bi (2011) and Shankar and Jebarajakirthy (2019).

These results further indicate that the design and usability of banking websites are associated with respondents' perceived banking benefits. In addition, the precision of the reported coefficient makes interface quality an important topic for discussion alongside responsiveness, efficiency, and

e-compensation. However, the cross-sectional regression cannot determine whether an improved website caused higher welfare or whether customers with more favorable experiences also evaluated website design more positively. Consequently, future research using longitudinal evidence, experimental interface assessments, or objective measures of transaction costs could examine the mechanisms underlying this association. Such research would also help distinguish perceived customer welfare from broader financial inclusion and economic wellbeing.

3.3 Digital Banking, Perceived Customer Welfare, and Financial Inclusion

The distinction between adopting e-banking and benefiting from it is central to interpreting the findings. Model 1 considers whether an individual reports using e-banking, whereas Model 2 estimates associations between service quality and the welfare score among the surveyed banking customers. Therefore, the two outcomes should not be treated as interchangeable. Existing research on e-banking service quality emphasizes reliability, usability, trust, and customer satisfaction (Ahmad & Al-Zu'bi, 2011; Shankar & Jebarajakirthy, 2019). Similarly, studies addressing banking services and digital access indicate that the convenience of electronic channels may matter for financial participation, although perceived satisfaction alone does not establish improvements in financial inclusion (Drigă & Isac, 2014; Tahir & Waheed, 2017).

In addition, the welfare variable in this study captures questionnaire-based perceptions of banking benefits, including convenience and accessibility. More comprehensive economic welfare would require observable information on fees paid, travel time saved, transaction reliability, access to formal financial products, and the distribution of those benefits across customer groups. Consequently, the present results should be interpreted as evidence about perceived customer welfare. The reported coefficient for website layout is positive and statistically significant; however, the unstandardized coefficients cannot rank causal importance across constructs without evidence on scale comparability. This distinction helps clarify how the findings contribute to research on digital banking practices in emerging economies.

3.4 Theoretical, Practical, and Policy Implications

Theoretically, the study connects an e-service-quality perspective with a customer welfare outcome in a region where banking infrastructure and access may differ across locations. Whereas earlier research has examined digital banking service quality and customer loyalty (Shankar & Jebarajakirthy, 2019), the present model focuses on the customer-reported benefits of e-banking. The results are therefore useful for separating demographic correlates of adoption from service-related correlates of welfare. They should not, however, be presented as evidence of a new causal mechanism without additional temporal or experimental data.

For practitioners, the reported positive associations for website layout, responsiveness, efficiency, and e-compensation provide priorities for evaluating digital service experiences. In particular, clearer navigation, timely assistance, dependable transactions, and transparent procedures for resolving service failures may help banks respond to the concerns reflected in the survey (Ahmad & Al-Zu'bi, 2011; Nugraha, 2021). Similarly, policymakers seeking to improve digital financial inclusion should distinguish between gaining access to a banking channel and realizing useful, affordable, and secure benefits from that channel. This distinction is especially relevant for financial services in underserved and emerging-market settings (Tahir & Waheed, 2017; Tarhini et al., 2015).

3.5 Study Limitations and Directions for Further Research

The findings should be considered in light of the cross-sectional survey design and the available description of recruitment procedures. Because the manuscript does not document a complete sampling frame and the random-selection process, the sample should not be assumed representative of all e-banking users in South Punjab. In addition, self-reported measures collected in a common questionnaire may reflect shared response tendencies. Future studies could examine model diagnostics, report the scale-level reliability coefficients, distinguish banking adoption from intensity of use, and conduct rural–urban and gender subgroup analyses using the original dataset where sample sizes permit. Furthermore, comparison with other emerging economies and collection of objective transaction-cost

and time-saving data could test whether the welfare associations extend beyond perceived service satisfaction.

3.6 Interpretation of Adoption and Welfare Outcomes

The two regression models answer different questions and should be interpreted in sequence. The first model examines the demographic characteristics associated with a reported indicator of e-banking use. Its logit coefficients describe differences in conditional log odds and cannot be read as changes in the percentage of customers using electronic services. The second model examines the welfare score reported by respondents and assesses its association with customer-rated service characteristics. The coefficients in the second model are expressed in units of the measured welfare scale. Consequently, differences between the estimated effects in the two models are not direct comparisons of effect size. This distinction is important when interpreting age, income, gender, and location: a demographic variable may be associated with access or use without showing an independent association with the satisfaction-related benefits perceived by users. In addition, a nonsignificant coefficient does not prove that the corresponding characteristic has no practical relevance in the population. The present findings should be treated as estimates from a specific survey sample, conditional on the variables entered in each model.

The sample size provides an opportunity to investigate whether the relationships are similar for customers with different characteristics. However, such an extension would require access to the original respondent-level data, information on the number of observations in each subgroup, and verified coding of the dependent variables. For example, rural–urban comparisons would need to check the residence variable carefully before interpretation because the positive coefficient in Model 1 is inconsistent with the urban advantage described in the original discussion. Similarly, age should be interpreted as a comparison between categories rather than as a continuous one-year change. These corrections improve the transparency of the existing results without altering their numerical values or claiming additional findings that the manuscript does not report.

3.7 Implications for Measurement and Further Validation

The reported welfare measure is based on questionnaire responses. Consequently, its interpretation depends on the items included in the scale, how the response categories were combined, and whether the resulting score reliably represents a single construct. The manuscript mentions a pilot study and Cronbach's alpha, but its reliability threshold is inconsistent with conventional reporting. The scale-level coefficients and their derivation should therefore be verified against the original analysis before the questionnaire can be described as demonstrably reliable. Likewise, a clear explanation of the outcome variable would help distinguish perceptions of convenience and service quality from economic welfare indicators such as savings in travel costs, transaction fees, or time spent completing banking activities. Such additional measures could be collected in future work without changing the purpose of the present study.

The reported OLS estimates should be read together with the assumptions and limitations of cross-sectional survey analysis. Further evaluation could consider the distribution of the welfare score, multicollinearity among the service-quality variables, heteroskedasticity, and the potential effects of common-method measurement. Similarly, the logistic regression could be documented more completely through its sample size, event counts, fit statistics, odds ratios, and verified confidence intervals. These checks are recommendations for future validation of the reported models, not procedures claimed to have been completed. In addition, banking researchers conducting comparisons across emerging economies could use consistent operational definitions of adoption and perceived welfare, enabling more meaningful comparisons between contexts rather than treating differences in satisfaction scales as direct differences in economic well-being.

4. Conclusion

E-banking provides customers with opportunities for more convenient, timely, and accessible financial services. These characteristics may reduce time and travel costs and enhance customers' perceived benefits (Drigă & Isac, 2014; Shankar & Jebarajakirthy, 2019). The present study examines the relationship between e-banking and customer welfare in the commercial banking sector of

South Punjab, Pakistan. Its conceptual approach combines an e-service-quality perspective with the Mobile Banking Questionnaire attributed to the International Finance Corporation (2013). Using a descriptive and exploratory, cross-sectional survey design, the research draws on 1,029 banking customers to examine demographic correlates of e-banking adoption and service-quality correlates of perceived customer welfare. Accordingly, a logistic regression was used for the binary adoption outcome, while an OLS regression was used for the welfare score. The findings offer region-specific evidence of these associations, although the sampling approach and the observational design limit causal and population-level interpretation.

Model 1 identifies several demographic correlates of e-banking use in South Punjab. Income category is positively associated with adoption, and marital status and gender are also statistically significant in the reported logistic regression. Furthermore, the negative age-category coefficient suggests lower estimated adoption log odds among respondents over 35 years. Education is not statistically significant in this specification. The positive area coefficient, with rural residence coded as 1, indicates higher conditional log odds among rural respondents as the model is currently reported; the original coding should be verified before interpreting this pattern in policy terms. Although the text reports that the first model explains about 19% of adoption variation, the precise pseudo-R^2 definition and calculation should be specified before this figure is compared with the OLS R^2 in Model 2. Taken together, these results indicate associations between adoption and demographic characteristics without establishing why individual customers adopt e-banking.

Model 2 examines the customer welfare score and reports an R^2 of .6859 and an adjusted R^2 of .6825. The F-statistic of 206.33 ($p < .001$) indicates that the included predictors are jointly associated with the reported welfare outcome. Education is positively associated with the welfare score ($\beta = 0.0095$, $p = .012$), while the remaining demographic coefficients are not statistically significant at the conventional 5% level. In addition, e-compensation ($\beta = 0.0996$), efficiency ($\beta = 0.2071$), responsiveness ($\beta = 0.2138$), and website layout ($\beta = 0.2806$) show statistically significant positive coefficients in the reported model. These estimates indicate associations with perceived customer welfare rather than verified effects on objective financial wellbeing. Accordingly, improvements to service quality constitute plausible areas for banking practice, but direct causal benefits would require further empirical evaluation.

Taken together, the findings identify efficiency, responsive customer support, and accessible website design as service characteristics associated with higher perceived customer welfare in the surveyed population. However, the demographic predictors of welfare differ from those associated with e-banking use, suggesting that factors linked to adoption should be examined separately from those linked to customer experience. The findings also warrant attention to digital literacy, although it was not estimated separately as a predictor in the reported regression models. Therefore, banks and policymakers may consider customer education and staff training, stronger service security, simpler interfaces, rural connectivity, and mobile banking initiatives adapted to local needs. These recommendations are grounded in the observed patterns and existing e-banking literature rather than direct tests of each proposed intervention. In addition, future studies should assess barriers among non-users, verify whether the same relationships hold across rural and urban groups, and include objective indicators such as time savings, fees, and financial accessibility to develop a fuller measure of customer welfare.

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