

Bridging the digital divide in the adoption of digital financial services

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Abstract

Purpose – As the digital economy expands, examining Malaysians' acceptance of digital financial services (DFS) becomes imperative. The intricacies of DFS necessitate that consumers possess both financial knowledge (FK) and digital financial literacy (DFL) to utilize DFS effectively. This study examines FK and DFL across demographics and their impact on DFS usage, aiming to bridge the gap between intended and actual adoption.

Design/methodology/approach – An online survey garnered 525 responses. Given that FK and DFL, DFS usage intention and actual usage were ordinally measured, ordered logistic regression was employed.

Findings – Age aside, socio-demographics similarly affect financial knowledge and digital financial literacy. FK strongly drives both intended and actual digital financial service (DFS) use. However, the impact of DFL varies: awareness and understanding are key for both intention and use, but digital financial risk control knowledge is vital for actual use. Digital skills mainly influence intended, not actual, DFS usage.

Originality/value – This research distinguishes between the impacts of FK and DFL on DFS adoption. Moreover, the study decomposes digital financial literacy into three fundamental components, yielding valuable insights for targeting specific knowledge domains to enhance DFS implementation.

Keywords Digital financial literacy, Digital skills, Financial knowledge, Digital risk control

Paper type Research paper

1. Introduction

Financial innovation and liberalization have diversified and democratized retail finance. Digital financial products and services (DFS) empower consumers to conveniently conduct various cross-border transactions, often bypassing traditional institutions via peer-to-peer (P2P) platforms. As DFS encompasses many products and services, consumers need the knowledge to make informed decisions. This includes understanding features and fees as well as cybersecurity best practices to protect against online threats. This is particularly pertinent given the rise of financial security breach cases, which have caused substantial losses to consumers (Nair, 2022; Yeong, 2022). Therefore, consumers need financial and digital financial knowledge to fully benefit from and effectively utilize DFS (Ferrilli *et al.*, 2024; OECD, 2023; Koskelainen *et al.*, 2023; Kakinuma, 2022).

JEL Classification — G53, E42, D12

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Past studies have shown that financial literacy promotes the adoption and usage of various innovative financial products, including DFS (Yang *et al.*, 2023; Kakinuma, 2022; Andreou and Anyfantaki, 2020; Świecka, 2018). However, as financial transactions become more digitalized, some suggest that financial literacy alone is not sufficient to explain the adoption of DFS (Ferilli *et al.*, 2024; Koskelainen *et al.*, 2023; Kakinuma, 2022; Kass-Hanna, 2021; Morgan *et al.*, 2019). Digital literacy, including device proficiency and digital risk awareness, is crucial for consumers to securely and effectively use DFS. Furthermore, the rising financial security breach reports (Nair, 2022; Yeong, 2022) indicate that digital skills alone are not sufficient, as consumers need to be aware of the digital risks involved and possess digital risk control knowledge. As the economy becomes increasingly digitalized, a lack of digital financial literacy (DFL) among consumers risks widening the digital divide and hindering financial inclusion (Amnas *et al.*, 2024; Ravikumar *et al.*, 2022; Lyons and Kass-Hanna, 2021; Morgan and Trinh, 2020).

Past research has consistently demonstrated that individuals with specific socio-demographic characteristics, such as females, younger individuals, those from lower-income households and those with lower levels of education, tend to exhibit lower levels of financial knowledge (FK) (OECD, 2023; Dewi, 2022; Lusardi and Mitchell, 2017; Buecher-Koenen *et al.*, 2017). While the relationship between socio-demographic factors and digital financial literacy (DFL) is less extensively studied, existing research suggests that males and individuals with higher socioeconomic status correlate with higher DFL (Muthia *et al.*, 2023; Abdul Azeez *et al.*, 2022; Setiawan *et al.*, 2022).

As DFL is a relatively new concept compared to financial literacy and its measurement is still evolving, the measurements of digital financial literacy are varied. For example, OECD (2022) focused on password habits and paid attention to the security of websites. On the other hand, Lyons and Kass-Hanna (2021) consider DFL to be a broader skillset that includes FK, the usage of DFS and avoiding online scams. Setiawan *et al.* (2022) focused on knowledge and experience with digital finance, risk awareness and the usage of financial apps. Ravikumar *et al.* (2022) break DFL into twelve components, including general financial literacy, financial management and digital skills. Despite the variations in measuring DFL, there is a consensus that DFL includes awareness and knowledge of DFS and digital financial risk.

As the economy becomes increasingly digitalized, to support the financial inclusion goals in the Twelfth Malaysia Plan 2021–2025 (Economic Planning Unit, 2021), it is essential to assess Malaysians' readiness and receptiveness to DFS. As DFS is complex, consumers need the knowledge to confidently use it to improve their financial well-being (Economic Planning Unit, 2021, p. 385; Lyons and Kass-Hanna, 2021). Therefore, a study on determining the state of FK and DFL among Malaysians and the comparative influence of FK and DFL on the receptivity of DFS is warranted.

This research contributes to digital financial literacy (DFL) studies by addressing several gaps. First, recognizing the evolving and diverse measurements for DFL, it develops a new set of DFL indicators specifically tailored to the Malaysian context. Second, it expands the understanding of how socio-demographic factors influence DFL within Malaysia, an area with limited existing research. While previous studies have focused on specific demographics and outcomes such as young adults (Wan Nawang and Abdul Shukor, 2023; Rahim *et al.*, 2022), small and medium-sized enterprises (Basar *et al.*, 2022) and farmers (Liew *et al.*, 2020), this research provides a broader perspective.

Additionally, it complements the existing body of knowledge on DFL in Asia, particularly in India (Abdul Azeez *et al.*, 2022; Ravikumar *et al.*, 2022) and Indonesia (Widyastuti *et al.*, 2024; Setiawan *et al.*, 2022). Thirdly, the paper differentiates between FK and DFL in both the analytical framework and the examination of DFS receptivity. Finally, by analyzing the knowledge components influencing both the intention to use and the actual usage of DFS, this study provides insights for designing targeted financial and digital education strategies to bridge the intention-behavior gap.

2. Insights from literature

This paper leverages research on financial literacy, DFL, and DFS adoption to shape the conceptual foundations of this study. In the literature, financial literacy is divided into three components: financial knowledge (FK), financial behavior and financial attitude. Most studies examining the relationship between DFS usage and financial literacy consider all three components (Morgan and Trinh, 2020; Morgan *et al.*, 2019; Świecka, 2018). There are limited studies that specifically examine the role of FK in DFS usage (Königsheim *et al.*, 2017). Unlike financial attitudes and behaviors, which require sustained effort for cultivation, FK can be readily acquired through financial education workshops. Therefore, this study prioritizes the FK component, as it can be easily imparted and plays a crucial role in fostering DFS adoption.

Despite the recent increased attention on DFL and its influence on DFS adoption, many studies primarily explore the link between financial literacy and DFS adoption (Yang *et al.*, 2023; Kakinuma, 2022; Andreou and Anyfantaki, 2020; Świecka, 2018). Senyo and Obsabutey (2020) highlighted that DFS requires a certain level of technological aptitude, and this is echoed by Lo Prete (2021), who pointed out that both digital and financial knowledge are crucial factors when evaluating consumers' personal financial decisions and usage of digital payments. Kass-Hanna (2021) also pointed out that studies on the role of digital literacy in DFS adoption and usage are limited (Muthaiyah and Zaw, 2020), unlike the relationship between financial literacy and DFS, which has been rigorously studied. However, the rapid digitalization of financial services in the past two years has spurred a surge in research on the impact of DFL on financial inclusion (Amnas *et al.*, 2024; Widyastuti *et al.*, 2024; Sholihah *et al.*, 2023), the usage of FinTech (Shehadeh *et al.*, 2024; Sholihah *et al.*, 2023; Yang *et al.*, 2023; Basar *et al.*, 2022) and financial behavior (Abdallah *et al.*, 2024). While these studies explore the influence of DFL on DFS adoption, a comparative analysis of the impacts of FK and DFL on financial inclusion remains largely unexplored. Therefore, this study aims to compare FK and DFL among Malaysian consumers and their adoption of DFS.

The measurement of DFL in existing studies varies significantly, reflecting the evolving nature of the concept. Some researchers adopt a narrow approach, focusing on only two components. For instance, Sholihah *et al.* (2023) measure it as financial literacy and digital literacy (digital skills). Conversely, other studies (Abdallah *et al.*, 2024; Shehadeh *et al.*, 2024) employ a multidimensional approach, inspired by the frameworks of Lyons and Kass-Hanna (2021) and Morgan *et al.* (2019). Meanwhile, Muthia *et al.* (2023), Basar *et al.* (2022), Liew *et al.* (2020) and Setiawan *et al.* (2022) adopted Morgan *et al.*'s (2019) four-component framework, encompassing knowledge of digital financial products and services, awareness of risks, knowledge of financial control and understanding of consumer rights. Given the diverse approaches to measuring DFL and the concept's evolving nature, this paper contributes by proposing a novel measurement framework specifically tailored to the Malaysian context while aligning with the core themes of DFL.

While numerous studies have identified socio-demographic groups with lower FK, the disparities in DFL across these groups remain less explored. Early research often crudely measured DFL as digital skills (Aydin, 2021; Elena-Bucea *et al.*, 2021) or digital financial knowledge (OECD, 2023; Abdul Azeez *et al.*, 2022). More recent studies have adopted a multidimensional approach to measuring DFL (Muthia *et al.*, 2023; Abdul Azeez *et al.*, 2022; Setiawan *et al.*, 2022). These studies consistently found that women, younger individuals and those with higher socioeconomic status tend to exhibit higher levels of DFL. However, a comparative analysis of variations in FK and DFL across socio-demographic groups is still lacking. This study fills the gap in the literature on DFL in several ways. First, it proposes a novel framework for measuring DFL, tailored to the specific context of Malaysia. Second, it examines and compares disparities in FK and DFL across various socio-demographic groups. Third, it investigates the differential impact of FK and DFL on individual receptivity to DFS. Finally, it analyzes the relative influence of the different components of DFL indicators on DFS adoption.

3. Methodology

3.1 Data

A nationwide online survey was conducted to collect data for this study. The Google Forms application was utilized, and the link was distributed through various social media platforms. The survey was conducted from June 2022 to September 2022. The survey targeted Malaysians aged 25–65 years who reside in Malaysia and have used at least one new financial product or service within the previous five years.

The self-administered structured questionnaire comprised four sections. Socio-sociodemographic and economic factors, financial experience, FK, digital skills and digital financial knowledge. The questions regarding components of DFL were based on insights drawn from [Lyons and Kass-Hanna \(2021\)](#) and [Kass-Hanna \(2021\)](#). Two academic experts and a financial industry professional validated the questionnaire, and a pilot study involving 30 participants preceded the actual data collection.

While specific DFS user demographics in Malaysia are unavailable, Bank Negara Malaysia (2022) reported that 74% of the population has utilized DFS services. Numerous studies have demonstrated significant age differences in FK ([Wilson et al., 2022](#); [Finke et al., 2016](#); [Kim et al., 2019](#)) and in DFS usage ([Krivkovich et al., 2021](#); [Dospinescu et al., 2021](#)). Therefore, without DFS user profiles, sampling was based on age groups to obtain a representative sample of the Malaysian population. A non-probability quota sampling was employed based on the age group distribution of Malaysians aged 25–65 years of the 2020 population statistics ([Department of Statistics, 2022](#)).

The total analysis sample of 525 exceeds the minimum requirement of 400, given the population of 16.7 million people aged 25–65 years in Malaysia, with a 5% margin of error ([Yamane, 1967](#)).

3.2 Model

There are two primary analyses in this paper: one determines the socioeconomic factors that have a significant influence on the level of FK and DFL, and another identifies and compares financial and DFL components that play a significant role in the intention and usage of DFS. Ordered logit is used for both analyses, as knowledge and adoption are measured based on levels that are ordered and tiered.

The general equation for ordered logit can be written as follows:

$$\text{Logit}(P(Y \leq j)) = \beta_{j0} + \beta_1 X_1 + \dots + \beta_p X_p \quad (1)$$

where $j = 1, 2, 3$ denotes the three-tiered categories, namely, low, moderate and high knowledge and adoption, while p denotes the predictors.

3.3 Dependent variable

In the analysis of knowledge, the dependent variables are FK and DFL. By examining these components and their interaction with different socio-demographic groups, this study seeks to investigate how individuals engage with and adopt DFS. FK is measured using [Lusardi and Mitchell \(2011\)](#) and [Credit Counselling and Debt Management Agency \(2011\)](#) FK assessment questions. [Lusardi and Mitchell's \(2011\)](#) assessment questions have been widely used by many researchers, particularly by the OECD in its financial literacy survey ([OECD, 2020, 2016](#)). Six fundamental FK questions cover concepts such as inflation, interest rate, risk diversification and financial net worth. The maximum score is 6, and respondents' FK is categorized as low, moderate or high based on the score obtained, as detailed in [Table A1 \[1\]](#).

The other dependent variable, DFL, focuses on the digital aspect of financial literacy beyond fundamental financial concepts. DFL comprises three key components. The first component, digital skills, encompasses the ability to perform various digital activities. The second component refers to the level of awareness and knowledge of DFS, and the third

component, digital financial risk control knowledge, involves secure usage of digital financial platforms. In digital skills, respondents' abilities are ranked from very poor to very good. The questions about respondents' awareness and knowledge of DFS were modified from [Lyons and Kass-Hanna \(2021\)](#), while digital skills assessment items were adopted from [Kass-Hanna \(2021\)](#). Digital financial risk control knowledge is gauged by whether respondents take precautionary measures to safeguard and minimize risk when conducting financial transactions. These three components are categorized into low, moderate and high levels. A score of one to three is given for low, moderate and high, respectively. The scores are then summed, with the total ranging from three to nine. Based on this total score, DFL is divided into low, moderate and high, as detailed in [Table A1 \[1\]](#).

The adoption of DFS is analyzed from two perspectives: intention to use DFS and current usage of DFS. The intention to use DFS is captured through three statements measured using a five-point Likert scale of agreement. The average score categorizes the intended usage of DFS into low, moderate and high levels. The current usage of DFS is based on the number of DFS that respondents are using. A list of ten DFS items is presented, and the level of usage is ranked as low, moderate or high depending on the number of DFSs the respondent currently uses. The information used to capture DFS adoption is detailed in [Table A1 \[1\]](#).

3.4 Explanatory variable

The explanatory variables for the analysis of FK and DFL consist of socio-demographic factors only. The socio-demographic variables included gender, age, income, education, ethnicity, employment status and region of residence. Age is a continuous variable, and older individuals are expected to have higher FK but lower DFL. This follows from [Wilson et al. \(2022\)](#), [Finke et al. \(2016\)](#), and [Kim et al. \(2019\)](#). Household income classification follows the [Department of Statistics Malaysia \(2020\)](#) Household Income and Basic Survey Amenities Report of 2019. For the analysis, low-income households are categorized as low B40 (less than RM2,500 monthly income) or high B40 (RM2,500–RM4,850). Medium-income households are categorized as low M40 (RM4,851–RM7,100) or high M40 (RM7,101–RM10,970). High-income households (T20) earn above RM10,970.

Malaysia is a multiethnic country, and the ethnicity variable comprises three main ethnic groups: Malay, Chinese, Indian and others. Geographical regions are divided into five regions: Northern, Central, Southern and Eastern (Peninsular Malaysia) and East Malaysia (Sabah, Sarawak and Labuan).

The explanatory variables for analyzing DFS adoption are FK and the three components of digital financial knowledge.

4. Results and discussion

The results are discussed in four sections: respondent profiles, respondent breakdown by FK and DFL, the relationship between socio-demographics, FK and DFL, and finally, the influence of FK and DFL components on DFS usage intention and actual usage.

4.1 Summary profile of respondents

[Table A2 \[1\]](#) summarizes the socio-demographic breakdown of the respondents in the study. The sample comprises more females, who make up 63% of the sample, and most respondents have at least a university degree (72.9%). The sample's age distribution (25–65) reflects the Malaysian population's age distribution within that range. There is also a slightly higher share of individuals in the high-income group of T20 in this sample. Respondents from the Northern and Central regions of Peninsular Malaysia are almost equal, and both regions have the highest internet penetration in the country ([Malaysian Communication and Multimedia Commission, 2023](#)), representing about 82% of the sample.

4.2 Analysis of financial knowledge and digital financial knowledge

Figure A1 [1] presents the distribution of respondents by their FK and DFL levels. Given the sample's high education and income, most respondents showed moderate to high FK (74.4%) and DFL (72.7%). However, high FK (45.5%) was more common than strong DFL (31.7%) and low DFL (27.3%) was more prevalent than low FK (15.6%), indicating respondents generally had weaker DFL than FK.

4.3 Analysis of the relationship between socio-demographic factors, financial knowledge and digital financial literacy

Table A3 [1] presents the marginal effects of socio-demographic factors on the probability of levels of FK and DFL. Age, income, education and ethnicity significantly affect FK and DFL, though the effects differ slightly. For example, age increases the probability of having a higher FK but lowers the probability of having a higher DFL. Chinese ethnicity correlates with higher FK but lower DFL. This DFL difference between Malays and Chinese is significant only for low DFL, unlike FK, where differences exist at all levels.

Income and education similarly affect FK and DFL: higher levels increase both. While income affects all FK levels, high M40 and low B40 incomes do not significantly differ in DFL. Employment status affects only DFL; self-employed individuals are more likely to have high DFL than other employed or unemployed individuals.

Previous studies found significant gender differences in FK (D'Alessio *et al.*, 2020; Buecher-Koenen *et al.*, 2017); however, this study shows no significant gender differences in either FK or DFL. Furthermore, the significance of income and education on FK (OECD, 2023; Dewi, 2022; Lusardi and Mitchell, 2017; Buecher-Koenen *et al.*, 2017) and DFL (OECD, 2023; Yang *et al.*, 2023; Abdul Azeez *et al.*, 2022; Aydin, 2021; Elena-Bucea *et al.*, 2021) corroborates existing studies. In summary, socio-demographic factors influencing FK generally extend to DFL with similar effects observed across various factors except for gender and age.

4.4 Analysis of adoption of digital financial services

The adoption of DFS is analyzed from two perspectives: usage intention and actual usage. Usage intention is divided into low, moderate and high, while actual usage is categorized into four levels: no usage (none), low, moderate and high.

Table A4 [1] details the results of the marginal effects on the probability of the levels of usage intention and actual usage of DFS. Besides DFS awareness and knowledge, which strongly drive intention and actual use, other knowledge components have varying effects. FK positively impacts intention to use, and its effect on actual usage differs between those with low and high FK. However, higher FK consistently increases both intention and actual DFS usage. These findings align with prior research (Swiecka, 2018; Morgan and Trinh, 2020; Andreou and Anyfantaki, 2020). Digital skills influence DFS usage intention but not actual use, while digital financial risk control knowledge influences actual DFS usage but not intention. Higher digital skills increase usage intention, whereas moderate digital financial risk control knowledge increases usage.

In summary, the influence of FK and DFL on both intention and actual usage of DFS varies significantly. While awareness and knowledge of DFS are important for both intention and actual usage, the impact of digital financial risk control knowledge and FK becomes particularly pronounced in the actual usage context. This resonates with Jin *et al.* (2018) and Singh *et al.* (2020). Conversely, digital skills exert a significant effect on DFS usage intention, but not on actual usage. The study found that digital skills boost DFS intention, likely by reducing technostress (Lee, 2021), but do not directly drive usage, contrasting with findings from Korea (Nam and Lee, 2023). The differentiation between FK and components of DFL accentuates their disparate impact on both intentions to use and actual utilization of DFS.

5. Conclusion

Understanding the attributes of DFS adoption is crucial for accelerating digital financial inclusion. Based on a sample of 525 respondents in Malaysia, this study examines the relationship between DFS adoption receptivity, FK and DFL and socio-demographics. The findings offer insights for increasing DFS usage and largely confirm previous research on these factors.

5.1 Contributions

Unlike prior studies that have examined the FK and DFL constructs separately, this research utilizes a unified sample to provide a more robust analysis. For instance, while older individuals often possess greater FK, their DFL tends to be lower.

By analyzing DFL components and differentiating usage intention from actual use, this study identifies key DFL elements that bridge the intention–behavior gap. For example, while digital skills strongly correlate with DFS usage intention, digital risk control knowledge is a more critical determinant of actual usage. This finding emphasizes the importance of promoting both digital literacy and risk management education to encourage DFS adoption.

This study introduces a novel multidimensional framework to measure DFL. The framework encompasses three dimensions: digital skills, awareness and knowledge of DFS and digital financial risk control knowledge. The influence of these components on DFS usage intention and actual adoption enables a deeper understanding of the critical aspects of DFL that may help bridge the intention–behavior gap in DFS usage.

5.2 Implications of findings

This study found that age, income and education significantly affect FK and DFL, with DFL needing more improvement. DFS providers can collaborate with nongovernmental agencies to offer targeted support for vulnerable groups through skills training and awareness workshops. Additionally, employers could also provide DFL training workshops.

DFL was found to significantly affect the intention and actual usage of DFS. Digital skills affect the intention to use DFS, and digital financial risk control knowledge strongly influences the actual usage of DFS. Therefore, to increase DFS awareness and knowledge, more discussion platforms and digital finance workshops are needed. Financial education authorities such as the financial education network (FEN) should increase DFS education, emphasizing risk control to combat fraud and to address varying FK and DFL levels.

5.3 Limitations and suggestions for future research

As the data in this study is single cross-sectional, it limits the understanding of evolving DFS usage. Future research should use longitudinal data to capture DFS adoption dynamics and intention–behavior gaps. Furthermore, non-probability quota sampling used in this study limits generalization due to potential bias. Future studies should use random sampling. Additionally, DFS's rapid evolution necessitates mixed methods research. Qualitative data, such as focus group discussions, can reveal consumer challenges and richer information. Future studies should examine how FK interacts with income and education and incorporate behavioral, psychological, social and environmental factors such as trust, self-efficacy, social norms and infrastructure quality. This multifaceted approach will better explain the DFS intention–behavior gap and inform strategies for digital financial inclusion.

In summary, the existence of an intention–behavior gap in DFS adoption is evident and FK and DFL influence the receptivity of DFS with varying impacts. Therefore, regulators, policymakers, financial educators and DFS providers should focus on these attributes when designing strategies to narrow the gap and foster DFS usage.

Notes

1. Please see it on the [Online Appendix](#).

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Supplementary material

Supplementary material for this article can be found online.

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