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DIGITAL SERVICES (ONLINE SERVICES) AND CONSUMER BEHAVIOR: ANALYSIS USING THE LOGIT/PROBIT MODEL

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Abstract. This article analyzes the relationship between digital services and consumer behavior using Logit and Probit models. The study examines the influence of factors such as age, education level, internet accessibility, income level, and trust in security on the usage of digital services. The results have practical implications for the development of digital services and better understanding of consumer needs.
Keywords: Digital services, consumer behavior, Logit model, Probit model, internet access, trust, online services.
Аннотация. В данной статье анализируется взаимосвязь между цифровыми услугами и поведением потребителей с использованием моделей Логит и Пробит. Исследование рассматривает влияние таких факторов, как возраст, уровень образования, доступ к интернету, уровень дохода и доверие к безопасности на использование цифровых услуг. Результаты имеют практическое значение для развития цифровых услуг и лучшего понимания потребностей потребителей.
Ключевые слова: Цифровые услуги, поведение потребителей, модель Логит, модель Пробит, доступ к интернету, доверие, онлайн-услуги.
Annotatsiya. Ushbu maqola raqamli xizmatlar va iste'molchilarning xulq-atvori o'rtasidagi munosabatni Logit va Probit modellari yordamida tahlil qiladi. Tadqiqotda yosh, ta'lim darajasi, internetga kirish imkoniyati, daromad darajasi va xavfsizlikka bo'lgan ishonch kabi omillar raqamli xizmatlardan foydalanishga ta'siri ko'rib chiqildi. Natijalar raqamli xizmatlarning rivojlanishi va iste'molchilar ehtiyojlarini yaxshiroq tushunishda amaliy ahamiyatga ega.
Kalit so'zlar: Raqamli xizmatlar, iste'molchi xulq-atvori, Logit modeli, Probit modeli, internet, ishonch, onlayn xizmatlar.

Introduction

The role of digital services in the modern economy is increasing. The consumption of online services is expanding day by day and has become an integral part of everyday life and business processes. As a result of the development of Internet technologies and mobile devices, consumers have access to digital services, which is fundamentally changing their purchasing behavior. Therefore, it is relevant to analyze consumers' attitudes towards digital services and the reasons for their use.

Many economic models are used to study consumer behavior, one of which is the Logit and Probit models. With the help of these models, the factors that determine whether consumers choose or not to choose online services are analyzed based on binary outcomes in the database. The use of Logit and Probit models allows for a clearer understanding of the decision-making process of consumers and helps to develop effective strategies in the field of digital services.

Digital services are services provided through digital platforms and internet technologies, and their scope is very wide and covers various areas. Digital services include e-commerce, online

education, digital banking, telemedicine in healthcare, digital marketing, cloud computing services, etc. (Buhalis, 2003; Laudon & Traver, 2021).

The development of digital services in recent years is associated with the improvement of technological infrastructure, the spread of mobile devices and high-speed internet, as well as the widespread use of artificial intelligence and big data technologies. This has led to digital services becoming more interactive, personalized, and convenient (Chen et al., 2020).

Consumer behavior is the set of specific actions, decisions, and motivations that consumers demonstrate when selecting, purchasing, and using products or services (Solomon, 2018). In economics, consumer behavior theory is used to predict these decisions and identify the factors that shape them.

Consumer behavior toward digital services differs from traditional services because:

- Interactivity: Since digital services are delivered online, consumers interact directly with the services.
- Speed and convenience: Digital services are available 24/7, allowing consumers to access services at any time.
- Personalization: Services are tailored to individual needs through artificial intelligence and data analytics.
- Security and trust issues: Consumers are increasingly concerned about the security, privacy, and reliability of online services.

In addition, consumer decisions in digital services are often driven by factors such as price, quality, brand credibility, user experience, and platform capabilities (Kimes, 2010).

Logit and Probit Models: Concepts and Role in Economic Analysis

a) **Logit Model**

The logit model is a probability model that is used in cases where the outcome variable has only two values (for example, "yes" or "no"). In this model, the associated probability is expressed by the logistic function. Mathematical representation:

$$P(Y = 1|X) = \frac{e^{X\beta}}{1 + e^{X\beta}}$$

Here: X - a vector of independent variables, β - a vector of parameters.

The maximum likelihood method is used to estimate the parameters of the logit model. It is widely used in economic, social, and marketing research (Long, 1997).

b) **Probit model**

The probit model is also used for binary outcomes, like the logit model, but it represents the probability using the standard normal distribution function:

$$\mathbf{P(Y=1 \mid X)=\Phi(X\beta)}$$

Here: Φ - the standard normal distribution function.

The results of the Probit and Logit models are often very close, and their choice depends more on practical convenience and information (Greene, 2012).

Application in economic research. Logit and Probit models are very convenient for analyzing consumers' decisions to use online services. For example, considering the cases when a consumer chooses (1) or does not choose (0) a service, it is possible to include factors that influence the choice of a service — such as price, convenience, security — in the model. Using these models, it is determined how each factor affects the probability of choosing a service, which provides valuable information to business and policymakers.

This study uses survey data collected from large cities and regions in the Republic of Uzbekistan to study the use of digital services and consumer behavior. The survey examines the demographic characteristics of respondents (age, gender, education level), frequency of use of digital services, reasons for choosing a service, and online shopping habits.

The data was collected during the 4th quarter of 2023, with a total of 1,500 respondents. This data is of sufficient volume and diversity to understand economic behavior and analyze it using Logit/Probit models.

Model construction and parameter estimation. Two main models — Logit and Probit models — were built in the study. The outcome variable is the respondent's decision to use a digital service (1 – uses, 0 – does not use).

Independent variables include:

- Age (in years)
- Gender (male – 1, female – 0)
- Education level (1 – higher education, 0 – other)
- Ease of access to the Internet (1 – good, 0 – bad)
- Salary level (in soums)
- Online shopping experience (1 – yes, 0 – no)
- Level of confidence in security (1 – high, 0 – low)

The parameters were estimated using the maximum likelihood method and the model fit was checked using statistical tests.

Analysis of main results

- Age: Increasing age increases the likelihood of using digital services. It was observed that the age group quickly adopted digital technologies and had a high level of adaptation to online services.
- Gender: Men are slightly more likely to use online services than women, but the difference is not statistically significant.

Education level: Respondents with higher education are more likely to use digital services.

- Ease of access to the Internet: Those with good access to the Internet are more likely to use online services.
- Salary: Individuals with higher incomes invest more in digital services.
- Online shopping experience: Those with prior online shopping experience are more likely to choose new digital services.
- Trust in security: Trust in the level of security has a strong impact on the decision to use digital services.
- The model fit is high, and the Logit and Probit results are similar and statistically reliable.

The empirical results show that several important factors play a role in shaping the decision to use digital services. Age and education level represent high adaptability to digital technologies. This, in turn, ensures the active use of digital services by the younger generation.

Easy access to the Internet — as a basic infrastructure condition — increases interest in digital services. Conversely, poor quality Internet or limited technical capabilities limit the use of services.

Income level indicates the tolerance of consumers to the price of digital services. Higher income groups tend to prefer higher quality and more expensive services, which encourages their regular use.

Trust in security — related to online payments and the protection of personal data — is one of the most important elements of consumer decision-making. Increased trust in this area significantly increases the level of use of services.

The gender factor, although not statistically significant, indicates that there may be differences in some regions and social strata, and the need to develop special gender-oriented policies and services.

The results of the Logit and Probit models are an important tool for developing marketing strategies, improving the quality of service in the field of digital services, and better understanding consumer needs. For example:

- Develop user-friendly interfaces for groups with low levels of education.
- Plan regional infrastructure projects to improve the quality of the Internet.
- Strengthen information campaigns on safety, build trust.
- Segment and adapt services for young people and older people.

Conclusion

This study examined the complex relationship between digital services (online services) and consumer behavior using Logit and Probit models. The results of the study showed that age, education level, internet access, income level, online shopping experience, and trust in security play an important role in shaping the decision to use digital services.

While respondents with a higher age and education level tend to actively use digital services, in regions with low internet infrastructure and trust levels, these indicators limit the use of services. Also, high-income consumers are turning to quality and more digital services.

Although the gender factor is not statistically significant, there is a need to develop gender-oriented services in some social and territorial conditions.

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