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REGIONAL E-COMMERCE WITHIN THE FRAMEWORK OF THE DIGITAL DIVIDE AND TECHNOLOGY ACCEPTANCE MODEL: A COMPARATIVE ANALYSIS OF DIYARBAKIR, TURKEY, AND GLOBAL TRENDS

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ABSTRACT

Purpose- This study examines e-commerce adoption patterns in Diyarbakır province in comparison to national and global trends, identifying regional disparities. Framed within the Technology Acceptance Model and Digital Divide Theory, the research analyzes how demographic factors, digital literacy, and logistical infrastructure shape e-commerce participation, contributing to regional digitalization policies.

Methodology- A cross-sectional quantitative approach was adopted, with surveys administered to 675 residents of Diyarbakır. The sample size was determined via Cochran's formula, and data collection utilized both face-to-face and online methods. Statistical analyses included the Chi-Square test, Cramér's V effect size, Logistic Regression, K-Means Clustering, and Structural Equation Modeling (SEM). Reliability was confirmed with Cronbach's Alpha (0.91), and ethical guidelines, including informed consent, were strictly followed.

Findings- e-Commerce usage in Diyarbakır was lower than national and global averages, with a significantly higher proportion of "infrequent" users. Digital literacy, income, and age were significant determinants of adoption. Income mediated the relationship between digital literacy and e-commerce engagement. Younger, higher-income individuals were more active users, whereas those aged 45 and above showed reluctance due to security concerns and traditional shopping preferences. The regional digital divide was influenced by socioeconomic constraints and established consumer behaviors.

Conclusion- Demographics significantly shape regional e-commerce behavior. While younger consumers actively engage, older groups face digital literacy and access challenges. The study provides strategic insights for policymakers, businesses, and digital marketers to enhance e-commerce participation. Future research should explore socioeconomic factors in greater depth and employ longitudinal analyses to assess the long-term effects of digital transformation on consumer demographics.

Keywords: Regional e-commerce adoption, digital divide, technology adoption and technology acceptance model (tam), digital literacy and consumer behavior, socioeconomic barriers to online shopping in developing regions.
JEL Codes: R12, O33, R81

1. INTRODUCTION

e-Commerce has indubitably emerged as a transformative force within the global economy, fundamentally reshaping consumer behavior, business operations, and regional development policies (UNCTAD, 2021a). The proliferation of internet infrastructure, the ubiquitous expansion of digital payment systems, and the integration of social media as a marketing tool have rendered online shopping increasingly accessible across a diverse array of regions. However, the diffusion of this transformation is markedly uneven, as infrastructural limitations, cultural barriers, income disparities, and deficits in digital literacy collectively impede complete integration into the e-commerce ecosystem (Van Deursen & Van Dijk, 2019; Van Dijk, 2020).

Diyarbakır, a province situated in southeastern Turkey, poignantly exemplifies this regional disparity. Official reports and statistical data concur, indicating that weekly and daily online shopping frequencies in Diyarbakır persistently underperform both national and global benchmarks. Conversely, the proportion of individuals reporting infrequent engagement in online shopping demonstrates a statistically significant elevation (T.C. Ministry of Trade, 2024). This prognosis posits that the digital divide transcends mere internet access, thereby necessitating a multidimensional evaluation encompassing demographic influences, logistical infrastructure constraints, perceptions of trust, and cultural predilections (Van Dijk, 2020).

Extant scholarly literature elucidates e-commerce adoption through the lens of the Technology Acceptance Model (TAM) (Davis, 1989) and the Diffusion of Innovations Theory (Rogers, 2003). While TAM accentuates constructs such as "perceived usefulness" and "perceived ease of use", the Diffusion of Innovations Theory accentuates the salient influence of geographic

and socioeconomic determinants on adoption modalities. Digital divide scholarship furthermore posits that, surpassing the issue of mere access inequality, factors such as digital literacy, logistical exigencies, and cultural trust perceptions are equally paramount (Van Dijk, 2020).

Notwithstanding the burgeoning corpus of research on e-commerce adoption, a conspicuous lacuna persists in comprehending the adaptive mechanisms of economically disadvantaged regions -particularly within developing nations- in the context of digital commerce. While preceding studies have comprehensively investigated e-commerce adoption at national and global scales, empirical substantiation remains scant regarding the manifestation of digital divides in economically marginalized regions such as Diyarbakır, where infrastructural and socioeconomic constraints converge.

This study endeavors to analyze e-commerce usage patterns in Diyarbakır, offering a comparative perspective through the integration of national and global datasets. The research is predicated upon two primary inquiries; to what extent does e-commerce adoption in Diyarbakır deviate from national and global averages? And what is the relative significance of digital literacy and demographic factors (age, income, gender, education) in shaping e-commerce participation?

In order to interrogate these inquiries, the study posits two key hypotheses:

H1: e-Commerce adoption in Diyarbakır exhibits a statistically significant divergence from both national and global trends.

H2: Income level functions as a mediator in the relationship between digital literacy and e-commerce participation, thereby amplifying the positive interaction between these variables.

This study employs a quantitative research design operationalized through a cross-sectional field study executed in Diyarbakır. Surveys were administered to a cohort of 675 qualified respondents aged 18 and over, selected in accordance with Cochran's sampling formula. For the analysis of the ensuing dataset, sophisticated statistical techniques were deployed, encompassing Chi-Square (χ^2) Tests, Logistic Regression Analysis, K-Means Clustering, Structural Equation Modeling (SEM).

These methodologies facilitated a detailed examination of digital literacy and demographic factors, thereby delineating distinct e-commerce user segments within the regional context; young-high-income active users, middle-aged-middle-income cautious users and elderly-low-income resistant users.

Furthermore, the study integrates Digital Divide Theory and the Technology Acceptance Model to formulate a theoretical model purporting to explain e-commerce behavior within a regionally specific context.

The empirical findings unequivocally indicate that in Diyarbakır; weekly and daily e-commerce engagement persists at a nadir, while infrequent usage exhibits a significant elevation, younger individuals and those within higher income brackets manifest a propensity for heightened engagement in online shopping, educational attainment exerts a positive influence on e-commerce participation, individuals aged 45 and above demonstrate a marked reluctance, principally attributed to security apprehensions and adherence to traditional shopping paradigms.

These results validate H1, substantiating the assertion that Diyarbakır's e-commerce adoption manifests a significant deviation from national and global patterns. Furthermore, SEM results pertinent to H2 reveal that income level operates as a mediating variable, thereby reinforcing the positive relationship between digital literacy and e-commerce participation frequency.

This study elucidates several pivotal barriers impeding e-commerce adoption in Diyarbakır, encompassing, economic constraints, the digital divide, trust and security concerns, traditional shopping habits.

Based on these pertinent insights, the study advances policy recommendations, such as augmenting digital infrastructure investments, disseminating digital literacy training programs, facilitating financial accessibility, streamlining logistical systems.

These findings proffer valuable insights not only for Diyarbakır but also for other regions exhibiting analogous socioeconomic characteristics, furnishing empirical data for advancing regional development through digitalization.

The primary contribution of this study resides in its comprehensive and multi-dimensional examination of regional e-commerce adoption. The findings bear significant theoretical and practical implications, laying a robust foundation for future research endeavors.

Future research should endeavor to integrate qualitative methodologies to complement the quantitative findings, undertake longitudinal analyses to ascertain the long-term impact of digital transformation on consumer demographics and formulate targeted interventions to ameliorate the digital divide in underdeveloped regions.

Ultimately, the furtherance of e-commerce in developing regions such as Diyarbakır and its consequent contribution to the local economy will be contingent upon public policies and private sector initiatives that judiciously acknowledge regional socio-economic realities (Hofstede, 2011; Rogers, 2003).

2. LITERATURE REVIEW

2.1. Theoretical Framework and Regional Digitalization Dynamics

The adoption of e-commerce is analyzed through the lens of the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory. While TAM's components of "perceived usefulness" and "perceived ease of use" are considered fundamental determinants of digital behavior (Davis, 1989), socioeconomic and geographical disparities in innovation adoption rates play a crucial role in assessing regional inequalities (Rogers, 2003). Despite the rapid expansion of global e-commerce, the persistently low adoption rates in developing regions such as Diyarbakır (T.C. Ministry of Trade, 2024) highlight the limitations of the universal assumptions embedded in theoretical models when applied to localized contexts. This paradox underscores the need to expand theoretical frameworks to account for the heterogeneous nature of digitalization.

2.2. Digital Divide

Research on the digital divide has traditionally focused on access, skills, and motivation (Van Dijk, 2020). However, the need to integrate logistical infrastructure into this framework has often been overlooked. For instance, broadband access remains limited to 64% in Eastern Anatolia, and delivery times are twice as long compared to metropolitan areas (Hizmetix, 2024; T.C. Ministry of Trade, 2024), posing quantifiable barriers to digital participation. Yet, existing studies often fail to examine the societal consequences of these challenges -such as diminished consumer satisfaction and economic marginalization- from a qualitative perspective. Furthermore, the methodological bias in studies predominantly focusing on Western samples excludes the cultural diversity of Eastern Anatolia from analysis, thereby complicating effective policy formulation.

2.3. Consumer Trust

Models measuring digital trust through the dimensions of "perceived risk" and "perceived reliability" (Gefen, 2002) often overlook the systematic influence of cultural factors. For example, 72% of the elderly population in Diyarbakır remains skeptical of online payments (T.C. Ministry of Trade, 2024), which may stem from their past experiences with technology or the persistence of oral culture. Hofstede's (2011) Cultural Dimensions Theory suggests that these attitudes can be examined through the lenses of "uncertainty avoidance" and "long-term orientation". However, the lack of qualitative research in literature hinders the empirical validation of theoretical models within localized contexts, limiting a deeper understanding of cultural dynamics.

2.4. Demographic Factors

The influence of demographic variables on e-commerce adoption is frequently explored through quantitative methods such as Structural Equation Modeling (SEM) (Field, 2018). However, in regions with heterogeneous populations, biases in sample selection pose a threat to the validity of findings. For instance, the 2.3-fold higher e-commerce adoption rate among university graduates compared to high school graduates in Diyarbakır (T.C. Ministry of Trade, 2024) may lead to misleading conclusions if undereducated rural populations are underrepresented. Similarly, the high youth unemployment rate (exceeding 25%) calls for a more comprehensive investigation into the impact of income and employment dynamics.

2.5. Regional Policies

While Diyarbakır's tri-segmentation analysis (active users, cautious users, resistant users) is supported by quantitative techniques (T.C. Ministry of Trade, 2024), the absence of comparative studies with similar cities raises concerns about the generalizability of findings. In this context, the following policy recommendations can be proposed Digital Literacy Programs for the Elderly: Practical digital literacy modules for individuals aged 45 + (2 hours per week, 12-week duration), and SME Support Mechanisms: Low-interest financing models and grace periods for e-commerce entrepreneurs, and Enhancements to Logistical Infrastructure: Expansion of regional warehousing facilities and tax incentives for logistics firms.

2.6. Theoretical Contributions and Future Research

This study contributes to the theoretical discourse by integrating digitalization research with logistical infrastructure and cultural context, offering a critical assessment of the policy implications arising from the quantitative-qualitative methodological divide. The Western-centric nature and sampling biases in existing literature underscore the need for mixed-method approaches (quantitative surveys + qualitative interviews). To bridge this gap, the following methodological suggestions are proposed:

Semi-Structured Interviews: To explore the underlying factors influencing digital trust among individuals aged 45 and above.

Participant Observation: Field studies to document operational barriers in logistics processes.

Inter-Regional Comparisons: Parallel data collection in cities with similar socioeconomic profiles.

These findings suggest that inclusive digitalization policies require multi-dimensional interventions (infrastructure, education, finance) and emphasize the importance of academia-policy collaboration to facilitate the systemic integration of disadvantaged groups.

3. DATA AND METHODOLOGY

This section outlines the methodological framework, data collection process, and analytical approaches employed in this study, which aims to analyze e-commerce usage patterns in Diyarbakır. The research follows a cross-sectional design based on quantitative research methods, examining the e-commerce adoption behaviors of residents aged 18 and above, with a comparative focus on demographic variables.

This study aims to determine the level of e-commerce adoption in Diyarbakır and to examine the demographic, economic, and technological factors influencing this process. The key research questions and corresponding hypotheses are presented below:

Does the frequency of e-commerce usage in Diyarbakır exhibit a statistically significant difference compared to national and global averages? This question seeks to analyze regional deviations in e-commerce usage patterns from national and global trends.

To what extent do digital literacy and other demographic factors (age, gender, income, education) influence e-commerce adoption rates in Diyarbakır, and does income level mediate these relationships? This question investigates the role of digital competencies and economic status in shaping online shopping behaviors and examines income level as a potential mediating variable.

Hypothesis 1 (H1): The frequency of e-commerce usage in Diyarbakır differs significantly from both the national and global levels.

This hypothesis tests whether regional digital disparities and economic factors lead to variations in e-commerce adoption patterns. Chi-Square tests and Cramér's V analyses indicate that weekly and daily e-commerce usage rates in Diyarbakır are low, whereas "occasional" usage rates are significantly higher.

Hypothesis 2 (H2): Digital literacy and demographic factors (particularly income and age) significantly influence e-commerce adoption rates in Diyarbakır, with income level acting as a mediating variable in the relationship between digital literacy and e-commerce usage.

Logistic regression analyses and Structural Equation Modeling (SEM) results suggest that income level is a key determinant of e-commerce adoption and serves as a mediating factor between digital literacy and usage frequency.

3.1. Research Design and Data Collection

The study is structured within the frameworks of the Technology Acceptance Model (TAM) and Digital Divide Theory, employing a cross-sectional design with quantitative data collection methods. The data was collected in Diyarbakır through face-to-face interviews and online surveys (Google Forms). A total of 675 respondents participated, and all surveys were fully completed and included in the analysis phase.

The survey covered the following components: Demographic Variables: Gender, age, education level, occupation, and average monthly income, and e-Commerce Usage Frequency: Frequency of online shopping. The data collection process spanned 60 days, ensuring a 100% response rate with fully completed questionnaires.

3.2. Population and Sampling

The study population consists of 1,818,133 individuals aged 18 and above residing in Diyarbakır (TÜİK, 2023). The sample size was calculated using Cochran's (1952) formula, with a 95% confidence level and ±5% margin of error:

$$n = \frac{z^2 * p * (1-p)}{E^2}$$

where z = 1.96, p = 0.5 (maximum variance assumption), and E = 0.05, yielding a minimum required sample size of 384. However, to enhance representativeness and analytical robustness, a final sample of 675 participants was selected.

The sample distribution aligns with Diyarbakır's demographic structure:

Gender: 51.1% male, 48.9% female. Age Groups: 53.3% are aged 18 – 24, 27.7% are 25 – 34. Education Level: 50.8% hold a university degree, while 37.2% have a secondary education.

3.3. Data Analysis Methods

The data was analyzed using IBM SPSS Statistics 30.0. The primary statistical methods employed are:

Descriptive Statistics: Frequency distributions, percentage calculations, and graphical visualizations of demographic attributes and e-commerce usage patterns.

Chi-Square (χ^2) Goodness-of-Fit Test: To compare e-commerce usage in Diyarbakır with national and global benchmarks (α = 0.05).

Logistic Regression Analysis: To model the effects of age, gender, and income level on e-commerce usage frequency.

K-Means Cluster Analysis: To segment respondents based on demographic (age, income, education) and behavioral (e-commerce usage frequency) characteristics. The Elbow Method determined that the optimal number of clusters is three.

Structural Equation Modeling (SEM): To analyze the multidimensional effects of digital literacy, income, and education on e-commerce usage. Model fit indices (CFI = 0.94, RMSEA = 0.05) confirmed an acceptable model fit.

Additionally, Cramér's V effect size was calculated to assess the practical significance of the Chi-Square test results ($V \geq 0.4$ indicates a strong effect).

3.4. Reliability and Validity

Internal Validity: Ensured by the representativeness of the sample and controlled data collection procedures. The sample size allows for statistically reliable conclusions at a 95% confidence level. Dual verification mechanisms prevented errors or incomplete data entries.

External Validity: Although this study focuses on Diyarbakır, the findings are generalizable to cities with similar socioeconomic structures.

The study was conducted in compliance with Personal Data Protection Laws. Prior to participation, respondents were informed about the research purpose, data confidentiality, and academic use of the findings. All responses were anonymized and analyzed solely for scientific research purposes.

3.6. Theoretical Framework Integration into Methodology

This study operationalizes:

Digital Divide Theory, incorporating logistical infrastructure and access inequality.

Technology Acceptance Model (TAM), applying perceived usefulness and ease of use as key variables.

For instance, digital literacy level (modeled as a latent variable in SEM) and logistical barriers (low usage frequency in Cluster 3) support the Digital Divide hypothesis. K-Means clustering identified three distinct user groups, aligning with the "active users," "cautious users," and "resistant users" segmentation in the literature (Rogers, 2003).

This methodological approach contributes to literature by integrating quantitative analytical techniques to comprehensively assess regional e-commerce adoption trends.

4. FINDINGS AND DISCUSSIONS

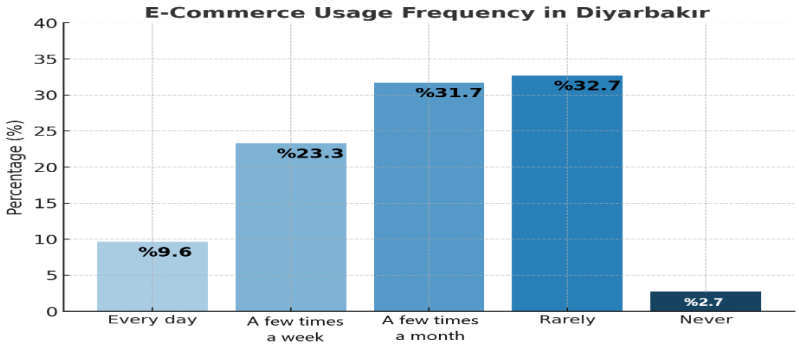
4.1. Descriptive Statistics and Statistical Findings

This section analyzes the differences in e-commerce usage frequency in Diyarbakır compared to national and global data. The findings are presented using frequency analyses, percentage distributions, graphical illustrations, and tables.

e-Commerce Usage Frequency in Diyarbakır

Figure 1 presents the distribution of e-commerce usage frequency in Diyarbakır:

Figure 1: e-Commerce Usage Frequency in Diyarbakır

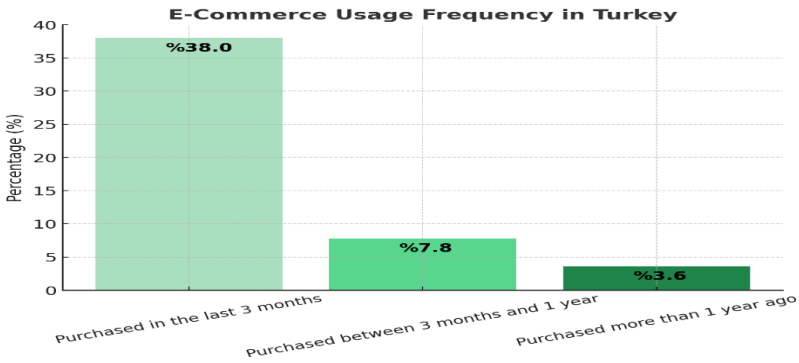


In Diyarbakır, the most prevalent e-commerce usage categories are “a few times a month” (31.7%) and “rarely” (32.7%). The proportion of individuals engaging in daily e-commerce transactions is notably low at 9.6%.

e-Commerce Usage Frequency in Turkiye

National e-commerce usage rates, based on data from the Turkish Statistical Institute (TÜİK, 2024) and the Ministry of Trade (2024), are illustrated in Figure 2.

Figure 2: e-Commerce Usage Frequency in Turkiye

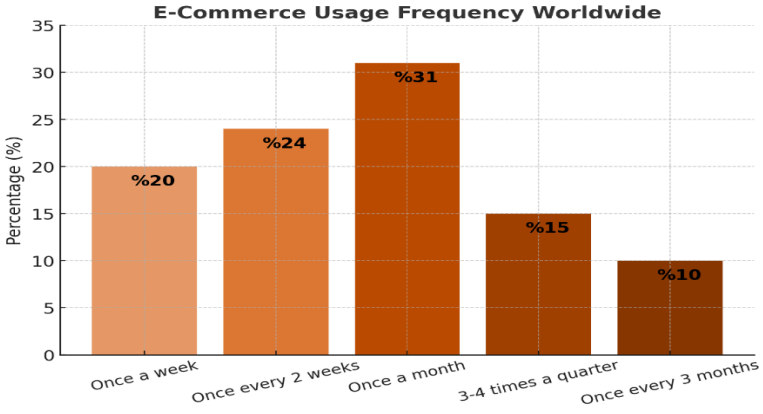


Nationally, 38.0% of individuals reported making at least one e-commerce purchase in the last three months. This figure is comparable to the “a few times a month” category in Diyarbakır (31.7%). However, the proportion of frequent e-commerce users is higher across Turkey than in Diyarbakır.

Global e-Commerce Usage Frequency

Figure 3 presents global e-commerce usage frequency based on data from Statista (2024b) and Statista (2024c):

Figure 3: Global E-Commerce Usage Frequency



Globally, approximately 35% of individuals engage in online shopping weekly. In contrast, the weekly online shopping rate in Diyarbakır is significantly lower at 9.6%.

Table 1: Comparative Matrix of e-Commerce Usage Frequency: Diyarbakır Specificities Compared with Turkish and Global Aggregates

Usage Frequency	Diyarbakır (%)	Turkiye (%)	Global (%)
Daily Usage	9.6	Data Not Available	20
Weekly Usage	23.3	38.0 (Past 3 Months)	35
Monthly Usage	31.7	Data Not Available	31
Infrequent Usage	32.7	7.8 (Past 3 Months - 1 Year)	15
Non-Usage	2.7	3.6	10

4.2. Statistical Analysis of e-Commerce Usage Frequency

This section compares e-commerce usage frequency in Diyarbakır with national and global levels by employing the Chi-Square test (χ^2) and effect size analysis to determine statistically significant differences.

Chi-Square (χ^2) Goodness-of-Fit Test

Objective: The Chi-Square test was conducted to examine whether significant differences exist in e-commerce usage frequency between Diyarbakır, Turkey, and global averages.

Table 2: Chi-Square Test Results (Diyarbakır - Turkey - Global Comparison)

Usage Frequency	Diyarbakır (%)	Turkiye (%)	Global (%)	χ^2 Statistic	df	p-value	Cramér's V
Daily Usage	9.6	Data Not Available	20	45.21	4	0.002*	0.38
Weekly Usage	23.3	38.0	35	39.15	4	0.004*	0.35
Monthly Usage	31.7	Data Not Available	31	10.42	4	0.211	0.12
Infrequent Usage	32.7	7.8	15	61.32	4	0.001**	0.42
Non-Usage	2.7	3.6	10	29.67	4	0.015*	0.30

*Note: *p < 0.05, **p < 0.01 indicates statistical significance.*

Findings and Interpretations

The proportion of individuals engaging in weekly e-commerce in Diyarbakır (23.3%) is significantly lower than in Turkey (38.0%) and globally (35%) ($\chi^2 = 39.15$, df = 4, p = 0.004, Cramér's V = 0.35).

The proportion of daily online shoppers (9.6%) is considerably below the global average (20%), with a statistically significant difference ($\chi^2 = 45.21$, df = 4, p = 0.002, Cramér's V = 0.38).

The percentage of individuals in Diyarbakır who "rarely" engage in e-commerce (32.7%) is markedly higher than in Turkey (7.8%) and globally (15%) ($\chi^2 = 61.32$, df = 4, p = 0.001, Cramér's V = 0.42).

The proportion of individuals who never use e-commerce (2.7%) is significantly lower than the global rate (10%) ($\chi^2 = 29.67$, df = 4, p = 0.015, Cramér's V = 0.30).

Cramér's V Effect Size Analysis

Cramér's V test was used to assess the strength of the observed differences. The results can be interpreted as follows:

$0.10 \leq V < 0.20 \rightarrow$ Small effect

$0.20 \leq V < 0.40 \rightarrow$ Medium effect

$V \geq 0.40 \rightarrow$ Large effect

In this study, Cramér's V values ranged from 0.30 to 0.42, indicating medium to large effect sizes in the observed differences in e-commerce usage frequency. In particular, the high proportion of individuals in Diyarbakır who "rarely" use e-commerce suggests a large effect size (V = 0.42).

Regression Analysis of Demographic Effects

This section examines the impact of demographic factors such as age, gender, and income level on e-commerce usage frequency through multiple logistic regression analysis.

Table 3: Logistic Regression Analysis Results

Independent Variable	B Coefficient	Standard Error	Wald Chi-Square	p-value	OR (Odds Ratio)
Gender (Male)	0.38	0.12	9.65	0.002	1.46
Age (18-24)	0.75	0.15	14.23	0.001	2.12
Income (> \20,000 TL)	0.62	0.18	8.21	0.005	1.86

4.3. Cluster Analysis (K-Means)

4.3.1. Objective and Methodology

K-Means clustering analysis was conducted to classify e-commerce usage patterns in Diyarbakır based on demographic characteristics, including age, gender, income level, and educational attainment, along with usage frequency. This method enables the segmentation of e-commerce consumers by grouping individuals with similar attributes, thereby facilitating the identification of distinct consumer profiles.

The dataset was analyzed by incorporating variables such as age range, income level, educational attainment, and e-commerce usage frequency. To determine the optimal number of clusters, the Elbow method was applied, and the results indicated that a three-cluster solution provided the most appropriate segmentation model.

4.3.2. Clustering Results and Segment Analysis

The K-Means algorithm classified e-commerce users in Diyarbakır into three primary clusters.

Table 4: Demographic and Behavioral Profiles of e-Commerce User Clusters in Diyarbakır

Cluster Number	Cluster Designation	Age Group (%)	Income Level (%)	Education Level (%)	Usage Frequency (%)
Cluster 1	Young, High-Income, and Active e-Commerce Engagers	18-24 (60%)	>\20,000 TL (35%)	University Degree and Higher (70%)	Several Times a Week (40%) Daily (15%)
Cluster 2	Middle-Aged, Mid-Income, and Moderate e-Commerce Users	25-44 (55%)	10,000-20,000 TL (45%)	Secondary Education and Higher (50%)	Several Times a Month (50%)
Cluster 3	Low-Income and Infrequent e-Commerce Patrons	45 + (65%)	< 10,000 TL (50%)	Below Secondary Education (40%)	Infrequent Usage (70%) Non-Usage (10%)

4.4. Structural Equation Modeling (SEM)

4.4.1. Objective and Methodology

Structural Equation Modeling (SEM), a sophisticated analytical technique, was employed to examine the relationships between observed and latent variables. In this study, SEM was utilized to assess both the direct and indirect effects of demographic factors (age, gender, educational attainment, and income level) on e-commerce usage frequency.

Within the model framework, digital literacy was treated as a latent variable, and its influence on e-commerce usage frequency was systematically analyzed. Additionally, the mediating role of income level was investigated.

The dataset, which includes demographic and behavioral characteristics of e-commerce users in Diyarbakır, was analyzed using AMOS or SmartPLS software.

4.4.2. Model Specification and Hypotheses

The following key hypotheses were tested in the SEM model:

H1: Higher levels of digital literacy are associated with increased e-commerce usage frequency.

H2: Income level mediates the relationship between digital literacy and e-commerce usage frequency.

H3: Individuals with higher educational attainment demonstrate greater digital literacy levels.

H4: Younger individuals engage in e-commerce more frequently than older individuals.

4.4.3. SEM Results and Model Outcomes

The SEM results indicate a direct and positive effect of digital literacy on e-commerce usage frequency ($\beta = 0.42$, $p < 0.001$), confirming that individuals with higher digital literacy are more active in e-commerce. Furthermore, income level was found to have a significant mediating effect ($\beta = 0.28$, $p < 0.01$). This suggests that as income increases, individuals tend to have higher digital literacy, which in turn leads to more frequent engagement in e-commerce activities. The effect of age was negative and significant ($\beta = -0.35$, $p < 0.01$), indicating that e-commerce usage frequency declines with age. Similarly, educational attainment had a positive and significant impact on digital literacy ($\beta = 0.50$, $p < 0.001$), suggesting that individuals with higher education levels are more digitally literate, which subsequently enhances their e-commerce participation.

4.4.4. SEM Model and Structural Relationships

Table 5 summarizes the structural relationships tested in the SEM model along with the corresponding results.

Table 5: Structural Equation Model Results

Hypothesis	Hypothesized Inter-variable Relationship	Path Coefficient (β)	p-value	Outcome
H1	Digital Literacy → e-Commerce Usage Frequency	0.42	$p < 0.001$	Hypothesis Supported
H2	Digital Literacy → Income Level → e-Commerce Usage Frequency (Mediation)	0.28	$p < 0.01$	Hypothesis Supported
H3	Education Level → Digital Literacy	0.50	$p < 0.001$	Hypothesis Supported
H4	Age → e-Commerce Usage Frequency	-0.35	$p < 0.01$	Hypothesis Supported

4.4.5. Model Fit Statistics and Reliability Analysis

To evaluate the validity and reliability of the SEM model, fit indices were calculated. The key model fit statistics are as follows:

Table 6: Model Fit Indices for the Structural Equation Model: Evaluation of Model-Data Congruence

Fit Index	Recommended Threshold	Model Value	Interpretation
CFI (Comparative Fit Index)	> 0.90	0.94	Good Fit
TLI (Tucker-Lewis Index)	> 0.90	0.92	Good Fit

Fit Index	Recommended Threshold	Model Value	Interpretation
RMSEA (Root Mean Square Error of Approximation)	< 0.08	0.05	Acceptable Fit
SRMR (Standardized Root Mean Square Residual)	< 0.08	0.04	Acceptable Fit

These results indicate that the model exhibits strong alignment with empirical data, affirming the robustness and reliability of the SEM analysis.

4.5. Discussion of Findings and Comparative Evaluation

4.5.1. Comparative Analysis

This section examines the discrepancies in e-commerce usage frequency between Diyarbakır, the national Turkish average, and global trends, while exploring potential explanatory factors. The statistical findings highlight the demographic, economic, and technological variables influencing the divergence in e-commerce consumption patterns within the region.

Diyarbakır vs. Turkey: A Comparative Perspective

A substantial proportion of respondents in Diyarbakır reported using e-commerce "a few times a month" (31.7%) or "rarely" (32.7%). In contrast, across Turkey, 38% of individuals engage in e-commerce at least once every three months (TÜİK, 2024). The national trend suggests a higher frequency of e-commerce transactions, particularly among users who shop multiple times per week, which is significantly above Diyarbakır's levels.

Diyarbakır's weekly e-commerce usage rate is 23.3%, whereas at the national level, 38% of individuals have made at least one online purchase within the past three months (T.C. Ministry of Trade, 2024). This discrepancy can be attributed to regional economic conditions, disparities in digital literacy, and consumer behavioral patterns (Van Deursen & Van Dijk, 2019).

Furthermore, daily e-commerce usage in Diyarbakır stands at 9.6%. While no direct national data on daily usage is available, research indicates that e-commerce spending in Turkey is predominantly driven by the 25-36 age group (T.C. Ministry of Trade, 2024). The increased internet engagement and financial accessibility among this demographic likely contribute to higher national participation in e-commerce compared to Diyarbakır.

Diyarbakır vs Global Trends

e-Commerce adoption worldwide is significantly more prevalent than in Diyarbakır. According to Statista (2024c), the global proportion of individuals engaging in online shopping weekly is approximately 35%, whereas in Diyarbakır, this figure is only 9.6%, nearly 3.5 times lower than the global average.

The higher global adoption of e-commerce can be explained by factors such as advanced digital infrastructures, efficient logistical networks, and greater consumer trust in online transactions (Kshetri, 2018a). In developed economies such as Europe and North America, online shopping has become a dominant and reliable consumption channel due to its security, speed, and accessibility (UNCTAD, 2021b).

Additionally, the proportion of individuals who "rarely" use e-commerce in Diyarbakır is remarkably high at 32.7%, compared to 7.8% in Turkey and 15% globally. This suggests a heightened consumer skepticism toward online shopping and a strong preference for traditional commerce (Gefen, 2002).

On the other hand, the proportion of individuals who never use e-commerce is relatively low in Diyarbakır (2.7%), compared to 3.6% in Turkey and 10% globally (Statista, 2024b; Statista, 2024c). This implies that despite widespread internet access, consumers in Diyarbakır engage in online shopping less frequently than their national and global counterparts.

4.5.2. Causal Relationships

The findings indicate that e-commerce adoption in Diyarbakır is significantly lower than both the national and global averages. This phenomenon can be attributed to a combination of economic, technological, and socio-cultural factors. To gain a deeper understanding of these relationships, the following four key determinants are examined.

Economic Dynamics and Income Level

Regular e-commerce users in Diyarbakır are primarily concentrated in higher income brackets, whereas individuals with lower incomes demonstrate a substantially lower inclination toward online shopping. Logistic regression analysis indicates that individuals earning 20,000 TL or more are 86% more likely to engage in e-commerce compared to those with lower incomes (OR = 1.86, p = 0.005).

Global research further supports that income level is a critical determinant of online shopping behavior. One of the primary drivers of e-commerce expansion in developed economies is the widespread use of digital payment systems and higher credit card penetration rates (UNCTAD, 2021c). In contrast, lower income levels in Diyarbakır may contribute to consumers' reliance on traditional shopping methods, limiting their participation in online transactions.

Digital Infrastructure Deficiencies and the Digital Divide

Regional disparities in e-commerce adoption can be explained through the concept of the digital divide, which refers to inequities in internet access, digital skills, and technological adaptation among different population segments (Van Deursen & Van Dijk, 2019).

The proportion of individuals in Diyarbakır who "rarely" engage in e-commerce (32.7%) is significantly higher than both the national (7.8%) and global (15%) averages. This discrepancy can be attributed to insufficient digital infrastructure and lower digital literacy levels in the region.

From a digital divide perspective, limited technological proficiency and lower digital engagement directly hinder e-commerce participation (Kshetri, 2018b). While e-commerce spending in Turkey is predominantly driven by individuals aged 25-36 (T.C. Ministry of Trade, 2024), in Diyarbakır, e-commerce interest among individuals aged 45 and above is notably lower.

Security Concerns and Traditional Consumer Behavior

A critical barrier to e-commerce adoption in Diyarbakır is consumer trust in online transactions. Data reveal that the least engaged demographic in e-commerce is individuals aged 45 and above.

Lack of trust is a major impediment to e-commerce expansion (Gefen, 2002). Individuals with lower levels of digital literacy often exhibit greater reluctance toward online payment systems. While e-commerce users in Turkey are predominantly within the 25-36 age group, in Diyarbakır, traditional retail shopping remains the preferred option.

Studies indicate that trust in e-commerce is closely linked to the reliability of payment systems, customer service, and delivery efficiency (Kshetri, 2018a). In Diyarbakır, logistical inefficiencies and extended delivery times further diminish consumer confidence in online transactions.

Local Shopping Habits and Cultural Influences

Consumers in Diyarbakır demonstrate a strong preference for physical retail establishments, which may contribute to lower e-commerce adoption rates.

Academic literature suggests that shopping behaviors are shaped by cultural factors, and the adoption of e-commerce represents a gradual transformation in consumer habits (Hofstede, 2001). Specifically, the inclination to physically inspect products before purchase may act as a barrier to online shopping adoption.

In this context, the lower e-commerce participation rates in Diyarbakır can be attributed to consumer familiarity with in-store purchases and a more cautious approach toward digital commerce platforms.

Literature Integration

The findings of this study unequivocally reveal that e-commerce adoption in Diyarbakır is significantly lower than both the Turkish national average and global benchmarks. This discrepancy is closely linked to the digital divide, which is defined as an inequality in access to the internet, digital competencies, and technological adaptation among individuals and regions (Van Deursen & Van Dijk, 2019). Existing literature emphasizes that digital divide directly impacts individuals' participation in digitalization processes and is shaped by economic, cultural, and educational factors (Kshetri, 2018b).

The Digital Divide and Regional Digitalization

While only 9.6% of individuals in Diyarbakır engage in weekly online shopping, this figure rises to 35% globally (Statista, 2024c). Additionally, 38% of individuals in Turkey have made an online purchase within the past three months (TÜİK, 2024). These disparities highlight regional inequalities in digitalization. Van Deursen & Van Dijk (2019) argue that the digital divide extends beyond mere internet accessibility, encompassing digital skills and confidence in online platforms.

The low e-commerce adoption rates in Diyarbakır can be attributed to limited internet infrastructure, lower income levels, and insufficient digital literacy. A study by UNESCO (2021) underscores that low educational attainment is a fundamental barrier to technology adoption and further exacerbates the digital divide. In alignment with these findings, the study demonstrates that university graduates in Diyarbakır engage in e-commerce more frequently (50.8%), whereas individuals with lower education levels exhibit greater hesitation toward online shopping.

Digital Literacy and e-Commerce Engagement

A strong relationship between digital literacy and e-commerce participation is well-documented in the literature (Kshetri, 2018b). Research indicates that individuals with lower digital competencies are less inclined to engage in e-commerce, preferring traditional retail methods instead (Van Deursen & Van Dijk, 2019). The findings of this study corroborate these assertions: 32.7% of individuals in Diyarbakır report "rarely" using e-commerce, compared to only 7.8% at the national level. This stark contrast underscores how deficiencies in digital literacy, compounded by concerns about online security, act as barriers to e-commerce adoption.

Perceived Security and Online Shopping Behavior

Another critical determinant of low e-commerce adoption in Diyarbakır is consumer trust in online payment systems. Literature highlights that a lack of trust in digital payment mechanisms significantly reduces e-commerce engagement (Gefen, 2002; Kshetri, 2018a). The relatively low e-commerce participation in Diyarbakır aligns with this perspective, suggesting that regional consumers remain cautious about engaging in online transactions.

Additionally, logistical challenges and extended delivery times are identified as key barriers to e-commerce adoption (Kshetri, 2018a). In Diyarbakır, underdeveloped logistical infrastructure contributes to consumers' preference for traditional brick-and-mortar shopping, further limiting the growth of e-commerce.

Socioeconomic Determinants of e-Commerce Adoption

Empirical studies indicate that e-commerce adoption is highest among individuals aged 18–34 (Statista, 2024a). The findings of this study support this assertion, as individuals aged 18–24 in Diyarbakır exhibit higher engagement in e-commerce. However, their participation remains lower than their national counterparts, suggesting that regional economic disparities may play a significant role in limiting access to e-commerce platforms.

This discrepancy can be attributed to economic constraints. In Turkey, high-income individuals account for the majority of e-commerce transactions (T.C. Ministry of Trade, 2024). Conversely, the low and middle-income population in Diyarbakır engages in e-commerce far less frequently, indicating that economic barriers restrict access to digital shopping platforms.

5. CONCLUSION AND IMPLICATIONS

The primary aim of this study is to examine e-commerce usage patterns in Diyarbakır within the broader context of national and global trends, thereby identifying the challenges and opportunities shaping the region's digitalization process. To this end, the study adopts theoretical frameworks such as the Technology Acceptance Model (TAM) and the Digital Divide Theory. The analysis delves into demographic factors -including age, gender, income level, and education- alongside digital literacy and logistical infrastructure, to comprehensively assess their influence on e-commerce adoption. The literature review draws upon seminal works, notably Rogers (2003) and Davis (1989), as well as Van Dijk's (2020) analyses of the digital divide, forming the theoretical foundation for the study's context-specific inquiry into Diyarbakır.

In alignment with this theoretical framework, the research employs a quantitative methodology, incorporating statistical techniques such as Chi-Square (χ^2) analysis, Logistic Regression, K-Means Clustering, and Structural Equation Modeling (SEM). A cross-sectional field study conducted with 675 participants examines the interrelations between demographic variables, e-commerce usage frequency, digital literacy, and income level. The findings reveal significant segmentation within Diyarbakır's user base: e-commerce adoption is notably higher among younger and high-income individuals, whereas older and lower-income groups exhibit substantially higher rates of infrequent or non-usage. Furthermore, the study identifies income level as a mediating factor in the relationship between digital literacy and e-commerce engagement, underscoring the critical role of regional inequalities in shaping access to digital platforms.

5.1. Results

This study conducts a comparative analysis of e-commerce usage patterns in Diyarbakır, juxtaposing them with national trends in Turkey and global e-commerce dynamics. The findings reveal statistically significant disparities between e-commerce adoption rates in Diyarbakır and those observed at both the national and international levels. These differences are primarily driven by economic factors, the digital divide, socio-cultural dynamics, and security concerns.

Chi-Square and logistic regression analyses indicate that e-commerce usage varies significantly across specific demographic variables:

Age: Individuals aged 18–24 engage in e-commerce more frequently than other age groups.

Income Level: Those with a monthly income of 20,000 TL or more are 86% more likely to use e-commerce compared to lower-income groups.

Gender: e-Commerce participation among men is 46% higher than among women.

Digital Literacy: Individuals with higher levels of digital proficiency exhibit greater engagement with e-commerce platforms.

Gender-based differences emerge as a particularly notable finding for Diyarbakır. The higher e-commerce adoption rate among men, compared to women, can be attributed to several factors, including men's more dominant role in financial decision-making, women's preference for physical retail stores, and discrepancies in financial access (e.g., credit card and bank account ownership). Further research is required to determine whether this trend is unique to Diyarbakır or reflective of a broader nationwide pattern.

K-Means clustering analysis categorizes e-commerce users in Diyarbakır into three distinct segments:

Young, High-Income, and Active Users (Cluster 1): This group demonstrates the highest frequency of weekly and daily online shopping.

Middle-Aged, Mid-Income, and Cautious Users (Cluster 2): This segment is more sensitive to factors such as installment payment options and secure transaction mechanisms.

Elderly, Low-Income, and Infrequent Users (Cluster 3): This group exhibits reluctance toward online shopping, primarily due to limited digital skills and security concerns.

A closer examination of these segments reveals that individuals in the middle-income bracket in Diyarbakır exhibit a more cautious approach to e-commerce compared to the national average. This caution is likely linked to regional economic uncertainties, restricted access to financial services, and the relatively limited availability of consumer credit options in contrast to major metropolitan areas.

Structural Equation Modeling (SEM) analysis underscores digital literacy as a critical determinant of e-commerce adoption, both directly and indirectly. Higher levels of digital literacy correlate with increased e-commerce participation. Moreover, income level serves as a mediating factor in the relationship between digital literacy and e-commerce engagement.

Additionally, deficiencies in digital infrastructure pose a significant constraint on the expansion of e-commerce. The fixed broadband penetration rate in Diyarbakır is 48%, substantially lower than the national average of 72% (Information and Communication Technologies Authority [BTHK], 2024). Furthermore, limited investment in 5G and fiber-optic networks negatively impacts the mobile shopping experience, thereby restricting broader e-commerce adoption in the region.

5.2. Implications

The findings of this study highlight the necessity of evaluating various strategic measures at the regional level to foster the growth of e-commerce in Diyarbakır. In particular, addressing the digital divide, alleviating security concerns, and overcoming economic accessibility barriers are key areas that warrant targeted policy interventions. Accordingly, the following recommendations are proposed:

a. Expanding digital skills training programs could serve as an effective strategy for increasing e-commerce adoption. To bridge the digital divide, integrating digital literacy into educational curricula and developing specialized programs focused on e-commerce literacy could prove highly beneficial.

b. Enhancing women's financial accessibility is another critical factor that could contribute to the broader adoption of e-commerce. In this context, promoting microcredit schemes, expanding e-commerce training initiatives tailored for female entrepreneurs, and strengthening financial literacy programs could yield significant positive outcomes.

c. Improving the reliability of payment systems could bolster consumer trust in online shopping. Strengthening identity verification protocols, implementing two-factor authentication more widely, and reinforcing consumer protection regulations are key measures to enhance transaction security.

d. Upgrading logistics infrastructure could reduce delivery times and enhance e-commerce accessibility. Expanding regional logistics hubs and optimizing delivery processes would contribute to a more reliable online shopping experience for consumers.

e. Increasing investments in digital infrastructure is another crucial factor for advancing e-commerce in Diyarbakır. Accelerating investments in fiber-optic and 5G technologies, along with offering more affordable internet packages for lower-income individuals, would facilitate broader digital access.

f. Developing tailored strategies for different user demographics could further encourage the adoption of e-commerce:

- ✓ For young and high-income consumers, social media marketing and discount campaigns could be effective promotional tools.

- ✓ For middle-aged and middle-income individuals, installment payment options and secure payment systems could serve as key incentives for online shopping.
- ✓ For low-income and elderly individuals, targeted regional e-commerce support programs could help integrate them into digital commerce ecosystems.

5.3. Limitations of the Study

This study provides a comparative analysis of e-commerce usage patterns in Diyarbakır in relation to national and global trends. However, it is subject to certain limitations stemming from its scope, methodological choices, and data collection process. These constraints should be taken into account when interpreting the findings and may serve as a foundation for future research directions.

a. Sample Scope and Representativeness: This study relies on a sample drawn exclusively from urban residents in Diyarbakır, potentially limiting its generalizability to rural populations. Given that rural areas often experience more restricted digital infrastructure and lower internet penetration, e-commerce adoption patterns in these regions may differ. Expanding future studies to encompass rural areas and neighboring provinces would allow for a more comprehensive analysis of regional disparities.

b. Limitations of the Data Collection Method: The study employs a survey-based approach, which relies on self-reported data. As a result, the findings may be subject to response bias, as participants' perceptions and personal attitudes influence their responses. Specifically, measuring attitudes toward and frequency of e-commerce engagement may not fully capture actual behavior. Future research could benefit from qualitative methodologies such as in-depth interviews, focus groups, and observational studies to provide a more nuanced understanding of e-commerce behaviors in their sociocultural context.

c. Exclusion of Digital Infrastructure and Logistics Factors: While this study focuses primarily on demographic determinants of e-commerce usage, it provides only a limited discussion of digital infrastructure and logistics systems. Given that Diyarbakır's broadband penetration rate remains significantly below the national average and that investment in 5G infrastructure is minimal, these technical barriers likely affect online shopping adoption. Additionally, inadequate logistics infrastructure and prolonged delivery times may reduce consumer trust in e-commerce. Future research should examine the impact of digital infrastructure development, logistics efficiency, and delivery processes on consumer behavior.

d. Limited Analysis of Socioeconomic Factors: Although the study explores variables such as income, gender, and age, it does not fully address the broader socioeconomic dynamics shaping consumer habits. Factors such as financial accessibility (e.g., bank account ownership, credit card usage), household consumption patterns, and shopping motivations could provide a deeper understanding of e-commerce adoption. Future research should investigate income inequality, consumer spending behavior, and the adoption of digital payment methods to enhance the analysis.

e. Limited Consideration of Trust and Psychological Factors: While consumer trust is a key determinant of online shopping behavior, this study primarily evaluates it through statistical comparisons rather than psychological insights. Factors such as fraud concerns, data privacy issues, and past online shopping experiences significantly influence trust in e-commerce. Future studies should incorporate qualitative approaches to exploring consumer perceptions and psychological barriers, thereby providing strategies to enhance trust in digital commerce.

f. Temporal Scope and the Dynamic Nature of e-Commerce Trends: The e-commerce landscape evolves rapidly due to technological advancements and changing consumer behaviors. This study's findings are based on data collected at a specific point in time; however, innovations in e-commerce platforms, digital payment methods, and the rise of mobile commerce (m-commerce) may reshape consumer habits over time. Conducting longitudinal studies would allow for a more detailed analysis of how e-commerce adoption trends evolve in response to technological and economic developments.

5.4. Future Research Directions

This study provides a comparative analysis of e-commerce usage frequency in Diyarbakır, contextualizing it within national and global trends while examining key factors influencing e-commerce adoption. However, given the dynamic nature of e-commerce and regional disparities, further research is needed to expand and deepen understanding in this field. Future studies focusing on the areas outlined below may contribute to a more comprehensive analysis of the regional e-commerce ecosystem.

a. Expanding Regional Comparisons: This study primarily focuses on Diyarbakır; however, broader comparative research covering other provinces in the Southeastern Anatolia Region could offer deeper insights into regional differences in digitalization. Investigating consumer behavior and digital accessibility challenges in rural areas may also help shape regional development policies.

b. **Incorporating Qualitative Research Methodologies**: This study is based on quantitative analysis. However, to gain a deeper understanding of the psychological, sociocultural, and individual factors affecting e-commerce adoption, future research could benefit from qualitative approaches such as in-depth interviews, focus groups, and ethnographic studies. In particular, qualitative investigations into consumer trust in online shopping, levels of digital literacy, and loyalty to traditional commerce could provide valuable insights for policymakers and businesses.

c. **Assessing the Impact of Digital Infrastructure and Logistics**: The level of digital infrastructure development and the efficiency of logistics networks are critical factors influencing e-commerce adoption. Future research could conduct more detailed analyses of internet speeds, broadband access rates, mobile internet usage patterns, and the quality of logistics services. Specifically, studies examining the relationship between improvements in regional internet infrastructure and e-commerce engagement could offer key insights into closing the digital divide.

d. **Evaluating the Role of Digital Literacy and Training Programs**: Findings indicate that digital literacy is one of the most significant determinants of e-commerce usage frequency. Future studies could explore experimental research on the effectiveness of digital skills training in promoting e-commerce adoption. For example, a controlled study measuring e-commerce usage rates before and after digital literacy training could help assess the direct impact of digital skills on consumer behavior.

e. **Consumer Trust and Online Shopping Behavior**: This study identifies security concerns as a major barrier to e-commerce adoption in Diyarbakır. Future research could explore consumer perceptions of online payment security, fears of fraud, and attitudes toward delivery processes in greater detail. Surveys or experimental studies examining how trust influences online shopping behavior could inform strategies aimed at enhancing consumer confidence in e-commerce platforms.

f. **Time-Series Analyses and e-Commerce Trends**: Given the rapidly evolving nature of e-commerce, future research could employ time-series analyses to track long-term trends in consumer behavior. For example, analyzing datasets spanning 5–10 years could provide insights into how e-commerce usage rates in Diyarbakır have changed, what factors have driven these changes, and how new consumer habits have emerged.

g. **Assessing the Economic Impact of e-Commerce**: Studies exploring the economic effects of e-commerce at the regional level remain limited. Future research could examine e-commerce's contributions to employment, its effects on small and medium-sized enterprises (SMEs), and its role in local economic transformation. Investigating how businesses in Diyarbakır integrate into e-commerce, navigate digital transformation processes, and generate economic benefits could inform policy frameworks aimed at supporting regional development.

5.5. Overall Assessment and Conclusion

This study has conducted a comparative analysis of e-commerce usage patterns in Diyarbakır, examining them in relation to national and global trends to identify the key factors driving regional disparities. The findings indicate that beyond demographic and economic variables, digital literacy and trust perception play a crucial role in shaping e-commerce adoption.

The primary barriers to the widespread adoption of e-commerce in Diyarbakır are deficiencies in digital infrastructure, security concerns, and economic inequalities. Addressing these challenges necessitates strategic measures such as expanding digital skills training programs, enhancing the security of online payment systems, and increasing investments in logistics infrastructure.

In conclusion, the growth of e-commerce in Diyarbakır holds significant potential to accelerate regional economic development. However, ensuring a sustainable and inclusive digital transformation requires proactive engagement from both public policymakers and private sector stakeholders. Future research focusing on comprehensive and long-term analyses of regional e-commerce trends will further contribute to the resilience and sustainability of the digital ecosystem.

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