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Sociodemographic Effects on Financial Inclusion: Implications from Online Transaction in Developing-8 Countries

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Abstract

The world has reached the industry 4.0, where technological developments have been widely applied to electronic payment, with no exception on Muslim countries. This study aims to investigate association between sociodemographic and financial inclusion in country D-8 in the probability of using online financial transactions. Using The Global Findex 2017 from D-8 Organization for Economic Cooperation included in OIC countries and the logistic regression, this study explores the effect of sociodemographic namely gender, education, income status and working status on online financial transactions users. Using control variables such as Gross Domestic Product (GDP), Inflation and Exchange rate, results show that, there is a gender imbalance between men and women in using online transaction to access formal services. On the other hand, individuals who have higher level of education, upper-middle income and high-income, and those who work are more financially inclusive in using online transaction. In conclusion, those with higher sociodemographic status are more likely to use online transaction to access formal financial services. The government and third parties can use this study as policy recommendations for expanding online transaction as well as financial inclusion in developing Muslim countries.

Keywords: financial inclusion, online financial services, individual characteristics, socio-economic status, Muslim countries

JEL classifications: G2; J1; O0

1. Introduction

The importance of the usage of internet or mobile phone to access formal financial services (to make a payment, to buy something, or to send money) cannot be overstated. This shift towards online financial services has revolutionized the way individuals, businesses, and even governments conduct their financial transactions. The convenience and accessibility provided by internet and mobilephone technologies have significantly enhanced financial inclusion (Asongu, Biekpe & Cassimon 2021; Ooi & Tan 2016; Di Pietro et al. 2015). Previously underserved populations, such as those in remote

areas or with limited access to traditional banking services, can now participate in the formal financial system (Aron 2018). Mobile phones, in particular, have played a pivotal role in bridging the financial gap, allowing individuals to access a range of services and perform transactions regardless of their geographical location (Danquah & Iddrisu 2018; Pradhan et al. 2021).

It can not be denied that, the Covid-19 pandemic acted as a catalyst for the widespread adoption of online services. Lockdowns and social distancing measures forced individuals and businesses to rely heavily on digital platforms for work, education, entertainment, and even healthcare. Online service includes formal financial services has seen a surge during the pandemic (Gutiérrez-Romero & Ahamed 2021; Daragmeh, Lentner & Sági 2021;

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Fu & Mishra 2022; Kapoor et al. 2022; Zhang et al. 2022). Moreover, the adoption of online financial services has led to increased efficiency and cost-effectiveness. Online platforms and mobile applications offer streamlined processes for making payments, purchasing goods and services, and transferring money. This has reduced the reliance on physical cash, minimizing the associated costs and risks, while promoting greater financial transparency and traceability. The usage of internet or mobile phones to access formal financial services has also opened up new avenues for economic growth and entrepreneurship (Kanyam, Kostandini & Ferreira 2017; Mothobi & Grzybowski 2017; Vu 2017; Lwoga & Sangeda 2019; Andreou & Anyfantaki 2021). Small businesses and individuals can now leverage digital platforms to expand their customer base, access capital through crowdfunding or online lending, and engage in e-commerce activities. The ease of conducting financial transactions through digital means has lowered barriers to entry and fostered a vibrant ecosystem of online businesses.

Furthermore, the integration of internet and mobile technology with formal financial services has facilitated the digitization of government payments and services (Singh & Sahu 2008; Goldkuhl 2016; Ozili 2018; Danquah & Iddrisu 2018; Kapoor et al. 2022). Citizens can now pay taxes, receive social welfare benefits, and access government services online, saving time and resources for both individuals and administrative bodies. This digitization drive has the potential to enhance transparency, reduce corruption, and improve overall governance (Kanyam, Kostandini & Ferreira 2017; Asongu, Nwachukwu & Orim 2018; Wantchekon & Riaz 2019; Lu, Niu & Zhou 2021). However, with the rapid expansion of online formal financial services, new risks and challenges have emerged. Cybersecurity threats, such as data breaches and identity theft, pose significant concerns for individuals and financial institutions (Suh & Han 2002). The interconnected nature of online financial systems also raises the risk of large-scale cyberattacks (Tawalbeh et al.

2020), which can have severe economic and social consequences (Adam & Alhassan 2021). Governments and regulatory bodies face the daunting task of establishing robust cybersecurity measures and frameworks to safeguard users' financial information and maintain trust in online financial services.

Furthermore, the rise of online financial services has created regulatory and compliance challenges. Traditional regulatory frameworks often struggle to keep pace with the speed of technological advancements, leading to gaps in oversight and consumer protection (Monteith et al. 2021) and ensuring equal access to technology for all segments of society. Governments and regulatory authorities are grappling with issues related to data privacy, consumer rights, anti-money laundering, and know-your-customer requirements in the online financial ecosystem (Iman 2018; Ozili 2018; Ghosh 2021; Venkatraman & Reddy 2021). Striking the right balance between fostering innovation (Alhammad, AlOthman & Tan 2021) and ensuring regulatory compliance (Yadav 2020) remains a complex and ongoing endeavor.

The increasing dominance of large technology companies in the online financial services sector has raised concerns about market concentration and fair competition. Governments and policymakers are examining the potential risks associated with the concentration of financial power in the hands of a few players. They are exploring measures to promote competition (Cheng & Qu 2020; Banna, Hassan & Rashid 2021) protect consumer interests (Adam & Alhassan 2021) and prevent unfair practices that could stifle innovation and limit consumer choice (Mombeuil & Uhde 2021). In addition, online financial services, have shown great promise at lowering costs to increase access and might be the only way banks can deepen financial inclusion and make the economics work. One of online formal financial service is, electronic banking (e-banking). From the last two decades banking sector has develop e-banking as the new type of medium to provide the services based on information technology with the help of internet for the sake of customer

preferences and needs, competition has been increased from non-banks, changes in social trends and demographics, and deregulation from government for financial service sector (Liang, Ma & Qi 2013; Lee & Shin 2018; Andreou & Anyfantaki 2021; Asongu, Biekpe & Cassimon 2021; Banna, Hassan & Rashid 2021).

In conclusion, the usage of internet or mobile phones to access formal financial services has revolutionized the financial landscape, empowering individuals, businesses, and governments alike. The convenience, efficiency, and opportunities provided by online financial services have the potential to foster financial inclusion, drive economic growth, and transform the way financial transactions are conducted on a global scale.

This study aims to determine how socioeconomic characteristics affect on the probability of using internet or mobilephone to access formal financial services (to make a payment, to buy something or to send money). This study using observation from Eight (8) member countries of D-8 cooperation as they are developing country with a level of formal financial services still low. This is a research problem that is important to cover to give a recommendation for the government in developing countries. Besides by examining the probability of using online financial service in D-8 countries, mapping can be done between upper-middle and lower-middle-income countries. To the best of my knowledge, there are very few previous studies that have investigated this matter. This paper contributes to the existing literature in three ways. First, there have been limited studies concerned on the probability in accessing the online formal financial service in Muslim countries. Second, this research obtains the data from Global Financial Index, this microdata is unique since it covers many countries, yet the survey is conducted to the individuals. Third, this paper contributes to the knowledge by convincing the government that socioeconomic status is important to ensure that the benefits of online financial services are accessible to all. Fostering the socioeconomic status can have a significant impact on an

individual's access on formal financial service using internet and mobilephone.

This paper consists of six parts. First, the introduction contains the background of study, which is the importance of doing the research. Second, literature review and theoretical framework describe the usage of internet or mobile phones to access formal financial services in theories and empirical evidence. Third, the research method of this study. Four, the discussion on the probability on using internet or mobile phones to access formal financial services. Finally, this paper presents the conclusion and recommendations

2. Literature Review

Financial inclusion is an individual's ability to access, use and benefit from formal financial services that are safe, reliable and provide convenience, and suit the needs of the user (Ozili 2020). Inclusive finance is characterized when formal financial institution services can be reached by all levels of society, thus encouraging an improvement in the quality of life. Through intermediary schemes, financial inclusion contributes to development because it provides deposit services, credit expansion, financing, remittance facilities, and risk management that are beneficial for its users (Tchamyou, Erreygers & Cassimon 2019; Seng 2021; Ganle et al. 2015). This instrument can also increase business empowerment and the role of women, increase investment in education, and in the long term have a positive impact on improving individual welfare (Eton et al. 2018; Cabeza-García, Del Brio & Oscanoa-Victorio 2019).

Financial inclusion can be measured from the demand side to see the probability of use and from the supply side to invest in the readiness of financial service provider infrastructure such as the availability of ATMs, bank branches, financial service products offered. In the era of digitalization, the existence of the internet cannot be separated from formal financial services. Individuals who were previously

exclusive can become inclusive due to technological assistance in paying bills, shopping, transferring educational funds, as well as investing and making social expenditures.

Despite the increasing adoption of digital technologies, there is still a digital divide that persists, particularly in developing countries and among certain demographic groups. Previous studies have highlighted disparities in internet access, digital literacy, and ownership of smartphones, which can hinder the probability of using internet or mobile phones for financial services. Further research is needed to understand the underlying factors contributing to the digital divide and identify strategies to bridge this gap.

There are two grand theories that are competing in explaining this research, they are financial inclusion theory and online transaction behavior theory. There are three key theories that help explain the concept of financial inclusion and the factors that contribute to its attainment. First, Supply-Side Theory: The supply-side theory emphasizes the role of financial service providers in expanding financial inclusion. According to this theory, the lack of financial inclusion is primarily due to the limited availability and accessibility of financial services in certain areas or for specific populations. It suggests that by expanding the physical infrastructure, such as branches and ATMs, and developing innovative delivery channels, financial institutions can reach underserved populations and increase financial inclusion. Second, Demand-Side Theory: The demand-side theory focuses on the behaviors and preferences of individuals and businesses as key drivers of financial inclusion. It suggests that people may be excluded from the financial system due to various factors, such as lack of awareness, trust, or understanding of financial services. This theory emphasizes the importance of addressing demand-side barriers through financial education, consumer protection regulations, and building trust among potential users of financial services. Third, Institutional Theory: The institutional theory explores the role of formal and informal institutions in shaping financial

inclusion. It recognizes that formal financial institutions, regulatory bodies, and policies play a crucial role in enabling or constraining financial inclusion efforts. This theory emphasizes the need for supportive regulatory frameworks, inclusive policies, and collaborations among stakeholders to create an enabling environment that promotes financial inclusion.

There are several literatures that discuss financial inclusion from two sides, namely the supply and demand sides. Financial inclusion research from the supply side was conducted by Cámara & Tuesta (2014), Sarma (2015), Park & Mercado (2015), Nandru, Byram & Rentala (2016), and Davutyan & Öztürkkal (2016). In terms of demand, previous research was conducted by Ajani & Tjahjadi (2018) and Tjahjadi (2018) financial inclusion from formal account ownership in the ASEAN region, financial inclusion from formal account ownership (Nugroho & Purwanti 2018; Susilowati & Leonnard 2019), saving in the formal sector and formal credit in Indonesia and (Fungáčova et al. 2015) which examines financial inclusion of formal account ownership and use in China. There is also a study that discusses financial inclusion from the demand and supply side as conducted by Cámara & Tuesta (2014) determined by three dimensions of penetration, usage, and barriers in 70 countries.

Instead of financial inclusion theory, there are also several theories that help explain online transaction behavior, particularly in the context of e-commerce and digital financial services. Here are three key theories that shed light on online transaction behavior. First, Technology Acceptance Model (TAM), this theory focuses on the factors influencing individuals' acceptance and usage of technology. According to TAM, perceived usefulness and perceived ease of use are the primary determinants of an individual's intention to use a technology. In the context of online transactions, individuals are more likely to engage in online transactions when they perceive the technology as useful in facilitating their financial activities and find it easy to navigate. Factors such as convenience, security, and the ability to

compare prices and access a wide range of products/services influence the perceived usefulness of online transactions. Second, Trust Theory, this theory emphasizes the role of trust in influencing individuals' willingness to engage in online transactions. Trust is a critical factor as it reduces uncertainty and perceived risks associated with online transactions. Trust can be built through factors such as website security features, privacy protection, reputation of the online platform or financial institution, and positive experiences with previous online transactions. Trust theory suggests that individuals are more likely to engage in online transactions when they perceive a high level of trust in the online environment. Third, Theory of Planned Behavior (TPB), this theory posits that an individual's intention to engage in a behavior is influenced by three key factors: attitude toward the behavior, subjective norms, and perceived behavioral control. In the context of online transactions, individuals' attitudes toward online transactions, subjective norms (social influences and opinions of others), and perceived behavioral control (perceived ability to perform online transactions) influence their intention to engage in online transactions. Positive attitudes, social approval, and a sense of confidence in performing online transactions contribute to higher adoption rates.

These theories provide frameworks for understanding the factors influencing individuals' online transaction behavior. By considering factors such as perceived usefulness, ease of use, trust, attitudes, subjective norms, and perceived behavioral control, researchers and practitioners can design effective strategies to promote and facilitate online transactions. It is important to note that these theories are not exhaustive, and other factors, such as individual characteristics and situational factors, may also impact online transaction behavior.

There are several literatures that explain with regard to online transaction behavior. Customers prefer online transaction for conveniences, speed, round the clock services and access to the account from any parts of the world (Ooi & Tan 2016; Danquah & Iddrisu 2018; Lee & Shin 2018; Adam & Alhassan

2021; Asongu, Biekpe & Cassimon 2021; Ghosh 2021; Lu, Niu & Zhou 2021; Venkatraman & Reddy 2021; Kapoor et al. 2022).

Online transaction and e-banking offers benefits to banks. For example, banks can benefit from lower transaction costs as e-banking requires less paperwork, less staff and physical branches (Cheng, Collins & Huang 2006). E-banking leads to a higher level of customers' satisfaction and retention (Chau & Lai 2003). E-banking reduces loan processing time as borrowers' loan application can be viewed by loan processing and loan approval authority simultaneously (Smith & Rupp 2003). Typically, loan applications are received at branch level and sent to the head office for approval. These documents transfer to and from branch to head office consume much time and delay loan sanction period.

Several studies also have shown that the sociodemographic characteristics upon adoption of online banking (Fonseca et al. 2012; Demirguc-Kunt & Klapper 2012; Ajani & Tjahjadi 2018). The probability of using online financial service is influenced by gender and the level of education (Fungáčova et al. 2015; Zins & Weill 2016; Nugroho & Purwanti 2018; Ajani & Tjahjadi 2018; Cabeza-García, Del Brio & Oscanoa-Victorio 2019). Gender is a social construction of the role of individuals based on the sex they have. Men and women are the genders agreed upon by the community. The existence of a lineage makes the community give a certain gender privilege to make decisions that have a major impact on the individual or household (Barsoum 2006; Miled & Rejeb 2015; Asuming, Osei-Agyei & Mohammed 2019; Cabeza-García, Del Brio & Oscanoa-Victorio 2019). The probability of using online financial service is also influenced by the individual level of income (Demirguc-Kunt et al. 2015; Efobi, Beecroft & Osabuohien 2014; Sarma 2016; Abel et al. 2018; Susilowati & Leonard 2019); and status as workers (Nandru, Byram & Rentala 2016; Soumaré, Tchana & Kengne 2016; Morsy & Youssef 2017). This study selected men, individuals with low education, people with the poorest 20% income and people who do not work as a comparison.

This study aims to determine whether sociodemographic characteristics affect the probability of using online financial service. This study analyzes the probability of using online financial services of 8 member countries of D-8 cooperation which as a whole is a developing country with a level of formal financial services still low. The D-8 consists of eight developing countries, namely Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkiye. From the geographical aspects, D-8 muslim countries located in South Asia, Middle-East and Africa, and South-East Asian which has various internet penetration, but has no high level internet penetration on average. In 2017, 70% of Malaysian has access to internet, 60% internet penetration for Turkey, Indonesia has 51%, Egypt only 37%, and others are below (Digital Global Overview 2017). None of those countries are in 10th highest penetration, but interestingly, D-8 countries has rapidly growth on mobile's share of web traffic. Nigeria has 81% or the 1st place on percentage of total web pages served to mobile phones. Indonesia got 69%, 53% for Malaysia. This score are above from global average (50%) even United State only 37% of web pages transferred to mobile phones. This shows the tendency for internet use in Muslim countries that are members of D-8 to be dominated by mobile phone users.

Previous research also generally investigates the development of financial inclusion based on geographic location in regions such as Middle East and North Africa (Neaime & Gaysset 2018; Mushtaq & Bruneau 2019; Ahmad, Green & Jiang 2020; Emara & Mohieldin 2020; Emara & El Said 2021), ASEAN (Kim 2016; Ali et al. 2020; Erlando, Riyanto & Masakazu 2020; Seng 2021; Van et al. 2021) and Sub-Saharan Africa (Félix & Belo 2019; Alimi & Okunade 2020; Hussain et al. 2023). Other studies look at financial inclusion in terms of the economic level of respondents or gender as was done by (Aguila, Angrisani & Blanco 2016; Suri & Jack 2016; Fareed et al. 2017; Gyasi & Adam 2021) however, there is limited research that examines sociodemographic aspects and their impact on the use of

online transactions within the framework of financial inclusion, especially in Muslim countries that are members of the D-8 countries.

Besides by examining the probability of using online financial service in D-8 countries, mapping can be done between upper-middle and lower-middle-income countries. To the best of my knowledge, there are very few previous studies that have investigated this matter. This research has the advantage of identifying sociodemographic factors on the demand for access to internet-based financial services, especially in developing Muslim countries, which have not often been explored by previous studies.

3. Method

This study uses microdata from The Global Financial Index 2017 which includes 4,066 respondents from D-8 countries aged 15 years or older. Individuals who are research targets in 8 countries that are members of the D-8 Organization for Economic Cooperation in the Organization of Islamic Cooperation (OIC). This study is a cross-sectional study of 8 developing countries that are members of the Developing Eight Organization for Economic Cooperation consisting of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey.

Table 1. Number of Observations

Uncomcode	Freq.	Percent	Cum.
Bangladesh	353	8.68	8.68
Indonesia	429	10.55	19.23
Iran	816	20.07	39.30
Malaysia	731	17.98	57.28
Nigeria	531	13.06	70.34
Pakistan	194	4.77	75.11
Turkey	691	16.99	92.11
Egypt	321	7.89	100.00
Total	4,066	100.00	

Source: Global Financial Index 2017

In this study, the use of the internet or mobile phones in online transactions through formal financial services was chosen as the dependent variable. On the other hand, the independent variable consists of four individual characteristics, namely gen-

der (categorical variable) binary which consists of female (1) and male (0); income variable (categorical variable) multinomial which consists of income levels poorest 20% (1), second 20% (2), middle 20% (3), fourth 20% (4), and richest 20% (2); multinomial education variable (categorical variable), consisting of basic education level (1), secondary education (2), and further education (3); as well as binary categorical variables consisting of working (1) and not working (0). The use of classification in education and income variables is generally to overcome the problem of heterogeneity between individuals so that classification is chosen to classify individuals into groups based on similar patterns (Palma 2011; Gruber & Kosack 2014; Agbor 2015). The classification of individuals based on income level refers to The Global Findex report in 2017 published by the World Bank.

In this study, Bangladesh was chosen as the comparison to determine the level of inclusion of online financial services transactions among D-8 member countries. The reason is that, even though the campaign of financial inclusion in Bangladesh is very strong but the percentage of financial inclusion in Bangladesh is quite low. In addition, Iran is the most inclusive country in the use of internet or mobile phone technology to access formal financial services. On the other hand, Egypt is the most exclusive country in this regard.

The model used in this study refers to the models in previous studies, namely in the form of Qualitative Response Regression Models. A multinomial logit model is employed to see the probability of being financially (Pratomo 2015; Wardhono, Qori'Ah & Indrawati 2016; Fianto et al. 2018). This study predict the nexus of demographic issues on using the online transaction in 8-developing muslim countries. This model is suitable for analyzing dependent variables in binary form by log transforming the independent variable to see the probability. This research refers Manajit et al. (2020) using logistic regression was employed to identify the association between sociodemographic factors and the tendency to use online transactions at the individual

level. The logit model is a model used to analyze the probability of an event occurring at 0-1 intervals with the equation:

$$L_i = \text{Ln}(P_i/(1 - P_i)) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \mu_i \quad (1)$$

L_i is dependent variable of the research

$L_1(P_i/(1 - P_i))$ is the probability of using the internet or mobile phone to access formal financial services.

4. Results and Analysis

This study selected men, individuals with low education, people with the poorest 20% income and people who do not work as comparison variables. In Table 3 column 1 is the regression result of using the internet or mobile phone to transact through the formal financial sector. These results indicated that, there is no significant difference in women's use when compared to men. This finding is in line with research results from Guo, Chen & Zeng (2021), which found that technological factors (digitalization) increase gender equality in accessing internet-based financial services in China and increased the role of Indian women in formal financial services to promote well-being (Swamy 2014; Shrivastava & Satam 2015). Equal roles for women can support accelerated development because the majority of women use financial services to support family financial management such as investing, business expansion, improving woman entrepreneurship, and children's education (Cabeza-García, Del Brio & Oscanoa-Victorio 2019). Efforts to increase financial inclusion using technological aspects have been widely carried out in developing and developed countries. The internet is one of the determining factors in the development of penetration of formal financial services because it can accelerate the use of financial services that can be accessed anywhere and anytime with high security (Ahmad, Green & Jiang 2020). Nevertheless, this result con-

Table 2. Description of Variables

Variables	Description	Source	Mean	Std. Dev.	N
<u>Dependent variable</u>					
Online transactions user	Respondents who are 15 years old or more and use internet or mobile-phone to access formal financial services (to make a payment, to buy something or to send money).	The Global Findex 2017	0.329	0.470	4,066
<u>Independent variables</u>					
Women	1 if the respondent is women, 0 otherwise	The Global Findex 2017	0.430	0.495	4,066
Primary_edu	1 if the respondent is only finished basic education, 0 otherwise	The Global Findex 2017	0.102	0.385	4,066
Second_edu	1 if the respondent is only finished middle school, 0 otherwise	The Global Findex 2017	0.598	0.490	4,066
Tertiary_edu	1 if the respondent finished tertiary education or more, 0 otherwise	The Global Findex 2017	0.235	0.424	4,066
Second20% (lower-middle)	1 if the respondent is 20% poorest or lower-middle income, 0 otherwise	The Global Findex 2017	0.133	0.340	4,066
Middle20% (middle)	1 if the respondent is 20% middle income, 0 otherwise	The Global Findex 2017	0.184	0.388	4,066
Fourth20% (upper-middle)	1 if the respondent is 20% fourth or upper-middle income, 0 otherwise	The Global Findex 2017	0.229	0.420	4,066
Richest20%	1 if the respondent is 20% richest, 0 otherwise	The Global Findex 2017	0.229	0.771	4,066
Employee	1 if the respondent is in workforce, 0 otherwise	The Global Findex 2017	0.690	0.463	4,066
<u>Control variables</u>					
Gross Domestic Product (GDP)	Real Gross Domestic Product in 2017 at country level (in million USD)	The World Bank			
Inflation	Inflation in 2017 at the country level	The World Bank			
Exchange rate	Exchange rate in 2017 at the country level	The World Bank			

Source: Global Findex 2017; The World Bank

tradicts a study conducted by The Global Findex Report (2017) and Gyasi & Adam (2021) which saw a gap between women and men in accessing financial services in Sub-Saharan Africa.

Based on the length of education, individuals with secondary and tertiary education both likely to use online transaction. Moreover, individuals with tertiary education are more likely to use the internet or mobile phones to buy, pay and send money through formal financial institutions compared to individuals with secondary education. Matekenya, Moyo & Jeke (2021) found there is a two-way correlation between financial inclusion and human development in Sub-Saharan Africa. The increase in demand for the use of online transactions as a proxy for financial inclusion is influenced by individual literacy towards technology (internet) and financial literacy. Individu-

als with a higher level of education are considered to be more literate so they know and can wisely utilize the ease of digitalization and take advantage of developments in financial services. This literacy factor is also confirmed by research conducted by Hasan, Le & Hoque (2021) as one of the success factors in implementing financial literacy.

At the income level of the community, individuals with upper-middle income and the richest are likely using online transaction and the richest are statistically higher in propensity to use the internet or mobile phones to transact through formal financial institutions. Likewise, individuals who work will have a higher opportunity to use the internet and mobile phones in order to access formal finance.

Based on the results of the logistic regression and robustness test, it is known that there is no signif-

Table 3. Logistic Regression of Online Transaction User

Variables	Online transaction user in formal financial services	
	Regression 1 Coef.	Regression 2 Coef.
Women	-0.0191* (0.074)	-0.108* (0.079)
Secondary_edu	1.151** (1.012)	1.006** (0.017)
Tertiary_edu	2.239** (1.011)	1.877** (0.012)
Second20%	0.0131 (0.147)	0.053 (0.148)
Middle20%	0.061 (0.135)	0.201 (0.132)
Fourth20%	0.171 (0.129)	1.402 (0.208)
Richest20%	0.174** (0.017)	0.4663** (0.089)
Employee	0.3628** (0.083)	0.466** (0.089)
uncomcode=360 Indonesia		0.046 (0.202)
uncomcode=364 Iran		1.425** (0.073)
uncomcode=458 Malaysia		0.849** (0.075)
uncomcode=566 Nigeria		0.017 (0.188)
uncomcode=586 Pakistan		-0.174 (0.251)
uncomcode=792 Turkey		1.160** (0.073)
uncomcode=818 Egypt		-1.825** (0.032)
N observations	4,066	4,066
Cons	-2.388	-3.041
Prob>chi ²	0.000	0.000
Pseudo R ²	0.0845	0.160

Note: *** p<0.01, ** p<0.05, * p<0.1 probability *p-value* in parenthesis

icant difference between women and men in the use of online transactions through formal financial services. Yang, Huang & Gao (2022) contends that women have challenges in accessing financial information and services. Moreover, with technological developments, these obstacles can be minimized with internet penetration and technological inclusivity for all groups. Digitalization in the financial sector can encourage marginalized women to be more empowered. The absence of a gender gap in the D-8 Muslim countries shows a step forward compared to other countries, especially in Sub-Saharan Africa and parts of Asia, which indirectly reduces women's ability to access technology and financial services. Promoting gender equality in financial inclusion can also encourage poverty reduction, improve income

distribution, and provide access to self-development as Seng (2021) found in Cambodia.

However, the level of education and involvement of individuals in the world of work significantly affect the use of the internet or mobile phones for shopping, payments and sending funds through the formal financial sector. Education level determines an individual's choice to use online transfer. Indirectly, consumers' insight and level of understanding influences their decisions in using financial services that are safe, reliable and provide comfort in use. Kurniasari et al. (2021) discover that the level of financial inclusion in Indonesia is influenced by the level of education because the higher a person's education, the more able they are to respond to var-

Table 4. Logistic Regression of Online Transaction User

Variables	Regression 1 Coef.	Regression 2 Coef.	Regression 3 Coef.	Regression 4 Coef.	Regression 5 Coef.
Women	-0.074* (0.065)	-0.071* (0.067)	-0.066* (0.056)	-0.067* (0.068)	-0.068* (0.071)
Secondary_edu	1.218** (0.013)	0.349** (0.067)	1.229** (0.031)	1.222** (0.040)	1.218** (0.130)
Tertiary_edu	2.326** (0.013)	2.299** (0.014)	2.344** (0.013)	2.333** (0.013)	2.326** (0.039)
Second20%	0.141 (0.131)	0.152 (0.532)	0.152 (0.532)	0.120 (0.108)	0.138 (0.109)
Middle20%	0.147 (0.612)	0.151 (0.201)	0.147 (0.612)	0.0733 (0.935)	0.0863 (0.938)
Fourth20	(0.935)	(0.135)	(0.135)	(0.135)	(0.135)
Richest20%	0.403** (0.010)	0.346** (0.012)	0.422** (0.011)	0.437** (0.0123)	0.426** (0.0108)
Employee	0.363** (0.081)	0.363** (0.083)	0.363** (0.082)	0.363** (0.084)	0.466** (0.086)
GDP		0.045** (0.051)			
Inflation			-2.334** (0.021)		
Exchange rate				2.112** (0.421)	
Indonesia					1.234*** (0.006)
Iran					1.425*** (0.001)
Malaysia					0.849*** (0.007)
Nigeria					0.017 (0.185)
Pakistan					-0.174 (0.245)
Turkey					1.160*** (0.010)
Egypt					-1.825** (0.032)
N observations	4,066	4,066	4,066	4,066	4,066
Cons	-0.680 (0.040)	-0.474 (0.058)	-2.057 (0.012)	-2.034 (0.018)	-2.012 (0.011)
Prob>chi ²	0.000	0.000	0.000	0.000	0.000
Pseudo R ²	0.0002	0.0054	0.079	0.080	0.080

Note: *** p<0.01, ** p<0.05, * p<0.1 probability *p-value* in parenthesis

ious financial service options. Educated people will find it easier to obtain information from social media to gain broader insight into various alternative financing methods to improve their welfare.

Working groups certainly have greater opportunities to access online transactions. Salary payments, remittance transfers, and online purchases can be easily made by workers because they have a source of income. This is also found in D-8 countries where there is a probability gap between the worker group and the non-worker group in the frequency of ac-

cessing internet-based financial services.

It is interesting to see the level of individual income. The convenience of technology does not only refract the boundaries of geography, space and time. However, it also reduces inequality in the use of internet-based online transaction services from various income levels. The observation results show that there is no significant difference between the use of online transactions from the poorest, lower-middle, middle, upper-middle and richest income groups.

However, if we add a variable to see the level of inclusion in each country, individuals with the fourth-20% (upper-middle) income and the richest 20% have a higher potential to use the internet/mobile phone to access online transactions for formal financial services. The acceleration of technology and the availability of adequate infrastructure increases the ability of individuals from various income groups to carry out financing, purchase goods, and carry out daily transactions using mobile phone services connected to the internet (Kamel 2005; Evans 2018; Abor, Amidu & Issahaku 2018). This condition biases inequality between rich and poor groups so that every group can access financial services. For some individuals in the richest group, there may be an increase in the frequency of using online transactions because of the financial resources they have. However, the convenience of technology has provided a new era for increasing financial inclusion in developing countries, including the D-8 Muslim countries.

In this study, Bangladesh was chosen as the comparison to determine the level of inclusion of online financial services transactions among D-8 member countries. The reason is that, the financial inclusion in Bangladesh is quite low. The Global Findex reported in 2017, only 50% adults in Bangladesh who has account in formal financial services with the gender gap about 29 percentage point of woman and 17% of poorer has lower chance to access financial services. Towards internet users, Bangladesh also relatively low, only 19,8% adult in Bangladesh can afford internet connection and it increased to 24,8% in 2020 (Statista 2023). It is not surprising that Bangladesh is the research baseline because the condition of internet infrastructure and demand for internet use to access formal financial services are relatively low.

In addition, the association of account ownership in the formal financial sector, internet penetration, and the probability of using online transactions shows a positive relationship. Based on The Global Findex 2017 report, no less than 94% of Iran's adult population has a financial services account and has

the highest probability of accessing online transactions in the last 12 months. Iran is the most inclusive country in the use of internet or mobile phone technology to access formal financial services (Demirguc-Kunt et al. 2018). On the other hand, Egypt is the most exclusive country in this regard.

In this study, Bangladesh was chosen as the comparison to determine the level of inclusion of online financial services transactions among D-8 member countries. The reason is that, even though the campaign of financial inclusion in Bangladesh is very strong but the percentage of financial inclusion in Bangladesh is quite low. The Global Findex reported in 2017, only 50% adults in Bangladesh who has account in formal financial services with the gender gap about 29 percentage point of woman and 17% of poorer has lower chance to access financial services. Towards internet users, Bangladesh also relatively low, only 19,8% adult in Bangladesh can afford internet connection and it increased to 24,8% in 2020 (Statista 2023). It is not surprising that Bangladesh is the research baseline because the condition of internet infrastructure and demand for internet use to access formal financial services are relatively low.

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Based on the results of the odd ratio and robustness test, women have almost equal opportunities in using online transactions for formal financial services when compared to men. However, the percentage of the use of this technology is still dominated by

Table 5. Odds Ratio of Online Transactions User

Variables	Regression 1 Odds Ratio	Regression 2 Odds Ratio	Regression 3 Odds Ratio	Regression 4 Odds Ratio	Regression 5 Odds Ratio
Women	0.929 (0.063)	0.926 (0.0627)	0.936 (0.067)	0.935 (0.067)	0.935 (0.067)
Secondary_edu	0.705 (0.408)	0.705 (0.408)	3.147 (0.445)	3.394 (0.442)	3.381 (0.441)
Tertiary_edu	10.426** (1.047)	10.426** (1.044)	10.426** (1.042)	10.311** (1.043)	10.234** (1.045)
Second20%	0.879 (0.100)	0.878 (0.100)	0.875 (0.100)	0.887 (0.096)	0.871 (0.095)
Middle20%	1.222 (0.142)	1.211 (0.149)	1.221 (0.145)	1.111 (0.149)	1.231 (0.139)
Fourth20%	1.029* (0.093)	1.029* (0.082)	1.029* (0.073)	1.029* (0.083)	0.917* (0.086)
Richest20%	1.1898** (0.046)	1.1898** (0.046)	1.1898** (0.046)	1.1898** (0.046)	1.1898** (0.046)
Employee	1.437** (0.0119)	1.437** (0.0119)	1.437** (0.0119)	1.437** (0.0119)	1.437** (0.0119)
GDP		0.045** (0.051)			
Inflation			-2.334** (0.021)		
Exchange rate				2.112** (0.421)	
Indonesia					1.234*** (0.006)
Iran					1.223 (0.172)
Malaysia					2.337*** (0.403)
Nigeria					1.018 (0.188)
Pakistan					0.841 (0.206)
Turkey					3.189*** (0.540)
Egypt					0.161*** (0.052)
N observations	4,066	4,066	4,066	4,066	4,066
Cons	0.508	0.622	0.128	0.138	0.138
Prob>chi ²	0.000	0.000	0.000	0.000	0.000
Pseudo R ²	0.0027	0.0054	0.07	0.080	0.081

Note: *** p<0.01, ** p<0.05, * p<0.1 probability *p-value* in parenthesis

men.

The Figure 1 above shows the percentage of use of online transactions for formal financial services by gender. The percentage of men who use the technology is 33.6% and only 32% of women who use it.

A person's level of education has a significant positive effect on the use of online transactions. This can be seen in the odds ratio of respondents who completed secondary education having a 0.705 to 3.394 points higher chance of using the internet or

mobile phones when compared to individuals with basic education. Individuals with higher education obtained an odds ratio of 6.535 to 10.426 points so that statistically this group used online transactions more to access formal financial services than the group of individuals who did not take secondary or further education. Individuals with higher education will prefer to use the internet and mobile phones to buy things, pay and send money compared to individuals with lower education.

The Figure 2 above is a tabulation of internet or mobile phone usage for online transactions for for-

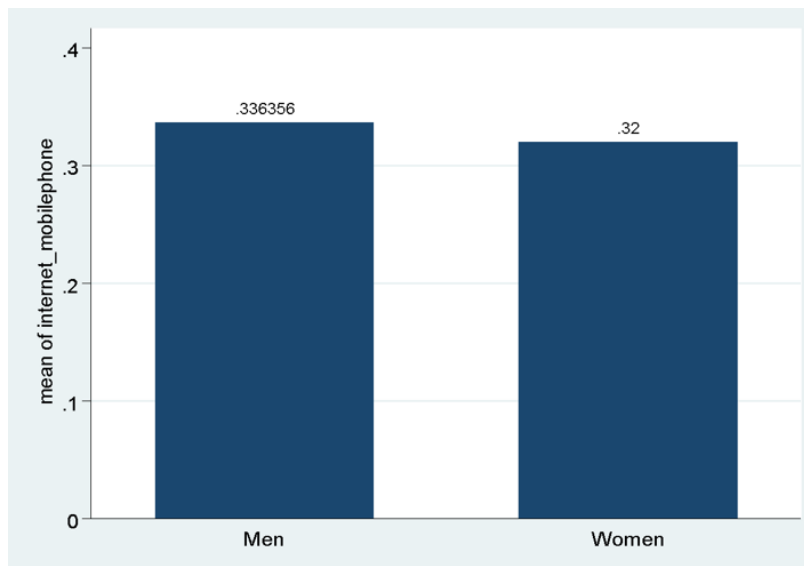


Figure 1. The Percentage of Use of Online Transactions for Formal Financial Services by Gender

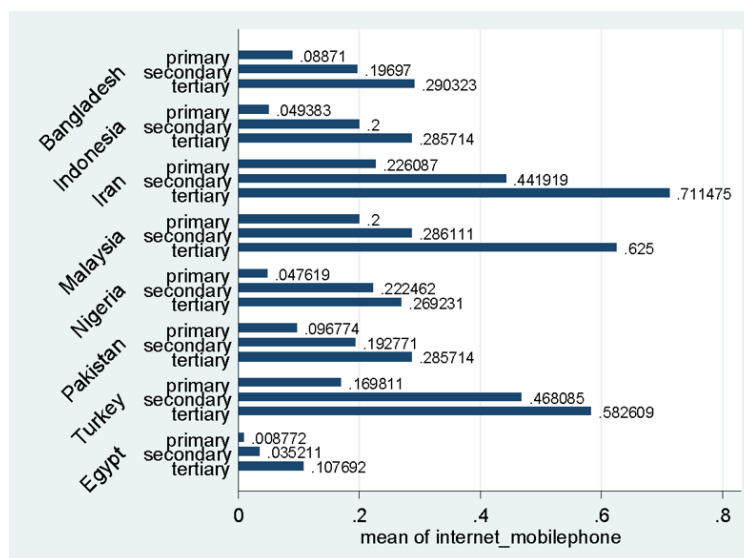


Figure 2. Internet or Mobile Phone Usage for Online Transactions for Formal Financial Services Based on Education Level

mal financial services. Based on the figure, it is known that the level of education has a positive effect on the inclusion of online transactions in each D-8 member country. In general, Iran, Malaysia and Turkey are classified as more inclusive than other member countries, while Egypt is the most exclusive country.

Based on the robustness test of the independent

variable, the level of individual income has no significant effect on the percentage of use of online financial services transactions. This can be seen in table 3 of the logistic regression and table 4 of the odds ratio which is not significant at alpha 0.01, 0.05 or 0.1. However, if each country variable is added, there is a change in the results at the individual income level. In table 4 column 9, it can be

seen that individuals who earn second 20% and middle 20% there is no significant difference in the percentage of using online transactions compared to the poorest 20% group. On the other hand, the fourth 20% and richest 20% income groups have a statistically significant positive effect. This can be seen in the odds ratio for the fourth-20% group of 1.495 points and the odds ratio for the richest 20% group of 1.599, which means that these two income level groups have a higher percentage of using the internet or mobile phones to access online transactions for formal financial services.

However, the involvement of individuals in the world of work significantly affect the use of the internet or mobile phones for shopping, payments and sending funds through the formal financial sector. Individuals who are involved in the labor market also make them more likely to use formal financial services via the internet or mobile phones. In workers 1.437 to 1.594 points higher odds when compared to people who do not work. The level of inclusion of workers is higher because they have an income so that access to formal finance is higher, as is the level of use of online transactions for formal financial institutions. Indirectly, the provision of non-cash salaries will increase the probability of using internet or mobilephone to access formal financial services (to make a payment, to buy something or to send money). This research is following that conducted by Atkinson & Messy (2013); Abel et al. (2018), Cabeza-García, Del Brio & Oscanoa-Victorio (2019) that status as a worker also has a positive effect on accessing online transaction of formal financial services. Hosseini, Fatemifar & Rahimzadeh (2015) and Tu et al. (2021) found that status as a worker also has a positive effect on accessing online transactions of formal financial services. Their studies revealed that individuals who are employed are more likely to engage in online transactions for various financial activities, including making payments, purchasing goods or services, and sending money electronically. By building upon the findings of Tu et al. (2021) this research aims to further explore the impact of non-cash salaries on

the probability of using internet or mobile phone for accessing formal financial services. Specifically, it seeks to investigate whether the provision of non-cash salaries, such as digital payments or direct deposits, influences workers' inclination to engage in online transactions and how it contributes to their overall financial behavior.

5. Conclusion

This study is to identify the influence of sociodemographic aspects on the probability of using online transactions in expanding financial inclusion in developing Muslim countries that are members of the D-8 Organization for Economic Cooperation. Sociodemographics are represented by gender, education level, income level, as well as individual status in the workforce.

1. There is a gender imbalance between men and women in the use of the internet or mobile phone to access formal financial services.
2. Individuals with secondary education are higher in the probability of accessing formal finance through the internet or mobile phone, while respondents with higher education are more likely to have access to formal finance via the internet compared to respondents with primary education.
3. The richest and upper-middle income groups are more likely to use online transactions than the middle-income and the poorest or lower-middle income groups.
4. Individuals who work have higher chances to use online transaction compared to respondents who do not work to access formal financial services using the internet.
5. In country D-8 coverage, middle-income and high-income countries (the richest) have a higher chance of accessing formal financial services via the internet or mobile phone compared to low-income countries.

In conclusion, those who with higher socioeconomic status are more likely to use formal financial ser-

vices using the internet or mobile phones. However, it is important to strive for greater financial inclusion and bridge the digital divide to ensure that all individuals, regardless of their socioeconomic background, can access and benefit from these services. There is academic implications of the findings. These research findings, most of them support the current theory or previous findings. Therefore, researchers and academics they should actively studying the impact of online financial services on society, by exploring issues such as financial literacy, digital divide, and the socioeconomic implications of widespread adoption. This step is important to understand the potential benefits and risks that online financial services bring, and how they can be leveraged to create more inclusive and sustainable financial systems for the whole society.

The limitation of this research is only using financial inclusion data from the Global Findex in 2017 because this study prioritizes identifying the probability of using online transaction services before the Covid-19 pandemic. This research can be a baseline study for further research to accommodate the impact of Covid-19 on increasing demand for internet-based formal financial services.

5.1. Recommendation

The policy implications of the findings is that the governments and regulatory bodies face the challenging task to establish robust cybersecurity measures and frameworks to safeguard users' financial information and maintain trust in online financial services. It is crucial for policymakers, financial institutions, and technology providers to work collaboratively to establish robust security measures, regulation, competition, protect customer data, bridge the digital divide, and to maintain socioeconomic impact to ensure the responsible and inclusive development of online financial services that benefit individuals and the global economy. Thus, the following recommendations can be considered:

1. Collaborate with community organizations: Partner with community organizations, non-profit

groups, and local financial institutions to raise awareness about digital financial services and provide support in navigating online platforms. These partnerships can help build trust and provide guidance to individuals who may have reservations or concerns about using digital technologies for financial purposes for both men and women.

2. Enhance digital literacy programs: The government implements comprehensive digital literacy programs that educate individuals from lower education backgrounds on the benefits and usage of digital financial services. These programs can focus on providing training and resources to improve understanding and confidence in using technology for financial transactions.
3. Promote accessibility: The government cooperates with private sectors to improve access to affordable internet services and mobile devices for the poorest or lower-middle income and middle income, particularly in underserved areas also among disadvantaged communities. This can be achieved through partnerships between governments, telecommunications companies, and non-profit organizations to provide affordable connectivity options and subsidized devices.
4. Simplify user interfaces and processes: The state-owned enterprise and private sectors design user-friendly interfaces, simplified processes and cost efficient for accessing and using digital financial services. By making the platforms cost efficient, intuitive and easy to navigate, individuals who are not working with varying levels of digital proficiency can feel more confident in adopting and utilizing these services.
5. Develop tailored financial products: The Managerial implications of the findings are also relevant especially for private sector to develop financial products and services that cater to the specific needs and preferences of individuals from low-income countries backgrounds. This can include low-cost banking solutions, microfinance options, and flexible payment plans that are accessible through online platforms or mobile apps.

Government policies and regulation: The government should implement policies and regulations that promote fair access to digital financial services and prevent discriminatory practices. Governments can encourage financial institutions to prioritize financial inclusion and monitor the impact of digital services on different socioeconomic groups. By implementing these recommendations, we can work towards reducing the socioeconomic disparities in accessing and utilizing digital financial services. The goal is to create a more inclusive financial ecosystem where individuals from all backgrounds can benefit from the convenience, efficiency, and opportunities offered by formal financial services using the internet or mobile phones.

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