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## Moderating effect of digital literacy on digital financial services and financial behavior of MSMEs

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### Abstract

Digital financial services have become essential in strengthening the financial operations of Micro, Small, and Medium Enterprises (MSMEs), particularly as businesses adapt to an increasingly digital economic environment. While digital tools are widely recognized for enhancing business processes, limited research has focused on how digital financial services and digital literacy influence the financial behavior of MSMEs. This study examined the relationship between Digital Financial Services (DFS), digital literacy, and financial behavior among MSMEs in the food sector of Calapan City. A descriptive-correlational research design was used, and data were collected from 170 MSMEs using a researcher-developed questionnaire assessing DFS usage, digital literacy, and financial behavior across saving, financing, investing, and spending. The results further showed that digital literacy strengthens the effectiveness of DFS by enabling MSMEs to apply digital tools more confidently and strategically. The study highlights specific behavior areas with lower adoption, such as separating digital savings, using digital loan platforms, monitoring investments digitally, and maximizing digital payment systems. These gaps reflect the need for targeted interventions that improve MSMEs' competencies in leveraging financial technologies. The findings emphasize the importance of DFS and digital literacy as key drivers of improved financial decision-making, stronger financial management, and greater business resilience within the MSME sector.

**Keywords:** Digital Literacy; Digital Financial Services; Financial Behavior; Saving Behavior; Financing Behavior; Investing Behavior; Spending Behavior

### 1 Introduction

In the global financial landscape, digital financial services (DFS) have become a critical component of modern finance. Advancements in financial technology have made DFS more accessible worldwide, enabling millions to shift from cash-based transactions to secure digital platforms [1]. Electronic services such as online banking, mobile payments, and digital bookkeeping create opportunities for better financial management and informed decisions [2]. However, the effective use of these tools depends heavily on digital literacy, as MSMEs' ability to utilize online banking, mobile payments, and digital lending services is shaped by their level of digital competence [3]. Studies by Li et al. [4] show that DFS positively influences entrepreneurship, innovation, and financial performance, while recent local findings by Atienza et al. [5] reveal that MSMEs in Calapan City already exhibit strong business growth associated with digital tool adoption.

Globally, individuals with strong digital skills can use DFS safely, avoid online scams, and make smarter financial decisions [6]. Entrepreneurs who understand these tools manage spending, saving, investing, and borrowing more efficiently, as stated by Ashshiddiqi and Rahmat [7], while appropriate platform use supports business growth and

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operational efficiency [8]. In the Philippines, MSMEs' ability to manage DFS depends on their technological comfort [9]. Financial behavior refers to the habits and actions individuals use to manage their finances [10].

In the Philippines, digital tools improve savings, borrowing, and investment management [11]. However, many MSMEs in Calapan City, Oriental Mindoro, have not fully maximized the benefits of DFS. Concerns about security, cost, limited skills, and weak financial monitoring persist [5]. Prior studies examined saving, financing, and investing behaviors but excluded spending behavior, leaving a gap in understanding overall financial management [11].

This study, therefore, examines the moderating effect of digital literacy on the relationship between DFS and MSMEs' financial behavior in Calapan City. It determines whether higher digital literacy strengthens positive financial outcomes in savings, financing, investments, and controlled spending. The findings are significant for business owners, policymakers, fin-tech providers, and researchers, particularly in developing programs and tools that enhance digital competence and financial management. The study aligns with Sustainable Development Goal 8 (SDG 8), which promotes inclusive economic growth and support for small and medium enterprises by improving access to financial services and strengthening entrepreneurship. The study further proposed the MSME Digital Literacy Module, implemented through "ANGAT DIGITAL, ANGAT NEGOSYO: The Calapan MSME Digital-FinLit Program." These modules address the weakest financial behavior areas identified in the study and reinforce digital literacy as a critical factor enabling MSMEs in Calapan City to maximize DFS and improve overall financial behavior.

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## 2 Review of Related Literature

### 2.1 Digital Financial Services

According to Beloke et al. [12], digital financial services (DFS) refer to financial transactions conducted electronically without physical cash, including mobile banking, e-wallets, digital lending, and online investment platforms. These tools provide accessibility, convenience, and security, allowing SMEs to pay suppliers, track expenses, and streamline operations. Angeles [11] noted that MSMEs engaging with DFS are more likely to save systematically, plan financing, and make informed investment decisions. DFS also increases confidence in managing finances and promotes disciplined financial behavior. DFS also increases confidence in managing finances and promotes disciplined financial behavior. Specifically, DFS influences saving, financing, investing, and spending behaviors, supporting structured practices such as monitoring obligations [13], accessing loans [14], allocating resources for growth [11], and controlling expenditures [15]. When combined with digital literacy, DFS strengthens financial discipline, supporting efficient resource management and business growth.

### 2.2 Digital Literacy

According to Clarence and Pertiwi [16], digital literacy is the ability to effectively use digital media, internet networks, and technological platforms to access, evaluate, and communicate information. It involves technical skills, knowledge, awareness, and confidence, enabling MSMEs to adopt modern technologies, manage financial operations, and interact with online platforms efficiently. Digital literacy is significantly related to both the use of digital financial services and financial behavior, as Kusumawardhani et al. [17] explain that higher digital financial literacy leads to more strategic and responsible saving and spending decisions when using digital financial tools. It allows entrepreneurs to select appropriate platforms [18], avoid digital fraud [6], and conduct transactions securely [8], while enhancing the effective use of mobile banking and e-wallets [7]. Digital literacy, therefore, strengthens financial discipline, supports structured financial practices, and enables MSMEs to leverage DFS for better financial management and business growth.

### 2.3 Financial Behavior

Goyal and Kumar [19] describe financial behavior as how individuals or businesses manage money, including cash handling, credit, savings, and other financial decisions. It reflects habits and practices that influence financial well-being and sustainability. MSMEs with access to DFS and higher digital literacy can adopt structured practices across saving, financing, investing, and spending [20, 21]. Digital tools enable real-time monitoring, support informed decision-making, and promote disciplined behavior. Effective financial behavior supports proper resource management, business growth, and financial stability, underscoring the role of DFS and digital literacy as key determinants of positive financial outcomes [11].

#### 2.3.1 Saving Behavior

According to Ismail et al. [22], saving behavior refers to the actions and habits individuals or businesses undertake to set aside money and accumulate financial resources for future use. Varlamova et al. [21] stated that engagement with

digital technologies, such as mobile applications and online banking, and having an account with a financial institution significantly increases the likelihood of saving. DFS supports practices such as allocating business income [7], separating personal and business funds [23], using automatic transfers [24], setting financial goals [25], and monitoring finances [26]. Using DFS and digital literacy encourages disciplined saving, strengthens financial decision-making, and enhances MSMEs' sustainability and growth.

### 2.3.2 *Financing Behavior*

Chiang and Yu [27] state that financing behavior refers to how individuals or businesses make decisions about acquiring and utilizing financial resources to support day-to-day operations and long-term objectives. According to Luo et al. [28], the widespread availability of online consumer credit has increased the potential for financing difficulties, as easy access to loans may lead to over-indebtedness if not managed properly. DFS supports practices such as tracking financing transactions [29], accessing loans conveniently [30], relying on digital platforms for funding [31], and meeting short-term capital needs [32, 33]. Proper financing behavior enables entrepreneurs to manage debt responsibly, use funds efficiently, and make strategic financial decisions, showing how DFS and digital literacy enhance MSMEs' financial management.

### 2.3.3 *Investing Behavior*

Investing behavior refers to how MSMEs allocate resources to generate future returns, support growth, and strengthen long-term financial stability [34]. Digital financial services (DFS) influence investing by providing real-time access to investment options, data-driven insights, and tools for portfolio diversification, enabling informed and strategic financial decisions [35]. DFS supports practices such as using platforms like GInvest, Maya Funds, and SeedIn [36], making investing more accessible and convenient [37, 38], applying data-driven decision-making techniques [39], and monitoring investment performance [37]. Using DFS enhances MSMEs' ability to make structured investment decisions, allocate resources effectively, and improve business performance, demonstrating its key role in financial outcomes and sustainability.

### 2.3.4 *Spending Behavior*

According to Aryan et al. [40], spending behavior refers to individuals' actions, judgments, and patterns of using and allocating financial resources to acquire products or services. Lyons et al. [20] emphasize that practicing financial discipline through these digital tools allows individuals to better understand spending patterns, save systematically, and achieve financial objectives. DFS facilitates activities such as making business payments through e-wallets and digital banking [41], tracking expenses [42], planning budgets, comparing costs, and fostering disciplined spending habits [43, 44], enabling MSMEs to better manage costs, make well-informed financial decisions, improve operational efficiency, and strengthen overall financial management and business sustainability.

## 2.4 **Theoretical Framework**

### 2.4.1 *Technology Acceptance Model (TAM)*

The Technology Acceptance Model (TAM), introduced by Davis [45], explains how individuals and organizations accept and use technology based on perceived usefulness and perceived ease of use, highlighting factors that influence adoption and actual use of digital platforms. In this study, TAM helps explain how MSMEs' perceptions of the usefulness and ease of use of Digital Financial Services (DFS) affect their adoption and integration of these tools into financial management.

### 2.4.2 *Diffusion of Innovation (DOI) Theory*

The Diffusion of Innovation (DOI) Theory, developed by Rogers [46], explains how new technologies and ideas spread in a social system, focusing on factors such as relative advantage, compatibility, complexity, feasibility, and clarity. For this study, DOI provides a framework for understanding how MSMEs acquire digital literacy, showing how perceptions of benefits, ease of use, and compatibility influence the willingness to adopt and integrate digital tools.

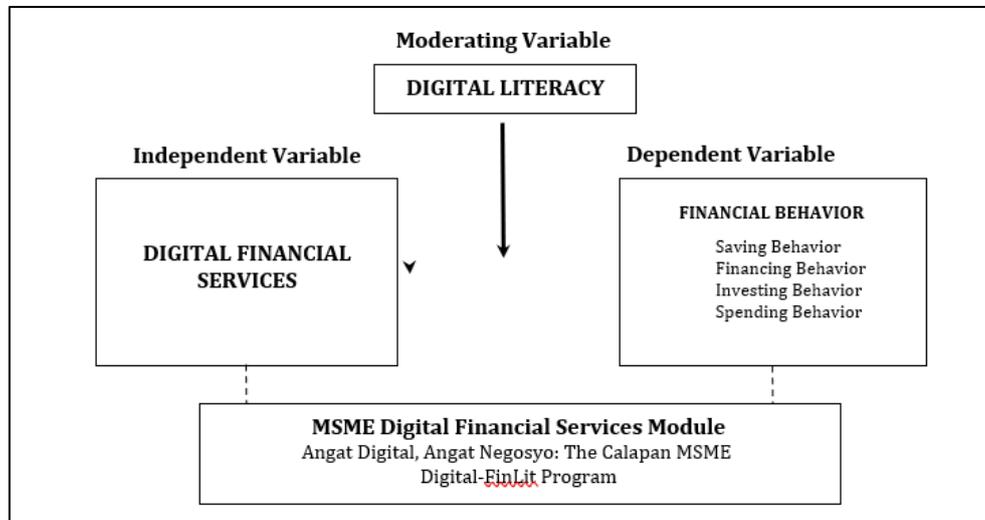
### 2.4.3 *Resource-Based View (RBV)*

The Resource-Based View (RBV), introduced by Barney [47], emphasizes that a firm's competitive advantage depends on valuable, rare, inimitable, and irreplaceable internal resources, including skills, knowledge, and capabilities. In this study, RBV explains how MSMEs' digital competencies serve as internal resources that enhance financial behavior, enabling structured budgeting, saving, cash flow management, and investment decisions.

#### 2.4.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. [48], identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of technology adoption. For this study, UTAUT connects DFS, digital literacy, and financial behavior by showing how perceptions, peer influence, and available support collectively shape MSMEs' adoption of digital tools and improved financial management.

### 2.5 Conceptual Framework



**Figure 1** Conceptual Framework

Figure 1 depicts the study's conceptual framework, which examines the moderating role of Digital Literacy in the relationship between Digital Financial Services (DFS) and the Financial Behavior of Micro, Small, and Medium Enterprises (MSMEs). The relationship between these variables is not direct nor automatic. Instead, it is influenced by the MSMEs' level of digital literacy, which influences how well digital financial tools are used. MSMEs that are digitally literate are more likely to use and maximize DFS, which leads to better financial decisions, tighter resource management, and more resilient firm operations. This study adopts the concept of Angeles [11] from "The Moderating Effect of Digital and Financial Literacy on the Digital Financial Services and Financial Behavior of MSMEs", which emphasizes that the impact of digital financial services (DFS) on saving, financing, and investing depends on the digital and financial literacy of MSME owners, and further suggests including spending behavior as a key component. Higher literacy strengthens the positive effects of DFS on financial behavior, guiding this study's framework.

Several studies highlight the importance of digital financial literacy in shaping financial behavior. Similarly, following Angeles' [11] study, Aryan et al. [40] showed that greater digital financial literacy among Jordanian millennial enhance their ability to manage transactions, savings, spending, and investments responsibly. Rahayu et al. [51] further confirmed that higher digital literacy improves financial planning, saving, and investing, supporting the view that literacy moderates the impact of DFS on financial behavior.

Based on the study's finding that digital literacy moderates the relationship between Digital Financial Services (DFS) and financial behavior, the results show that DFS improves saving, financing, investing, and spending practices only when MSMEs have the skills to use these tools effectively. Access to digital platforms alone is not enough without proper digital understanding. In response, the study proposes the MSME Digital Literacy Module under the program "ANGAT DIGITAL, ANGAT NEGOSYO: The Calapan MSME Digital-FinLit Program." These modules strengthen the impact of DFS by enhancing digital skills related to savings management, responsible digital borrowing, safe investing, and efficient digital spending, helping MSMEs in Calapan City improve their overall financial behavior.

### 2.6 Statement of the Problem

This study aimed to determine the Moderating Effect of Digital Literacy on Digital Financial Services and Financial Behavior of MSMEs in Calapan City. Specifically, this study aims to answer the following questions:

- What is the level of frequency in the use of digital financial services among MSMEs in Calapan City?

- What is the extent of digital literacy of MSMEs in Calapan City?
- What is the level of financial behavior of MSMEs in terms of:
  - Saving behavior;
  - Financing behavior;
  - Investing behavior; and
  - Spending behavior?
- Which aspect of MSMEs' financial behavior is most strongly influenced by digital financial services?
- Is there a significant relationship between digital financial services and the financial behavior of MSMEs?
- Does digital literacy significantly moderate the relationship between digital financial services and the financial behavior of MSMEs in Calapan City?
- Based on the findings of the study, the MSME Digital Literacy Module is proposed under the program "Angat Digital, Angat Negosyo: The Calapan MSME Digital-FinLit Program."

## 2.7 Hypothesis

- H1: There is no significant relationship between Digital Financial Services on Financial Behavior of MSMEs in Calapan City.
- H2: Digital Literacy does not significantly moderate the relationship between Digital Financial Services and the Financial Behavior of MSMEs in Calapan City.

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## 3 Materials and methods

### 3.1 Research Design

The researchers used quantitative methods to create the study. Quantitative research entails collecting and analyzing numerical data. It may be used to detect patterns and trends, make predictions, assess causal relationships, and extrapolate results to larger groups. Alhajri et al. [52] stated that quantitative research, unlike qualitative research, gathers and evaluates numerical data. Descriptive correlational research designs were used in the study. Descriptive research aims to accurately depict or summarize a scenario, event, or phenomenon by characterizing its traits or behaviors. Walters [53] defines descriptive research methods as surveys, observational studies, case studies, and correlational investigations. If there were any correlations between the independent and dependent variables, the researcher was curious to find out. In this case, the dependent variable, financial behavior, is matched with the independent variable, the effects of digital financial services, to determine both their joint and relative predictive values. A research-made survey questionnaire was used to collect data, and statistical methods such as mean, frequency, percentage, and Pearson correlation were employed to evaluate the findings.

### 3.2 Subject and Sampling

This study was conducted among 170 Micro, Small, and Medium Enterprises (MSMEs) in the Food Industry Sector in Calapan City, Oriental Mindoro, selected using purposive sampling, a non-probability strategy that targets participants with relevant characteristics [54]. Respondents were owners, co-owners, or managers of MSMEs with at least one year of operation and experience using digital financial tools such as online banking, e-wallets, or accounting software. The sample was drawn from a total population of 454 MSMEs as of August 2025, with a 90% confidence level and a 0.05 margin of error determined via Raosoft.

Respondent profiles show that most are business owners (46.7%) and managers (35.5%), with 48.8% operating for 2–5 years and 32.4% for 1–2 years. The majority (84.6%) are micro-enterprises, 8.9% are small enterprises, and all (100%) use digital financial services, with 76.5% using them consistently and 23.5% using them often. These characteristics indicate strong DFS adoption and support examining the impact of digital literacy on financial behavior among MSMEs.

### 3.3 Data Gathering Procedure

The data collection and instrumentation were designed to ensure accuracy and reliability, using a 30-item self-made questionnaire to examine the moderating effect of digital literacy on DFS and financial behavior among MSMEs. The questionnaire had three sections: frequency of DFS use (5 items), digital literacy, and financial behavior, including saving, financing, investing, and spending, along with demographics such as position, years of operation, business size, and DFS usage. Responses used a 4-point Likert scale from "Strongly Agree" to "Strongly Disagree" for digital literacy and from "Always" to "Never" for DFS and financial behavior to encourage decisive answers. Field experts and a statistician validated the instrument, which was then distributed via Google Forms and paper surveys, with

confidentiality ensured. Collected data were systematically encoded, summarized, and analyzed to assess how digital literacy moderates the relationship between DFS and financial behavior.

### 3.4 Reliability

The reliability of the questionnaire was evaluated using Cronbach's alpha to assess the internal consistency of the instrument. The survey items, covering digital literacy, digital financial services, and financial behavior, produced a Cronbach's alpha exceeding the acceptable threshold of 0.70, indicating that the items consistently measured the intended constructs [55, 56]. This ensured that the instrument yielded stable and dependable results, confirming its reliability and suitability for examining the moderating effect of digital literacy on DFS and financial behavior among MSMEs in Calapan City.

**Table 1** Interpretation of Cronbach

Coefficient of Cronbach's Alpha	Reliability Level
More than 0.90	Excellent
0.80-0.89	Good
0.70-0.79	Acceptable
0.6-0.69	Questionable
0.5-0.59	Poor
Less than 0.59	Unacceptable

**Table 2** Reliability of Questionnaire

Variables	Alpha Values	Description	Interpretation
Digital Literacy	0.81	Good	Reliable
Digital Financial Services	0.92	Excellent	Reliable
Financial Behavior			
Saving Behavior	0.80	Good	Reliable
Financing Behavior	0.91	Excellent	Reliable
Investing Behavior	0.86	Good	Reliable
Spending Behavior	0.83	Good	Reliable

The findings of the researchers' pilot testing are displayed in Table 2. According to the table, the alpha value falls between 0.80 and 0.89, which corresponds to a "Good" Cronbach's Alpha Reliability Level. As a result, the study's researcher-made questionnaires are trustworthy. In recent times, Cronbach's alpha has been utilized extensively for dependability estimation. After adjusting the sample size, range, number of items, variance, and standard deviation, it simulates various categorical data responses to various ranges of items.

### 3.5 Data Analysis

The data were analyzed using descriptive and inferential statistics, including frequency and percentage distribution, weighted mean, ranking, and Pearson's r correlation coefficient. Descriptive statistics summarized respondents' profiles and trends in digital literacy, DFS use, and financial behavior, while Pearson's r measured the strength and direction of relationships between variables and tested hypotheses. Reliability analysis using Pearson's r showed coefficients ranging from 0.83 to 0.92, indicating consistent and accurate responses. A 4-point Likert scale was used to assess digital literacy, DFS, and financial behavior, and results were interpreted numerically and verbally to evaluate patterns and test the study's hypotheses.

## 4 Results and discussion

This section provides a basic summary of the study's conclusions, which are based on the investigation's findings or outcomes. After deliberation and statistical analysis for the research study, the researchers arrive at the following conclusions or findings.

**Table 3** Scaling and Quantifying of Data

Scale	Range	Description		Interpretation
4	3.25 - 4.00	Always	Strongly Agree	Very High Level/ Extent
3	2.50 - 3.24	Often	Agree	High Level/ Extent
2	1.75 - 2.49	Rarely	Disagree	Low Level/ Extent
1	1.00 - 1.74	Never	Strongly Disagree	Very Low Level/ Extent

**Table 4** Interpretation of Correlation Coefficient

Correlation Coefficient	Degree of Correlation
$\pm 1.00$	Perfect Correlation
$\pm 0.81 - \pm 0.99$	Very Strong Correlation
$\pm 0.61 - \pm 0.80$	Strong Correlation
$\pm 0.41 - \pm 0.60$	Moderate Correlation
$\pm 0.21 - \pm 0.40$	Weak Correlation
$\pm 0.01 - \pm 0.20$	Very Weak Correlation
0.00	No Correlation

### 4.1 What is the level of frequency in the use of digital financial services among MSMEs in Calapan City?

**Table 5** The Frequency in the Use of Digital Financial Services

The Frequency in the Use of Digital Financial Services		Mean	Verbal Description	Interpretation	Rank
1	By utilizing digital financial services, I am empowered to effectively manage and save my business finances, enhancing my sense of control and confidence.	3.73	Always	Very High Level	1
2	The convenience of digital financial applications allows me to easily access financing services for my business, providing a sense of comfort and ease in managing my business finances.	3.53	Always	Very High Level	4
3	I utilize digital financial tools, such as e-wallets (e.g., Maya Crypto and GInvest), and digital banking (e.g., BPI Trade and GoTyme), to invest in opportunities that foster business growth.	3.46	Always	Very High Level	5
4	I use electronic transaction records to monitor my business spending.	3.64	Always	Very High Level	3
5	I utilize mobile business applications, such as mobile e-wallets, payment gateways, and e-commerce platforms, that cater to my business needs to enhance productivity.	3.66	Always	Very High Level	2
Overall		3.60	Always	Very High Level	

Table 5 presents the frequency of digital financial services (DFS) usage among MSMEs, with an overall mean of 3.60, described as “Always” and interpreted as “Very High Level.” This indicates that respondents consistently utilize digital financial platforms in managing, investing, and monitoring their business finances.

The highest-rated mean of 3.73 was obtained from item 1, “By utilizing digital financial services, I am empowered to effectively manage and save my business finances, enhancing my sense of control and confidence,” interpreted as a very high level. One respondent expressed, “Always, because it is easier for us to control our finances, and we feel more confident in identifying business priorities.” Another shared, “Always, because it helps us organize our income and expenses and plan our business goals.” These findings indicate that MSME owners depend on digital financial services to effectively manage transactions, monitor spending, and make informed business decisions, which enhances overall performance and digital competence. Using e-wallets, mobile banking, and other financial applications also allows them to navigate additional digital platforms such as online marketing and e-commerce. Beloke et al. [12] support this, noting that digital financial services provide structured and efficient methods for financial management, increasing both confidence and competence among small business owners. In this context, digital literacy and the ability to effectively use digital financial services are valuable intangible resources that enable MSMEs to efficiently monitor income, savings, and expenditures, thereby enhancing their overall financial control and decision-making capabilities.

Nevertheless, the lowest-ranked mean score of 3.46 was recorded for item 3, “I utilize digital financial tools, such as e-wallets (e.g., Maya, GCash, and GInvest), and digital banking (e.g., BPI Trade and GoTyme), to invest in opportunities that foster business growth.” While still rated very high, respondents noted that the use of digital investment tools is selective and depends on available capital and business priorities. One respondent mentioned, “Often, but it also depends on the opportunities and how much capital we have to invest.” Another added, “Rarely, because not all investment platforms apply to us, so we choose where to invest.” These insights reveal that MSME owners apply digital tools strategically, investing only in opportunities that align with their resources and business goals. Their engagement with these tools demonstrates how financial literacy and understanding of digital platforms directly influence financial behavior, guiding decisions about savings, investments, and risk management. Rahayu et al. [51] emphasizes that digital financial tools facilitate access to investment opportunities, but their effective use depends on the knowledge, skills, and preparedness of the business owner.

Overall, the findings reveal that MSMEs in Calapan City consistently use digital financial services, as indicated by the overall mean of 3.60, reflecting a very high level of usage. Respondents leverage these tools to plan, save, monitor, and invest efficiently, which not only improves financial management but also builds digital literacy and supports sound financial behavior. According to Beloke et al. [12], the integration of digital financial services into daily business operations demonstrates how these tools empower owners to make informed decisions, optimize resources, and achieve sustainable growth.

#### 4.2 What is the extent of digital literacy of MSMEs in Calapan City?

**Table 6** The Level of Digital Literacy

Digital Literacy		Mean	Verbal Description	Interpretation	Rank
1	My digital literacy enables me to utilize digital financial services effectively and manage my business finances.	3.68	Strongly Agree	Very Extent High	1
2	My digital literacy enhances my understanding of digital financial services, which in turn improves my ability to manage my business finances effectively.	3.65	Strongly Agree	Very Extent High	4
3	I utilize my digital literacy to identify digital financial platforms that support my business's growth and development.	3.64	Strongly Agree	Very Extent High	5
4	I can use digital financial services to conduct business transactions conveniently and efficiently.	3.66	Strongly Agree	Very Extent High	2.5
5	My skills in utilizing digital financial tools have positively impacted my business financial decisions.	3.66	Strongly Agree	Very Extent High	2.5
Overall		3.66	Strongly Agree	Very Extent High	

Table 6 presents the level of digital literacy of MSMEs, with an overall mean of 3.66, described as “Strongly Agree” and interpreted as “Very High Extent.” This indicates that respondents consistently demonstrate strong digital literacy skills, which enable them to effectively use digital financial services to manage and grow their business finances.

The highest-rated mean of 3.68 was obtained from item 1, “My digital literacy enables me to utilize digital financial services effectively and manage my business finances,” interpreted as a very high extent. One respondent expressed, “Strongly Agree, because it is easier for us to use and understand digital tools to manage our finances.” Another added, “Strongly Agree, because we know how to use e-wallets and online banking to better monitor our business.” These responses highlight that MSMEs highly value their digital skills in leveraging digital financial services, allowing them to manage finances efficiently, monitor transactions, and make informed business decisions. Diffusion of Innovation Theory helps explain this behavior, as the adoption of new technologies is influenced by factors such as relative advantage, compatibility, and observability. In this context, MSMEs with strong digital literacy are more likely to recognize the advantages of digital financial services, use them effectively, and share their positive experiences, which encourages broader adoption among peers and strengthens the overall integration of digital tools in business financial management.

Conversely, the lowest-ranked mean score of 3.64 was recorded for item 3, “I utilize my digital literacy to identify digital financial platforms that support my business's growth and development,” interpreted as a very high extent. While respondents still strongly agree, some indicated that they are still exploring new platforms and tools to maximize business opportunities. One respondent noted, “Disagree, because sometimes we still need to do research before deciding which platform is best for our business.” Another added, “Agree, because even though we know how to use the apps, we want to make sure they will truly help our business grow.” These insights suggest that while MSMEs are confident in their digital literacy, full optimization of digital platforms for growth requires ongoing learning and exploration. Supporting this, the Resource-Based View (RBV) theory highlights that digital literacy and the effective use of digital financial services are valuable intangible resources that enhance financial management capabilities and overall business performance.

Overall, the results show that MSMEs in Calapan City consistently exhibit strong digital literacy, as indicated by the overall mean of 3.66, interpreted as a very high extent. Their digital skills enable them to utilize digital financial services effectively, enhancing business financial management, decision-making, and growth potential.

### 4.3 What is the level of financial behavior of MSMEs in terms of

#### 4.3.1 Saving Behavior

**Table 7** The Level of Financial Behavior of MSMEs in terms of Saving

Saving Behavior		Mean	Verbal Description	Interpretation	Rank
1	I save a portion of my business income using digital financial platforms such as e-wallets and digital banking services.	3.56	Always	Very High Level	3.5
2	I use digital financial services to manage and separate my personal and business savings.	3.54	Always	Very High Level	5
3	I utilize automatic saving features (e.g., scheduled fund transfer and payroll deduction) for future business needs.	3.56	Always	Very High Level	3.5
4	I set specific saving goals (e.g., emergency fund, big purchases) using digital financial platforms.	3.59	Always	Very High Level	2
5	I use digital financial platforms to track business finances and manage my savings.	3.62	Always	Very High Level	1
Overall		3.58	Always	Very High Level	

Table 7 presents the level of financial behavior of MSMEs regarding saving, with an overall mean of 3.58, indicating “Always” and interpreted as “Very High Level.” This indicates that respondents consistently demonstrate strong saving habits, particularly through the use of digital financial platforms.

The highest-rated mean of 3.62 was obtained from item 5, “I use digital financial platforms to track business finances and manage my savings,” interpreted as a very high level. One respondent expressed, “Always, because it is easier for us to track our income and savings using mobile banking and e-wallet apps.” Another added, “Always, because it helps us monitor our finances and plan for the future needs of our business.” These statements highlight that MSMEs highly value digital tools for monitoring their finances, as these platforms provide real-time tracking, ease of use, and better control over business funds. The Technology Acceptance Model (TAM) explains this behavior, suggesting that users are more likely to adopt technology when they perceive it as useful and user-friendly. In the context of MSMEs, perceiving digital financial services as helpful for tracking income, expenses, and savings encourages consistent usage, which strengthens saving habits and overall financial management. Supporting this, Chen et al. [57] found that digital financial tools improve SMEs’ ability to manage cash flow, plan savings, and maintain financial discipline, while improving operational efficiency.

Conversely, the lowest mean score of 3.54 was recorded for item 2, “I use digital financial services to manage and separate my personal and business savings,” interpreted as a very high level. Although respondents generally practice fund separation, some noted challenges in fully distinguishing personal and business finances. One participant mentioned, “Often, but sometimes it becomes mixed because our resources are limited and we need to prioritize payments.” Another added, “Never, because sometimes it is really difficult for us to separate personal savings from business funds.” These insights suggest that while MSMEs are aware of the importance of separating funds, practical constraints and informal financial practices sometimes hinder full compliance. Research by Abdallah et al. [58] supports this, emphasizing that SMEs often face challenges in distinguishing business and personal finances due to limited financial literacy or inadequate financial record systems.

Overall, the findings reveal that MSMEs in Calapan City exhibit consistently strong saving behaviors, as indicated by the overall mean of 3.58, interpreted as a very high level. Respondents actively incorporate digital financial platforms into their routines to track income, monitor savings, and plan for future business needs. This demonstrates how the perceived usefulness and ease of use of digital tools enhance saving consistency, financial discipline, and overall business financial management. The results align with Safii et al. [59], showing that the adoption of digital financial platforms supports effective financial planning, strengthens saving behavior, and contributes to sustainable business growth among MSMEs.

#### 4.3.2 Financing Behavior

**Table 8** The Level of Financial Behavior of MSMEs in terms of Financing

Financing Behavior		Mean	Verbal Description	Interpretation	Rank
1	I use Digital Financial Services (DFS) platforms to manage business financing transactions.	3.56	Always	Very High Level	1
2	I use digital financial services like GLoan, Maya Credit, or lending apps for a more convenient way to make a loan for the business.	3.27	Always	Very High Level	5
3	I use digital financial services as my primary source of business financing.	3.44	Always	Very High Level	4
4	I utilize digital financial services, such as online banking, e-wallet loans, and online lending applications, to easily access business financing.	3.45	Always	Very High Level	3
5	I meet short-term business capital needs through the use of digital financial services.	3.54	Always	Very High Level	2
Overall		3.45	Always	Very High Level	

Table 8 presents the level of financial behavior of MSMEs in terms of financing, with an overall mean of 3.45, described as “Always” and interpreted as “Very High Level.” This indicates that MSMEs consistently use digital financial services (DFS) to support their business financing activities.

The highest-rated mean of 3.56 was obtained from item 1, “I use Digital Financial Services (DFS) platforms to manage business financing transactions,” interpreted as a very high level. One respondent expressed, “Always, because we can manage our financing transactions faster and more efficiently using DFS platforms.” Another shared, “Always, because it helps us track loan payments and other financial obligations of the business.” These statements highlight that MSMEs rely on digital financial platforms to handle financing activities efficiently, as these tools offer convenience, faster processing, and improved accuracy in monitoring transactions. The Diffusion of Innovation (DOI) Theory explains this behavior, noting that the adoption of new technologies depends on factors such as relative advantage, compatibility, and observability. MSMEs that experience the benefits of DFS, such as easier tracking of capital and quicker transaction processing, are more likely to adopt and continue using these platforms, while positive experiences may also influence peers to integrate DFS into their own business operations.

In contrast, the lowest mean score of 3.27 was recorded for item 2, “I use digital financial services like GLoan, Maya Credit, or lending apps for a more convenient way to make a loan for the business,” interpreted as a very high level. Although respondents still reported consistent usage, some expressed hesitation in fully relying on digital lending apps due to concerns about interest rates, loan terms, or limited familiarity with app-based financing. One participant noted, “Rarely, because sometimes we struggle with the terms and interest, so we don’t always rely on the apps.” Another added, “Never, because we don’t know what requirements are needed.” These responses suggest that while MSMEs recognize the potential convenience of digital lending, practical concerns and trust issues influence the extent of adoption. Supporting this, Zhao and Khaliq [60] found that small businesses are often cautious toward digital lending due to perceived risks, limited knowledge, and lack of familiarity with fin-tech platforms.

Overall, the findings reveal that MSMEs in Calapan City demonstrate a very high level of financing behavior, as indicated by the overall mean of 3.45, interpreted as a very high level. Respondents consistently use digital financial services to support business financing activities, manage loans, and monitor capital needs. This indicates that perceived usefulness and ease of use drive adoption of digital financial platforms, enhancing access to financing, improving financial management, and promoting sustainable growth. These results align with Tandilino et al. [61], demonstrating how DFS adoption strengthens financing behavior and overall financial performance among MSMEs.

#### 4.3.3 Investing Behavior

**Table 9** The Level of Financial Behavior of MSMEs in terms of Investing

Investing Behavior		Mean	Verbal Description	Interpretation	Rank
1	I utilize digital financial tools such as GInvest, Maya Funds, and SeedIn to access a diverse range of investment options that support my business's future needs.	3.32	Always	Very High Level	4
2	My access to digital financial platforms increases my willingness to invest.	3.34	Always	Very High Level	2.5
3	My access to digital financial platforms increases my willingness to invest..	3.34	Always	Very High Level	2.5
4	I utilize digital financial services to make investments more accessible for the business.	3.35	Always	Very High Level	1
5	I monitor business investments using digital financial tools to inform my decision-making.	3.30	Always	Very High Level	5
Overall		3.33	Always	Very High Level	

Table 9 presents the level of financial behavior of MSMEs in terms of investing, with an overall mean of 3.33, described as “Always” and interpreted as “Very High Level.” This indicates that respondents consistently demonstrate active investment behavior, particularly through the use of digital financial platforms.

The highest mean of 3.35 was obtained from item 4, “I utilize digital financial services to make investments more accessible for the business,” interpreted as a very high level. One respondent expressed, “Always, because it is easier for us to access different investment options such as GInvest and Maya Funds for the future needs of the business.” Another added, “Always, because it provides a convenient way to grow the business funds and plan for growth.” These statements highlight that MSMEs value digital financial tools for simplifying the investment process and providing access to diverse options, which facilitates strategic financial planning. The Technology Acceptance Model (TAM) explains this behavior, positing that users are more likely to adopt technology when they perceive it as useful and user-friendly. MSMEs who recognize the practical advantages of digital financial services are more likely to consistently utilize these platforms, strengthening their investment behavior. Supporting this, Chen et al. [57] found that digital financial tools increase SMEs’ access to investment opportunities, improve decision-making, and contribute to overall business performance.

However, the lowest mean score of 3.30 was recorded for item 5, “I monitor business investments using digital financial tools to inform my decision-making,” interpreted as a very high level. While respondents actively invest, some noted challenges in fully leveraging digital platforms for tracking and evaluating investment performance. One participant noted, “Rarely, because it is difficult to properly monitor all investments, especially when multiple platforms are used.” Another added, “Often, we still need to manually track sometimes to ensure the analysis is correct.” These responses suggest that while MSMEs are willing to invest, limited experience in data-driven decision-making or digital literacy may affect the effective use of monitoring tools. Supporting this, Imjai et al. [18] emphasize that SMEs may underutilized digital investment monitoring platforms due to gaps in digital skills or familiarity with analytic.

Overall, the findings reveal that MSMEs in Calapan City consistently exhibit strong investing behaviors, as indicated by the overall mean of 3.33, interpreted as a very high level. Respondents actively incorporate digital financial services into their investment routines, facilitating access to multiple investment options, improving financial planning, and enhancing decision-making. These findings align with Chen et al. [57], showing that the perceived usefulness and ease of use of digital financial platforms drive adoption, which strengthens investing consistency, financial management, and overall business performance among MSMEs.

4.3.4 Spending Behavior

**Table 10** The Level of Financial Behavior of MSMEs in terms of Spending

Spending Behavior		Mean	Verbal Description	Interpretation	Rank
1	I utilize digital payment platforms, including e-wallets and digital banking services, as well as other specialized payment services, to cover business-related expenses.	3.54	Always	Very High Level	5
2	I track my business spending using digital financial applications.	3.56	Always	Very High Level	4
3	I control my business spending through digital financial platforms.	3.59	Always	Very High Level	2.5
4	I use digital platforms for purchasing business-related items online.	3.59	Always	Very High Level	2.5
5	I use digital financial services to maintain better spending habits for my business.	3.60	Always	Very High Level	1
Overall		3.58	Always	Very High Level	

Table 10 presents the level of financial behavior of MSMEs in terms of spending, with an overall mean of 3.58, described as “Always” and interpreted as “Very High Level.” This indicates that respondents consistently demonstrate strong spending behaviors, particularly through the use of digital financial platforms to manage, track, and regulate their business expenses.

The highest mean of 3.60 was obtained from item 5, “I use digital financial services to maintain better spending habits for my business,” interpreted as a very high level. One respondent expressed, “Always, because we can avoid overspending, and our expense tracking is more organized using digital tools.” Another added, “Always, because it helps

us plan and monitor our business expenses, resulting in better cash flow management.” These statements highlight that MSMEs highly value digital financial services in cultivating disciplined and structured spending practices. Using the Resource-Based View (RBV), this behavior can be explained by recognizing that digital financial literacy and the effective use of financial technologies are valuable internal resources. These capabilities enable MSMEs to monitor expenses, prevent overspending, and make informed financial decisions, strengthening overall spending behavior. Supporting this, Jun and Ran [62] found that SMEs with strong digital finance capabilities exhibit better expenditure control and improved operational efficiency.

On the other hand, the lowest mean score of 3.54 was recorded for item 1, “I utilize digital payment platforms, including e-wallets and digital banking services, as well as other specialized payment services, to cover business-related expenses,” interpreted as a very high level. Although respondents consistently use these platforms, some indicated challenges such as transaction fees, platform limitations, or varying familiarity with different digital payment tools. One participant said, “Rarely, because we have sometimes experienced issues with transaction fees or not all suppliers accept digital payments.” Another added, “Rarely, because there are still some transactions that need to be done in cash or manually, so the process is not always smooth.” These insights suggest that while digital payment adoption is high, practical constraints and mixed-use practices still exist among some MSMEs. Supporting this, Vales et al. [63] emphasize that SMEs often rely on a combination of digital and traditional payment methods due to limited digital familiarity.

Overall, the findings reveal that MSMEs in Calapan City consistently exhibit strong spending behaviors, as indicated by the overall mean of 3.58, interpreted as a very high level. Respondents actively use digital financial platforms to manage, track, and regulate expenses, which enhances spending discipline, financial management efficiency, and resource allocation. These findings align with the study by Santoso et al. [64], demonstrating that digital financial literacy and the effective use of digital tools support stronger spending behavior and sustainable business performance among MSMEs.

#### 4.4 Which aspect of MSMEs’ financial behavior is most strongly influenced by digital financial services?

**Table 11** Influence of Digital Financial Services on the Different Aspects of MSMEs’ Financial Behavior

Financial Behavior	Digital Financial Services				
	<i>r-value</i>	<i>p-value</i>	<i>Degree</i>	<i>Direction</i>	<i>Interpretation</i>
Saving Behavior	0.671	<0.001	Strong	Positive	Significant
Financing Behavior	0.707	<0.001	Strong	Positive	Significant
Investing Behavior	0.548	<0.001	Moderate	Positive	Significant
Spending Behavior	0.506	<0.001	Moderate	Positive	Significant

Degrees of Freedom: 168; Level of Significance: 0.05

Table 11 presents the influence of digital financial services on the different aspects of MSMEs’ financial behaviors in Calapan City, highlighting the degree, direction, and significance of relationships across different financial behavior aspects. The results reveal that all dimensions, which are saving, financing, investing, and spending, are positively and significantly influenced by DFS, demonstrating the integral role of digital financial platforms in shaping MSMEs’ financial practices.

The strongest relationship was observed with financing behavior, which had an *r-value* of 0.707 and a *p-value* of <0.001, interpreted as strong, positive, and significant. This suggests that MSMEs heavily rely on DFS to manage business financing transactions, including digital loans, e-wallet-based credit, and online banking, because these platforms offer convenience, faster processing, and better financial monitoring. Similarly, saving behavior also showed a strong positive correlation with DFS ( $r = 0.671$ ,  $p < 0.001$ ), indicating that the use of digital platforms enhances the ability of MSMEs to monitor savings, set goals, and maintain disciplined financial habits. Li et al. [4] found that digital platforms support investment decisions by improving access to financial information and reducing uncertainty. Faiz [65] also noted that digital tools influence investment behavior by shaping risk perception and decision confidence. Urefe et al. [66] further explained that digital financial literacy helps small businesses make better investment choices.

Moreover, the correlation between investing behavior ( $r = 0.548$ ,  $p < 0.001$ ) and spending behavior ( $r = 0.506$ ,  $p < 0.001$ ) demonstrated moderate but significant positive correlations with DFS. While these findings suggest that digital financial services support informed investment decisions and regulated spending, they may also be influenced by other factors such as digital literacy, experience, and business size. Overall, the analysis indicates that DFS most strongly influences

financing and saving behaviors, reinforcing the idea that perceived usefulness and ease of use drive adoption and encourage consistent financial management practices among MSMEs. Additionally, digital financial services show a moderate positive relationship with spending behavior, with an  $r$ -value of 0.506 and a  $p$ -value  $<0.001$ , meaning MSMEs that use DFS tend to manage expenses better and avoid overspending. According to Uthailiang and Supaporn [67], some of the apps even include budgeting and financial management capabilities, assisting users in tracking expenditure, setting objectives, and managing finances more skillfully. Digital financial applications support better purchase decisions and spending monitoring. These findings explain why digital tools moderately but significantly enhance MSMEs' spending behavior.

Overall, these results imply that increasing MSMEs' adoption of digital financial services strengthens their financial practices across saving, financing, investing, and even spending behavior. This aligns with the Diffusion of Innovation Theory, which states that innovations like DFS are adopted more quickly when users perceive clear advantages such as convenience, compatibility with business needs, and ease of use, factors that help MSMEs improve saving discipline, manage loans responsibly, make better investment decisions, and control spending through digital tracking tools. It also supports the Resource-Based View, which explains that digital skills and access to reliable financial technologies serve as valuable and moderate-to-strong resources that enhance business performance. This aligns with evidence showing that digital tools are most effective when users understand how to maximize their features for financial planning and control.

#### 4.5 Is there a significant relationship between digital financial services and the financial behavior of MSMEs?

**Table 12** Correlational Analysis Between Digital Financial Services and Financial Behavior of MSMEs

Financial Behavior	Digital Financial Services				
	<i>r</i> -value	<i>p</i> -value	Degree	Direction	Interpretation
	0.757	$<0.001$	Strong	Positive	Significant

Degrees of Freedom: 168; Level of Significance: 0.05

Table 12 presents the correlational analysis between digital financial services (DFS) and the overall financial behavior of MSMEs in Calapan City. The results reveal a strong positive and statistically significant relationship, with an  $r$ -value of 0.757 and a  $p$ -value of  $<0.001$ . This indicates that MSMEs who actively adopt digital financial services are more likely to demonstrate effective financial behaviors, including consistent saving, strategic financing, informed investing, and controlled spending practices.

The strong correlation suggests that digital financial services play a pivotal role in shaping the financial management practices of MSMEs. By using platforms such as digital banking, e-wallets, and digital lending applications, business owners can monitor income and expenses, set financial goals, and make timely investment decisions. One respondent noted, "Using e-wallets and online banking helps me keep track of my business finances easily, so I know exactly how much to save, invest, and spend without confusion." This reflects the practical benefits of DFS, as these tools not only facilitate day-to-day transactions but also provide a structured framework for decision-making, enabling MSMEs to manage their finances more efficiently.

The statistical significance ( $p < 0.001$ ) confirms that the relationship between DFS and financial behavior is highly unlikely to be due to chance, emphasizing the critical role of digital financial adoption in improving business financial outcomes. This finding aligns with the previous study of Molosiwa et al. [68], which reported that SMEs actively using digital financial platforms demonstrate enhanced access to financing, improved savings behavior, and more disciplined expenditure practices. Likewise, Santoso et al. [64] emphasize that digital financial tools strengthen cash management, promote financial discipline, and support sustainable business growth.

Overall, the findings underscore that digital financial services are a vital driver of financial behavior among MSMEs. The adoption of these tools not only encourages better financial practices but also enhances decision-making capacity, operational efficiency, and business sustainability. This aligns with Saharan et al. [69], who emphasized that SMEs utilizing digital financial platforms demonstrate improved access to financing, better savings management, and more disciplined expenditure practices, leading to overall business growth. Consequently, the null hypothesis is rejected, confirming that there is a significant and strong positive relationship between digital financial services and the financial behavior of MSMEs in Calapan City, highlighting the strategic importance of digital financial integration in modern small business operations.

**4.6 Does digital literacy significantly moderate the relationship between digital financial services and the financial behavior of MSMEs in Calapan City?**

**Table 13** Moderating Effect of Digital Literacy to the Relationship between DFS and Financial Behavior

Digital Financial Services Vs Financial Behavior	Moderating Effect of Digital Literacy				
	<i>r-value</i>	<i>p-value</i>	Moderating Effect	<i>Direction</i>	<i>Interpretation</i>
	0.754	<0.001	Strong	Positive	Significant

Level of Significance: 0.05

Table 13 presents the moderating effect of digital literacy on the relationship between digital financial services (DFS) and the financial behavior of MSMEs in Calapan City. The results reveal a strong, positive, and statistically significant moderating effect, with a  $\beta$ -value of 0.754 and a p-value of <0.001. This indicates that the level of digital literacy among MSMEs significantly strengthens the positive relationship between DFS adoption and effective financial behavior.

The findings suggest that MSMEs with higher digital literacy are better equipped to leverage digital financial platforms, leading to more disciplined saving, strategic financing, informed investing, and controlled spending practices. One respondent noted, “With the help of my knowledge in digital, I can know how to use online banking and e-wallet apps well; I can plan my business finances better and make faster, more informed decisions.” This demonstrates how digital literacy enhances the usability and benefits of DFS, allowing business owners to maximize the potential of digital tools for financial management and growth.

The statistical significance ( $p < 0.001$ ) confirms that digital literacy is a critical factor in the effective utilization of DFS. This aligns with prior research, such as Imjai et al. [18], who highlighted that digital skills enable SMEs to efficiently navigate financial technologies, improve financial decision-making, and optimize business operations. Furthermore, Santoso et al. [64] note that SMEs with higher digital competence are more likely to adopt and benefit from digital financial services, reinforcing the importance of digital skills as a moderating factor in business financial behavior.

Overall, the results demonstrate that digital literacy significantly moderates the relationship between digital financial services and financial behavior, highlighting its pivotal role in enhancing the effectiveness of digital financial adoption among MSMEs. MSMEs with strong digital literacy are more likely to harness DFS effectively, thereby improving their financial behavior, decision-making capabilities, and overall business performance. This finding is consistent with Imjai et al [18], who emphasized that digital skills enable SMEs to navigate financial technologies efficiently and optimize business operations.

**4.7 Based on the findings of the study, the MSME Digital Literacy Module is proposed under the program “Angat Digital, Angat Negosyo: The Calapan MSME Digital-FinLit Program.”**

**Table 14** Components of the MSME Digital Literacy Module

MSME Digital Literacy Module			
Module 1	The Digital Wallet as a Ledger (Spending and Saving)	<a href="https://heyzine.com/flip-book/fa896d4a91.html">https://heyzine.com/flip-book/fa896d4a91.html</a>	
Module 2	Smart Borrowing and Digital Borrowing (Financing)	<a href="https://heyzine.com/flip-book/be8a9eae2b.html">https://heyzine.com/flip-book/be8a9eae2b.html</a>	

Module 3	Cyber-Resilience and Trust (Investing)	<a href="https://heyzine.com/flip-book/6e0f6928a0.html">https://heyzine.com/flip-book/6e0f6928a0.html</a>	
Module 4	Agri-Trade Digitalization	<a href="https://heyzine.com/flip-book/55f231375b.html">https://heyzine.com/flip-book/55f231375b.html</a>	
Modules 1-4	MSME Digital Literacy Module	<a href="https://heyzine.com/flip-book/2dc346d945.html">https://heyzine.com/flip-book/2dc346d945.html</a>	

Based on the findings of the study, gaps in digital literacy among micro, small, and medium enterprises (MSMEs) significantly affect their ability to effectively utilize digital financial and business tools. These gaps are largely attributed to limited knowledge, insufficient digital skills, and low confidence in using digital platforms for financial and operational decision-making. To address these challenges, the MSME Digital Literacy Module was developed as a structured learning intervention composed of four interconnected components. The first component focuses on the use of digital wallets as financial ledgers, enhancing MSMEs' ability to manage spending and savings through digital transactions. The second component emphasizes smart and responsible digital borrowing, equipping MSMEs with the knowledge needed to access and manage digital financing options effectively. The third component addresses cyber-resilience and trust, strengthening MSMEs' awareness of cybersecurity risks and safe digital practices to support informed investing decisions. The fourth component concentrates on agri-trade digitalization, providing practical guidance on the use of digital tools in agricultural trade transactions. Collectively, these components aim to strengthen MSMEs' digital and financial competencies, promote responsible financial behavior, and support business growth and sustainability in an increasingly digital economy.

## 5 Conclusion

- This study examined the moderating effect of digital literacy on the relationship between digital financial services (DFS) and the financial behavior of MSMEs in Calapan City. The findings confirm that DFS adoption is widespread among MSMEs and significantly enhances financial management practices, particularly in saving and financing activities.
- MSMEs actively utilize mobile banking, e-wallets, digital banking applications, and online payment systems to monitor income, organize expenses, and plan business goals. While digital investment platforms are used more selectively due to capital limitations and business priorities, entrepreneurs demonstrate strategic engagement in aligning digital tools with their financial objectives. The results indicate that DFS functions as a vital resource that strengthens liquidity management, operational efficiency, and overall business performance.
- The study also reveals that MSMEs possess a generally high level of digital literacy, enabling them to confidently navigate digital platforms for financial management. Digital literacy supports informed decision-making, efficient resource allocation, and continuous exploration of emerging financial technologies. Consequently, it serves as a key enabler of effective DFS utilization.
- Correlation analysis shows a strong positive relationship between DFS and financial behavior, with financing behavior exhibiting the strongest association, followed by saving, investing, and spending behaviors. These findings suggest that active engagement with DFS promotes more structured, disciplined, and strategic financial practices among MSMEs.

- Digital literacy significantly moderates the relationship between DFS and financial behavior. Higher digital literacy levels amplify the positive effects of DFS, resulting in improved saving discipline, strategic financing, informed investment decisions, and controlled spending. Overall, the study underscores that strengthening digital literacy enhances the impact of digital financial services, contributing to sustainable MSME growth. This study benefits society by promoting digital empowerment among entrepreneurs and provides a foundation for future programs that advance inclusive digital and financial development.

### *Recommendations*

- The researchers recommend that MSME owners, managers, and staff participate in and study the Digital Literacy and Financial Management Module provided in this study to enhance practical skills in using digital financial services, improve financial decision-making, and strengthen overall business management.
- The researchers recommend implementing structured training programs to enhance MSMEs' practical use of digital financial services (DFS), including digital payments, online banking, e-wallets, and digital credit. Hands-on workshops and demonstrations can help entrepreneurs move from basic usage to more strategic financial planning and control.
- Focused coaching programs should also be developed to strengthen saving, financing, investing, and spending behaviors. Through mentoring and simple financial planning tools, MSMEs can translate frequent DFS use into more disciplined and informed financial decisions.
- Simple monitoring and evaluation tools, such as digital scorecards and self-assessment checklists, are recommended to help MSMEs track their digital literacy, DFS usage, and financial behavior over time.
- Collaboration among local government units, financial institutions, and business support organizations should be strengthened to encourage responsible DFS adoption through incentives and coordinated programs.
- Future researchers are encouraged to expand the study to other sectors and locations and to include additional variables such as entrepreneurial mindset, risk tolerance, digital infrastructure access, and government support. Comparative studies between DFS users and non-users may further enrich understanding and provide stronger evidence for targeted policies and inclusive digital development programs.

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### **Compliance with ethical standards**

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#### *Disclosure of conflict of interest*

There is no conflict of interest.

#### *Statement of informed consent*

This study followed ethical standards to protect participants' rights. All respondents were informed about the purpose, scope, and nature of the research before providing consent. Confidentiality and anonymity were ensured, and participation was voluntary with the right to withdraw at any time. Data was used solely for educational purposes and handled according to data protection laws. Ethical clearance was obtained from an accredited review board, and diverse MSMEs were included to ensure representative fairness.

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