

IMPACTS OF DEMOGRAPHY ON E-BANKING TRANSACTIONS OF INDIVIDUAL CUSTOMERS AT BIDV BAC LIEU

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ABSTRACT— The study investigates the impact of demographic factors on e-banking transactions of individual customers at BIDV Bac Lieu. Based on a literature review and available data, five demographic factors were identified. Daily transaction data from July 3 to August 31, 2024, provided by BIDV Bac Lieu, were analyzed to test the proposed model. The estimation results, obtained using the Ordinary Least Squares (OLS) method, reveal that gender, age, occupation, and income affect transaction volume, while gender, age and income influence transaction value. Based on these findings, the study offers several policy recommendations to enhance e-banking transactions.

Keywords—Demography, e-banking transaction, individual customer, bank, BIDV Bac Lieu.

I. INTRODUCTION

In response to globalization and the rapid advancement of technology, Vietnamese commercial banks have embraced digital transformation to meet evolving customer demands and enhance competitiveness [1]. This shift has led to the rise of e-banking services, enabling transactions via digital platforms like the Internet, mobile apps and ATMs. These services improve convenience, reduce costs and increase efficiency, addressing diverse customer needs.

For instance, Vietcombank, TPBank, VIB and Techcombank have launched innovative digital solutions to modernize services and expand market share. BIDV, established in 1975, has made notable strides in e-banking since 2014, integrating advanced technology, automating processes and collaborating with Fintech companies to enhance its ecosystem. Despite these advancements, challenges remain in fully deploying and developing e-banking services.

The case study at BIDV Bac Lieu focuses on understanding the impact of demographic factors on the adoption of e-banking services among individual customers. BIDV, a prominent Vietnamese commercial bank, has prioritized digital transformation to modernize its operations and improve competitiveness. At its Bac Lieu branch, more than 80% of customers are individual clients, businesses and households, making it crucial to tailor e-banking services to their needs.

Since its introduction of e-banking in 2014, BIDV has made significant strides in integrating advanced technologies, automating processes and collaborating with Fintech/Bigtech companies. These efforts have enabled the bank to offer a wide range of high-tech financial services, such as mobile applications, digital business processes and self-transaction systems. Despite this progress, the development and adoption of e-banking services face challenges, including limited diversity in services and customer engagement.

There are several individual factors which influence e-banking transaction, like gender, Income, Education, Age, and Occupation. There are several types of research conducted in several countries to identify the individual factors influencing the customer using e-banking. At BIDV also, a few types of research were conducted to identify the individual factors influencing the customer use of e-banking. Therefore, this study aims to investigate how demographic factors influence e-banking usage. By analyzing data from individual customers and applying a linear regression model, the study identifies key variables affecting adoption rates and their relative impact. Moreover, insights from this research aim to guide BIDV in enhancing e-banking services, improving customer satisfaction and strengthening its competitive position in the market.

Understanding the impact of demographic factors on e-banking adoption is essential for BIDV Bac Lieu to refine its digital strategy and better serve individual customers. Previous studies have highlighted key factors such as gender, age, income, occupation, and education in shaping e-banking usage patterns. However, variations across different banking institutions suggest the need for localized analysis. By leveraging statistical techniques, this research aims to quantify the influence of these factors, providing actionable insights for BIDV. Enhancing service accessibility, improving user experience, and addressing customer concerns are crucial for increasing adoption rates. Ultimately, this study contributes to the broader goal of accelerating digital transformation in Vietnam's banking sector.

II. LITERATURE REVIEW

E-banking is one of the most advanced services commercial banks offer today, with most banks in Vietnam actively encouraging its usage. Understanding the factors influencing customers' decisions to adopt e-banking

services is a critical concern for managers. Various studies have explored these factors, often focusing on demographic variables and behavioral influences.

Demographic factors such as age, gender, income, education, and occupation play a significant role in shaping e-banking adoption. Additionally, perceived usefulness, ease of use, trust, and security concerns influence customer decisions. By analyzing these factors, banks can develop targeted strategies to enhance user experience, increase adoption rates, and strengthen their competitive position.

In Vietnam, Nguyen Thi Bup [7] found six factors influencing e-banking usage at LienViet Post Bank Tra Vinh, including gender, education, occupation, and transaction value. These factors suggest that demographic and financial characteristics play a substantial role in shaping banking preferences. At BIDV Hau Giang, Pham Thanh Hoa et al. [8] determined that education level, occupation, perceived usefulness, and ease of use significantly affect smart banking adoption, while gender and age were insignificant. This highlights the importance of customer perceptions in driving adoption beyond purely demographic variables. Meanwhile, Le Chau Phu and Dao Duy Huan [9] concluded that gender, age, income, and education significantly influence e-banking usage at Agribank Can Tho, further confirming the relevance of these factors in Vietnam’s banking sector.

These findings emphasize that while demographic factors such as gender, age, income, and education influence e-banking adoption, customer perceptions of usefulness and ease of use also play a critical role. The inconsistency in the significance of gender and age across different banks suggests that local market conditions and customer behavior patterns may impact adoption rates. Moreover, financial factors like transaction value indicate that individuals with higher transaction volumes are more likely to use e-banking services. Understanding these influences helps banks tailor their digital strategies, improve user experiences, and enhance financial inclusion. Future research should explore additional factors such as trust, security concerns, and technological readiness.

Marital status and residential area are demographic factors not examined in the study at BIDV Bac Lieu due to their limited relevance to e-banking adoption in this context. Unlike age, income, education, and occupation, which directly influence financial behavior and technology adoption, marital status and place of residence may not significantly impact customers’ decisions to use digital banking services. Additionally, BIDV’s customer base primarily consists of individual clients and businesses, and these factors are less likely to create notable variations in e-banking usage. Therefore, the study focused on more influential demographic factors to provide meaningful insights.

Building on the literature review above, this study analyzes the factors influencing e-banking transactions of individual customers at BIDV Bac Lieu. The study will provide insights for enhancing e-banking services at BIDV Bac Lieu, leveraging demographic trends in the region.

III. METHODOLOGY

Based on the literature review above, this study builds upon existing models and research to propose the model of factors influencing individual customers’ use of e-banking at BIDV Bac Lieu, as follows:

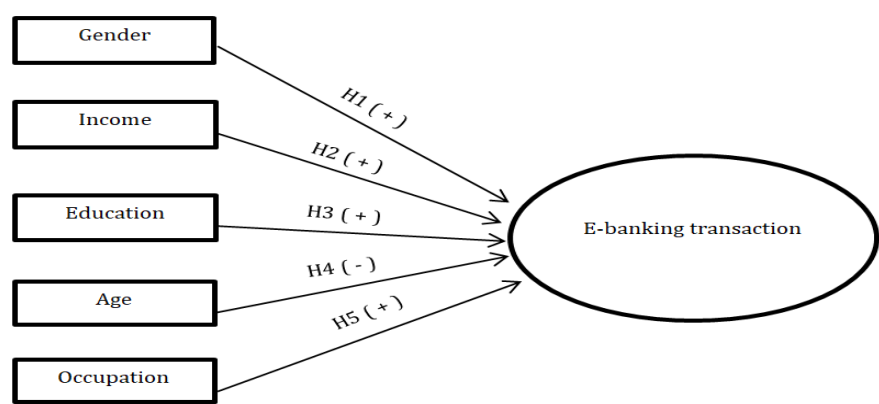


Figure 1. Conceptual framework

Source: Authors

Regression analysis is important for identifying the impact of independent variables on dependent variables. Under this analysis, the researcher uses the Beta value and Significance value to identify the factors influencing e-banking transaction of customers and for testing hypotheses.

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_t$$

In which:

- Y_t is e-bank transaction is provided by transaction volume and transaction value
- β is the regression coefficient of the model
- ε_t is the error of the model
- β_i is coefficients of independent variables including gender (X1), age (X2), occupation (X3), income (X4) and education (X5).

Table 1. Variables measurement
Source: Authors

Variable	Code	Measurement	Reference
Transaction volume	Y_1	Growth rate of transaction volume per day. According to the formula: $\frac{Y_{t1}-y_{t0}}{y_{t0}}$	Nguyen Thi Bup [7]
Transaction value	Y_2	Growth rate of transaction value per day. According to the formula: $\frac{Y_{t1}-y_{t0}}{y_{t0}}$	Nguyen Thi Bup [7], Nguyen Hong Hanh [10]
Gender	X_1	Percentage of male customers (%)	Aruna Shantha [2], Nguyen Thi Bup [7], Le Chau Phu and Dao Duy Huan [9]
Age	X_2	The age of the customer is measured using the logarithm of age per day in 60 days transaction	Nguyen Thi Bup [7], Nguyen Thi Truc Mai [11], Nguyen Hong Hanh [10]
Occupation	X_3	Percentages of customers who transact that are private or public employees (%)	Abayomi, Oj et al. [3], Pham Thanh Hoa et al. [8], Nguyen Thi Truc Mai [11]
Income	X_4	Customer income is measured using the logarithm of income per day in 60 days transaction	Aruna Shantha [2], Le Chau Phu and Dao Duy Huan [9], Nguyen Thi Truc Mai [11]
Education	X_5	Percentage of customers who have completed university (%)	Premarathne, W., and Gunattilake, M [6], Nguyen Thi Truc Mai [11], Nguyen Hong Hanh [10]

A. HYPOTHESIS

Customer demographics, including gender, age, education, income, and occupation, influence behaviors and decision-making in e-banking adoption. These factors help predict and understand customer preferences on digital banking platforms.

Research by De Leon [4] and Le Chau Phu & Dao Duy Huan [9] suggests men are more inclined to adopt and experiment with e-banking than women. However, as services become more accessible, women increasingly embrace e-banking, narrowing the gender gap.

H1: Male positively impacts e-banking transactions at BIDV Bac Lieu.

Studies by Abayomi et al. [3] and Nguyen Thi Bup [7] show that higher-income customers engage in more frequent and higher-value transactions, demonstrating income as a key determinant in e-banking adoption.

H2: Income positively impacts e-banking transactions at BIDV Bac Lieu.

Nguyen Hong Hanh [10] and Pham Thanh Hoa et al. [8] highlight that customers with higher education levels better understand and utilize e-banking services, making education a strong predictor of technology adoption.

H3: Education positively impacts e-banking transactions at BIDV Bac Lieu.

Premarathne and Gunatilake [6] found that older customers are less likely to adopt new technologies due to resistance or unfamiliarity. Younger customers, conversely, are more inclined to explore and adopt e-banking platforms.

H4: Age negatively impacts e-banking transactions at BIDV Bac Lieu.

Research by Shantha [2] and Abayomi et al. [3] shows that customers with stable occupations, particularly those employed in structured roles, are more likely to use e-banking services due to financial stability and frequent transaction needs.

H5: Occupation positively impacts e-banking transactions at BIDV Bac Lieu.

These hypotheses aim to explore how demographic factors shape e-banking behaviors, influence customer preferences, and provide valuable insights for enhancing service adoption, user experience, and overall digital banking engagement.

B. DATA COLLECTION

BIDV Bac Lieu provided data on the transaction volume and value of 2,200 customers from July 3 to August 31, 2024. The dataset includes customer details such as age, gender, education, and occupation (based on account opening information), as well as income (calculated using monthly cash flow). Additionally, it captures transaction frequency, preferred banking services, and digital banking adoption trends, offering a comprehensive view of customer behavior and financial activity during the given period.

C. DATA ANALYSIS

The linear regression model was utilized to analyze factors influencing the use of e-banking services at BIDV Bac Lieu. Linear regression, originally introduced by Sir Francis Galton [12], is a statistical method used to quantify relationships between variables, making it suitable for identifying how independent variables affect a dependent variable. This study employs regression analysis to examine demographic factors including income, gender, and age, affecting e-banking transaction volume and value.

IV. RESULTS AND DISCUSSION

A. DESCRIPTIVE STATISTICS

Table 2. Presents descriptive statistics of the variables used in the research model.
Source: BIDV Bac Lieu

Variable		Minimum	Maximum	Std.	Mean
Transaction volume	Y ₁	12,924	73,778	19,513	38,755
Transaction value	Y ₂	136	400	72,8	272
Age	X ₂	18	55	10.29	32.09
Income	X ₄	2,000,000	60,000,000	8.78	14.37
Gender	X ₁	1,295	58.86	905	41.14
Occupation	X ₃	711	32.32	1489	67.68
Education	X ₅	1,407	63.95	793	36.05

The dependent variable *Transaction Volume* measures the number of daily transactions by individual customers using e-banking services at BIDV Bac Lieu, describing changes over 60 days. Similarly, *Transaction Value* reflects daily transaction amounts (in million VND) over the same period.

The variable *Gender* is binary: 1 for male, 0 for female. Among customers, 58.86% are male, and 41.14% are female.

Age represents the customer’s age, ranging from 18 to 55 years, with an average of 32.09 years and a standard deviation of 10.29 years.

Occupation takes the value 1 for private/public employees and 0 for self-employed individuals. Employees constitute 32.32% of customers, while self-employed individuals account for 67.68%.

Income is measured as monthly income (in million VND), ranging from 2 to 60 million VND, with an average of 14.37 million VND and a standard deviation of 8.78 million VND.

Education is binary: 1 for above university and 0 for undergraduate or below. Customers with above-university qualifications make up 36.05%, while those with undergraduate qualifications account for 63.95%.

B. UNIT ROOT TEST

According to Gujarati [13], stationarity is crucial in time series analysis. A series is stationary when its mean, variance, covariance, and autocorrelation remain constant over time. Stationary series return to the mean, with consistent fluctuations around it.

Table 3. Stationarity test
Source: Authors

Variable	Test statistic	Conclusion
Transaction volume (Y ₁)	-16.628***	Stationarity
Transaction value (Y ₂)	-7.255***	Stationarity
Note: *, **, *** estimated coefficients statistical significance level 10%, 5%, 1% respectively		

The author tested the stationarity of the 60-day time series for two dependent variables transaction volume and transaction value - using the data of individual customers conducting e-banking transactions at BIDV Bac Lieu. Table 3 confirms that both variables are stationary, with significance levels below 5%.

Linear regression analysis identified the demographic factors influencing these variables. For transaction volume, the significant factors are income, gender, occupation, and age. For transaction value, the significant factors are income, gender, and age. Regression results are detailed in the Tables below.

C. ESTIMATION RESULTS

Regarding the transaction volume model, demographic variables significantly impact e-banking transaction volume at BIDV Bac Lieu, with a Prob > F of 0.041 and an R-squared of 18.8%, indicating these factors explain 18.8% of the variation. Gender is significant at the 5% level, with male customers performing more transactions than females, aligning with Nguyen Hong Hanh [10]. Age is significant at the 10% level, showing that younger customers tend to transact more frequently, supporting findings by Pham Thanh Hoa et al. [8]. Occupation is significant at the 10% level, with employees (public/private) transacting more than the self-employed, consistent with Abayomi et al. [3]. Income is significant at the 5% level, with higher incomes leading to increased transaction volume, corroborating Shantha [2] and Abayomi et al. [3]. Education is statistically insignificant, suggesting no impact on transaction volume, possibly due to varying e-banking preferences across education levels.

Table 4. Estimation results
Source: Authors

Variable	Transaction volume			Transaction value		
	Coefficient	t	P> t	Coefficient	t	P> t
Constant	-0.543	-2.33	0.024	-1.410	-0.65	0.516
Gender	0.331**	2.33	0.023	2.641**	2.01	0.050
Age	-0.103*	-1.79	0.080	-1.727**	-2.64	0.011
Occupation	0.176*	1.79	0.079	1.731	1.57	0.122
Income	0.298**	2.09	0.042	3.061**	2.20	0.032
Education	0.055	0.84	0.404	1.722	-0.59	0.559
Number of observations	60			60		
F-statistic	2.51			3.70		
Prob > F	0.041			0.006		
R-squared	0.188			0.255		
Note: *, **, *** estimated coefficients statistical significance level 10%, 5%, 1% respectively						

Regarding the transaction value model, demographic variables explain 25.5% of e-banking transaction value at BIDV Bac Lieu, with a Prob > F of 0.006, indicating their significant impact. Gender is significant at the 5% level, with males tending to have higher transaction values due to greater social roles and responsibilities, supporting findings by De Leon [4]. Age is significant with a negative coefficient of -1.727, suggesting that older customers engage in lower-value transactions, likely due to more cautious financial behavior. Occupation is statistically insignificant, as employment status does not affect transaction value, possibly because employees have stable but not high enough income to impact transaction size. Income is significant with a coefficient of 3.061, showing that higher income leads to larger transaction values, consistent with Abayomi et al. [3]. Education is statistically insignificant, with higher education slightly correlating with lower transaction values, possibly due to more cautious investment behavior.

In summary, for transaction volume, significant factors include gender, age, occupation, and income. Male customers perform more transactions than females. Age negatively impacts transaction volume, with younger

customers transacting more frequently. Employees (public/private) transact more than the self-employed, and higher incomes are linked to increased transaction volume. Education is statistically insignificant. For transaction value, significant factors are gender, age, and income. Male customers transact at higher values than females. Age has a negative impact, with younger customers engaging in higher-value transactions. Income positively affects transaction value, while occupation and education are insignificant. These findings align with previous studies, showing that demographic factors influence e-banking behavior at BIDV Bac Lieu.

V. CONCLUSIONS AND RECOMMENDATIONS

The study investigates demographic factors influencing individual customers' participation in e-banking transactions at BIDV Bac Lieu. Using secondary data from 2,200 customers over 60 days, linear regression analysis identified income and gender as factors affecting transaction volume. Income positively impacts transaction volume, with higher-income customers engaging more frequently, consistent with Abayomi et al. [3]. Gender also plays a role, with male customers transacting more often, as supported by De Leon [4] and Le Chau Phu & Dao Duy Huan [9], who noted men's greater openness to new technology. However, increasing accessibility has led to more women adopting these services.

The analysis also revealed three demographic factors including gender, age, and income, affecting transaction value. Male customers generally have higher transaction values. Age negatively impacts transaction value; older customers are more cautious, while younger ones are more willing to transact larger amounts. Income positively influences transaction value, with higher-income customers participating in larger transactions and being more risk-tolerant.

To fully integrate e-banking into daily life and maximize its benefits, coordinated efforts are crucial from managers, customers, and banks. Firstly, prioritize IT and e-commerce education. This involves providing comprehensive training for individuals, businesses, and government entities. By raising awareness and developing robust digital skills, we can empower users to effectively utilize e-banking services. Secondly, incentivize investment in e-banking. This can be achieved by rewarding businesses, investors, and financial institutions that actively promote online payment systems and related technologies. These incentives will encourage innovation and drive the adoption of e-banking solutions.

The study still has certain limitations. The ability to access secondary data sources was limited, so the author was not able to fully access information on service usage by other factors of the bank for individual customers, thereby preventing comparisons of individual customers when using e-banking services. Additionally, the sample size may not fully represent the diverse customer base, potentially limiting the generalizability of the findings. Future research could benefit from a larger sample, more comprehensive data, and a deeper exploration of specific customer segments to provide a clearer understanding of customer behavior.

On the one hand, to enhance e-banking adoption at BIDV Bac Lieu, the bank can implement various marketing and promotional strategies tailored to customer needs. First, promotional campaigns and discounts can attract new users, such as offering cashback incentives, fee waivers, or transaction fee discounts for first-time e-banking users. A referral program can also be introduced, rewarding existing customers for inviting new users. Second, educational workshops and enhanced customer support can address concerns, especially for older users or small businesses, by providing free training sessions and improving hotline or chatbot assistance. Additionally, personalized marketing strategies, such as targeted SMS/email campaigns and in-app notifications, can engage users and encourage them to explore new features. Collaborating with local businesses and Fintech companies can also provide exclusive discounts and improve digital banking security. Finally, loyalty programs and gamification techniques, like point-based rewards, lucky draws, or interactive challenges, can make e-banking more engaging. By implementing these strategies, BIDV Bac Lieu can increase e-banking adoption, improve customer satisfaction, and maintain a competitive edge in Vietnam's digital banking landscape.

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TÁC ĐỘNG CỦA NHÂN KHẨU HỌC ĐẾN GIAO DỊCH NGÂN HÀNG ĐIỆN TỬ CỦA KHÁCH HÀNG CÁ NHÂN TẠI BIDV BẠC LIÊU

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TÓM TẮT— Nghiên cứu nhằm xác định tác động của các yếu tố nhân khẩu học đến giao dịch ngân hàng điện tử của khách hàng cá nhân tại ngân hàng BIDV Bạc Liêu. Dựa vào các nghiên cứu và tài liệu có sẵn, 5 yếu tố nhân khẩu học được xác định. Các dữ liệu giao dịch hằng ngày từ ngày 3 tháng 7 đến ngày 31 tháng 8 năm 2024, được cung cấp bởi BIDV Bạc Liêu đã được phân tích để kiểm tra mô hình đề xuất. Phương pháp phân tích được sử dụng là hồi quy tuyến tính (OLS) cho thấy giới tính, tuổi, nghề nghiệp và thu nhập ảnh hưởng đến số lượng giao dịch, trong khi đó giới tính, tuổi, thu nhập ảnh hưởng đến giá trị giao dịch. Dựa trên những phát hiện này, nghiên cứu đưa ra một số khuyến nghị để cải thiện các giao dịch ngân hàng điện tử.

Từ khóa—Nhân khẩu học, dịch vụ ngân hàng điện tử, khách hàng cá nhân, ngân hàng, BIDV Bạc Liêu.



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