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A structure model of economic resilience on female single-parent families: The contribution of digital inclusion, financial management and financial trauma

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ABSTRACT

Female single-parent households are among the most vulnerable groups to economic shocks due to limited access to resources, decent work, and social protection. Strengthening their economic resilience is therefore a pressing challenge, particularly in the era of digitalization where opportunities and risks coexist.This study aims to examine the role of digital inclusion, financial management, and financial trauma in shaping the economic resilience of female single-parent families in Medan.The research contributes to the literature by integrating digital and psychosocial dimensions into a structural model of economic resilience, while also offering evidence-based insights for inclusive empowerment policies.A quantitative approach was employed using a survey of 200 respondents, and data were analyzed with Structural Equation Modeling–Partial Least Squares (SEM-PLS).The results indicate that digital inclusion significantly improves financial management and directly enhances economic resilience. Financial management mediates the relationship between digital inclusion and economic resilience, showing that digital access only translates into stronger resilience when supported by effective financial practices. Financial trauma, while directly influencing economic resilience, was not found to moderate the link between financial management and resilience.In conclusion, the findings highlight that access to digital technology combined with strong financial management skills is the key to building sustainable economic resilience in female-headed households.

1. Introduction

Female single-parent households are a social group vulnerable to economic shocks due to limited access to resources, decent work, and social protection. In such situations, economic resilience becomes a crucial aspect for maintaining household welfare and meeting the basic needs of the family (United Nation, 2020). According to Badan Pusat Statistik (2023) and Figure 1 shows that 12.73% of households in Indonesia are headed by women, a slight increase from 12.72% in the previous year. Although the number may appear small, it reflects a growing trend of women becoming heads of households, which in turn increases the need to strengthen their economic capacity. Today's more digital economy, digital inclusion the access to, use of, and ability to leverage information and communication technologies plays a crucial role in improving women's economic outcomes. Studies show that digital inclusive finance reduces rural household vulnerability to poverty by improving entrepreneurs' access to start-up capital, lowering financing constraints, and expanding the reach of financial services (Chen et al., 2022). Research also indicates that greater digital skills are associated

with better consumer outcomes and enhanced participation in financial services, including saving, credit, or insurance products (J. Liu et al., 2024). Moreover, ICTs support women microenterprises by improving marketing reach, facilitating communication, reducing costs (transport, information), and enabling more resilient and diversified sources of income (Malanga & Banda, 2021), holds great potential as a catalyst for female economic empowerment (Sutanto et al., 2025; Uppal et al., 2023).

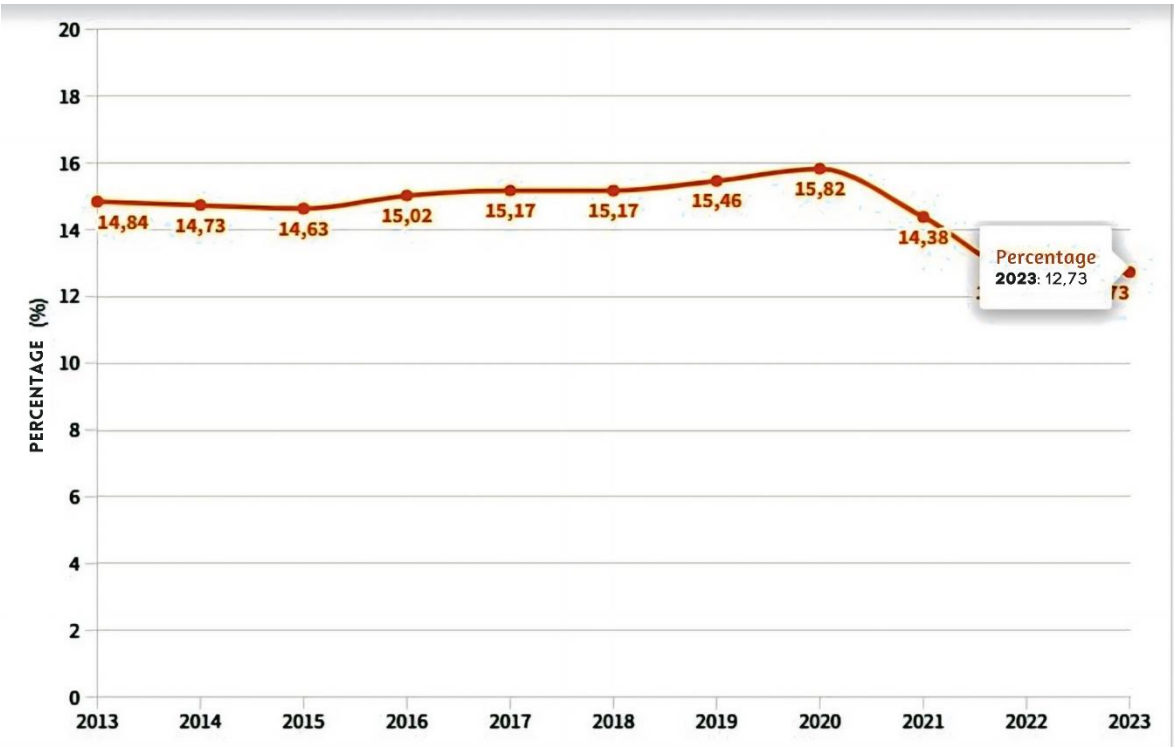

Figure 1. Percentage of Female Single-Parent Families (2013-2023)

Digital inclusion access to information, business opportunities, online training, and digital economic platforms. However, access to technology alone does not guarantee an increase in economic resilience if it is not accompanied by the capacity to manage resources effectively. Household financial management plays a vital role in converting digital access into productive and sustainable economic decisions. The ability to plan a budget, save money, avoid consumer debt, and utilize financial technology is key to achieving economic resilience (Mushtaq & Bruneau, 2019; Aziz & Naima, 2021). Nevertheless, psychological factors such as financial trauma, defined as emotional or psychological stress stemming from past financial crises, can degrade the quality of decision-making and reduce the effectiveness of financial management. Ross & Coambs (2018) emphasizes how trauma impairs cognitive and emotional capacities needed for prudent financial planning, Weida et al (2024) stated that trauma-informed interventions are more effective at improving financial outcomes for those exposed to adversity; and studies of financial stress during the COVID-19 pandemic. Moon et al (2023) found that heightened stress leads to changes in money management, risk-avoidance, and poorer decision outcomes.

The correlation between digital inclusion, financial management, financial trauma, and economic resilience among female single-parent households is still rarely explored, especially in Indonesia. Most studies only highlight financial literacy or access to capital, without considering the psychosocial aspects or current digital dynamics. Therefore, the urgency of this research is to fill this gap through a quantitative approach based on a Structural Equation Modeling (SEM), which tests the direct and indirect effects of digital inclusion on economic resilience, with financial management as a mediating variable and financial trauma as a Moderating variable. This study contributes to national development, particularly in supporting the fourth mission of Asta Cita, which is to strengthen the role of women. Furthermore, this research also addresses social challenges faced by vulnerable groups and contributes to the sixth mission of Asta Cita, which is to build from the ground up for economic equity and poverty eradication.

This study support the achievement of the Sustainable Development Goals (SDGs), specifically: no poverty by increasing the economic resilience of vulnerable women, gender equality through the

empowerment of female single-parent households based on technology and finance, and decent work and economic growth by strengthening sustainable economies. The inclusion of the financial trauma variable enriches theoretical studies and policies that are sensitive to psychosocial conditions. The findings of this study are expected to be the basis for developing inclusive, adaptive, and evidence-based digital economic empowerment programs.

To bridge the gap between previous studies, the study focus on the economic resilience of female single-parent families through a quantitative approach based on a structural model (SEM). This study analyze the direct and indirect effects of digital inclusion on economic resilience, with financial management as a mediating variable and financial trauma as a Moderating variable. The study supports the fourth mission of Asta Cita (strengthening the role of women) and the sixth (economic equity and poverty eradication), and also contributes to the achievement of the Sustainable Development Goals (SDGs), specifically no poverty, gender equality, and decent work and economic growth. The addition of the financial trauma variable strengthens the model's sensitivity to psychosocial factors. The main objective of the research is to build a structural model that explains the relationship between digital inclusion and economic resilience in female single-parent households, considering the roles of financial management and financial trauma. This research was conducted in Medan City, with respondents who are female heads of household aged 25–50 who have experience using digital technology in the context of household economics. The minimum sample size of 200 people was determined based on a formula (Hair et al., 2022), and a purposive sampling technique. The results are expected to serve as the basis for evidence-based digital economic empowerment policies for socially and economically vulnerable female single-parent households in Medan City.

This study focuses on examining how digital inclusion contributes to strengthening the economic resilience of female single-parent households and investigates the role of household financial management as a mediating mechanism that connects digital inclusion with economic resilience, emphasizing how effective financial practices can enhance the benefits of digital access. In addition, the study explores the dynamics of financial trauma as a moderating variable that shapes the relationship between financial management and economic resilience, particularly whether past negative financial experiences may weaken or alter this relationship. Ultimately, the research aims to develop a comprehensive structural model that illustrates the interconnections among digital inclusion, financial management, financial trauma, and the economic resilience of female single-parent households

2. Literature Review

2.1. Digital Inclusion

Digital inclusion refers to individuals' access to and use of information and communication technologies (ICT) in various aspects of daily life, including education, employment, and household financial management. Prior studies highlight that digital inclusion is strongly associated with poverty reduction, income generation, and economic well-being (Q. Li & Liu, 2023; Y. Li et al., 2025; Ong et al., 2023). For female single-parent households, digital inclusion is especially critical, as it provides opportunities to access financial services, online training, and entrepreneurial platforms, thereby enhancing both economic and social independence (Sutanto et al., 2025; Uppal et al., 2023). Moreover, evidence from Southeast Asia demonstrates that ICT infrastructure plays a crucial role in strengthening household absorptive capacity and resilience against economic shocks (Hartwig & Nguyen, 2022). Therefore, digital inclusion not only expands access to resources but also builds adaptive capacity for long-term resilience.

Access to digital technology improves households' ability to gather financial information, use budgeting tools, and participate in digital financial services. Evidence shows that digital financial inclusion promotes better household financial management practices, which are directly linked to improved quality of life and reduced financial stress (J. Liu et al., 2024; Song et al., 2024). Song et al (2024) found that digital financial inclusion smooths consumption and supports household entrepreneurship, while J. Liu et al (2024) confirmed its role in reducing financial vulnerability.

2.2. Household Financial Management

Household financial management includes planning, implementing, supervising, and evaluating financial resources to achieve long-term family well-being (Aziz & Naima, 2021; Mushtaq &

Bruneau, 2019). Good financial management helps households utilize digital access productively by saving, avoiding over-indebtedness, and effectively using digital financial services. Recent empirical studies show that financial literacy and responsible financial management significantly enhance household resilience by reducing vulnerability to shocks and facilitating faster recovery (Sun et al., 2022).

Digital inclusion opens opportunities, but its benefits for resilience depend on whether households can manage their finances effectively. Financial management thus acts as the mediating mechanism that transforms digital access into sustainable resilience. Without good financial practices, digital tools alone may not enhance household outcomes. Empirical research shows that the positive effects of digital financial inclusion such as consumption stability and access to credit operate through improved financial management practices (J. Liu et al., 2024; Song et al., 2024).

2.2. Financial Trauma

Financial trauma is defined as psychological distress caused by past financial crises, which can impair decision-making and increase financial avoidance behaviors (Guerra & Eboreime, 2021; Phojanakong et al., 2020; Scott et al., 2023). Households experiencing financial trauma tend to be more risk-averse, potentially undermining effective financial management and long-term resilience (Johnson et al., 2020; O'Donnell et al., 2020). Empirical evidence shows that past experiences of shocks shape households' adaptive behaviors, making financial trauma a critical moderating factor in resilience research (Hartwig & Nguyen, 2022). Financial trauma, defined as the psychological scars from past economic crises, may alter how households process information and take risks. This implies that the effect of financial management on resilience is not uniform trauma can weaken or, in some cases, reshape its impact. Guerra & Eboreime (2021) reveals the psychological effects of economic downturns, while Scott et al (2023) and Phojanakong et al (2020) noted that unresolved trauma reduces the effectiveness of financial interventions.

2.2. Economic Resilience and Behavioral Framework

Economic resilience refers to the ability of households to withstand, adapt to, and recover from economic shocks (Hair et al., 2022; Sun et al., 2022). Recent panel data studies in Southeast Asia reveal that resilience depends not only on assets and resources but also on adaptive capacities, such as financial literacy, digital access, and social safety nets (Do et al., 2025). In the case of female single-parent households, economic resilience is shaped by their ability to access digital opportunities, manage financial resources effectively, and cope with past financial traumas. Prospect theory provides a psychological lens to understand financial trauma. It explains that individuals are more sensitive to losses than gains, meaning that past financial crises strongly shape present financial decision-making. Contemporary applications of this theory show its relevance to modern financial behaviors such as consumption, saving, and investment, particularly under digital finance conditions (de Guevara Cortés et al., 2023; Y. Liu et al., 2021). de Guevara Cortés et al (2023) empirically tested a prospect theory in real financial decisions, confirming that loss aversion influences household risk-taking today.

3. Method

This study used a quantitative survey approach to examine the relationships among digital inclusion, financial management, financial trauma, and the economic resilience of female single-parent households. The research was conducted in Medan City with respondents consisting of female household heads aged 25–50 years who had prior experience using digital technology for financial or economic purposes. A purposive sampling technique was applied, with a minimum sample size of 200 respondents (Hair et al., 2022). Data were collected using a structured questionnaire developed from theoretical indicators of each variable: digital inclusion (access, use, utilization), financial management (planning, supervision, evaluation), financial trauma (emotional stress from past financial crises), and economic resilience (ability to survive and recover from shocks).

The instrument was pre-tested for validity before full distribution.The data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS software. The analysis covered direct and indirect effects as well as moderation testing, while model evaluation was carried out using validity tests, construct reliability, R-square, and Q-square to ensure both explanatory and predictive power. The advantage using the model as explains by Hair et al (2022) that SEM-PLS

handles complex models and has a flexibility. The model includes direct, mediating, and moderating effects. The structural equations for financial management as mediator can be written as follows:

$$FM = \beta_1 DI + \varepsilon_1 \quad (1)$$

The economic resilience equation for direct and mediated effect written as follows:

$$ER = \beta_2 DI + \beta_3 FM + \varepsilon_2 \quad (2)$$

The financial trauma as moderating variables written as follows:

$$ER = \beta_2 DI + \beta_3 FM + \beta_4 (FM * FT) + \varepsilon_3 \quad (3)$$

Where DI is the digital inclusion; FM is the financial management; FT is the financial trauma; ER is the economic resilience; $\beta_1 - \beta_4$ is the coefficient for independent variables and $\varepsilon_1 - \varepsilon_3$ is the error term for the model (1) – (3). Eqn (3) written as the full model. Based on literature review the hyphothesis for the model are: a). H1: Digital inclusion has a significant positive effect on household financial management; b). H2: Financial management mediates the relationship between digital inclusion and economic resilience; c). H3: Financial trauma moderates the relationship between financial management and economic resilience; and d). H4: Female single-parent households with higher digital inclusion and stronger financial management experience greater economic resilience.

4. Results and Discussion

The structural model in this study was designed to analyze the causal relationship between several variables. The model tests the effect of Digital Inclusion (DI) and Financial Management (FM) on Economic Resilience (ER). In addition, the model also includes Financial Trauma (FT) as a Moderateing variable that affects the relationship between Financial Management and Economic Resilience. Figure 2 shows the structural model in this study, where the DI (Digital Inclusion) variable has 11 indicators with Loading Factor values ranging from 0.812 to 0.864. The FM (Financial Management) variable has 8 indicators with Loading Factor values ranging from 0.764 to 0.845.

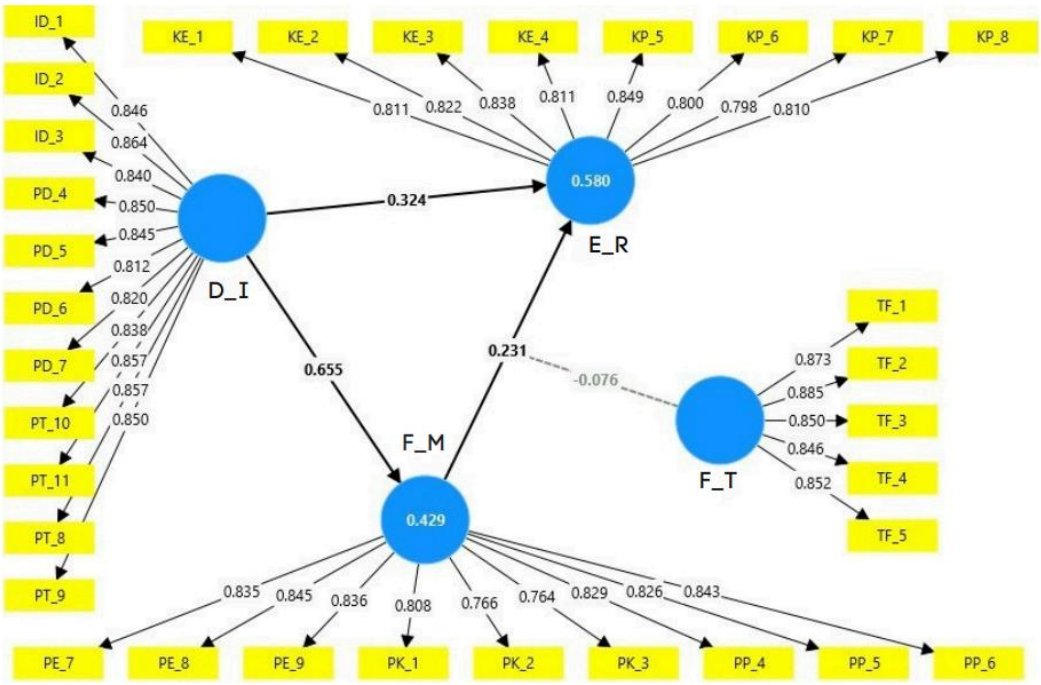

Figure 2. Measurement for Model Evaluation (Outer Model)

Meanwhile, the ER (Economic Resilience) variable has 8 indicators with Loading Factor values ranging from 0.798 to 0.849, and the FT (Financial Trauma) variable has 5 indicators with Loading Factor values ranging from 0.846 to 0.885. Thus, these results show that all indicators have a loading factor value above 0.7, which means they have met the convergent validity requirements. Therefore, the measurement model in this study can be considered valid (Ghozali & Latan, 2014). Validity is

determined by checking if the square root value of each AVE construct is greater than its correlation value with other constructs. Table 1 shows The results of the Fornell-Larcker criterion test show that the square root of the Average Variance Extracted (AVE) of each latent variable is greater than the correlation value of that variable with other latent variables. This proves that each latent variable has good discriminant validity, meaning that each variable is truly unique and does not overlap with other variables in the model. Thus, the discriminant validity requirements have been met and are acceptable.

Table 1. Result of Fornell-Larcker Criterion

	Digital Inclusion	Economic Resilience	Financial Management	Financial Trauma
DI	0.844			
ER	0.680	0.818		
FM	0.655	0.658	0.817	
FT	0.586	0.619	0.623	0.861

Source: data processed

The Composite Reliability value must be greater than 0.6, and this is strengthened by a Cronbach's Alpha value greater than 0.7. This indicates that the indicators in the construct are consistent and stable in measuring the same variable. Table 2 shows all variables in this study have a very good level of internal consistency. The Cronbach's Alpha values for all variables,Digital Inclusion (0.959), Economic Resilience (0.929), Financial Management (0.938), and Financial Trauma (0.913) are well above the 0.7 threshold. Similarly, the Composite Reliability values are also very high, with all variables having a value above 0.9. Therefore, it can be concluded that all constructs in this research model are reliable and consistent in measuring the intended variables.

Table 2. The Composite Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Digital Inclusion	0.959	0.961	0.964
Economic Resilience	0.929	0.930	0.942
Financial Management	0.938	0.938	0.948
Financial Trauma	0.913	0.915	0.935

Source: data processed

In this study, several criteria were used to evaluate the structural model. First, the R-square (R^2) value is used to assess how well the model can explain the dependent variable, with categories of strong (≥ 0.75), Moderatee (0.50–0.75), and weak (≤ 0.25). Second, the F-square (f^2) value is used to measure the effect size of each exogenous variable on the endogenous variable, with categories of small (0.02), medium (0.15), and large (0.35), while values below 0.02 are considered negligible. Third, the Q-square (Q^2) value is used as an indicator of predictive relevance, where a higher value indicates that the structural model is more consistent with the data (Hair et al., 2022). Table 3 shows the R^2 value shows that financial management can be explained by digital inclusion by 42.9% (moderate category), while economic resilience can be explained by the combination of digital inclusion, financial management, and financial trauma by 58.0% (moderate category). This indicates that the model has good predictive power in explaining the variation in the economic resilience of female single-parent households.

Table 3. The Result of Structural Model of SEM

Variable	R^2	f^2	f^2 Category	Q^2	Result
FM	0.429	DI → FM = 0.752	Large	0.424	Good Prediciton
ER	0.580	DI → ER = 0.116	Medium	0.537	Good Prediction
		FM → ER = 0.055	Small		
		FT → ER = 0.057	Small		
		FT*FM → ER = 0.017	Insignificant		

Source: data processed

Table 3 shows the f^2 analysis shows that the effect of digital inclusion on financial management is large (0.752), so this path is the most dominant contribution in the model. Meanwhile, the effect of

digital inclusion on economic resilience is medium (0.116), the effect of financial management (0.055) and financial trauma (0.057) on economic resilience is small, and the moderating effect of financial trauma (0.017) can be ignored. The Q^2 predict results of 0.424 for financial management and 0.537 for economic resilience show positive values that exceed zero, so the model is declared to have good predictive relevance. This means that the model not only explains the relationships between variables but is also able to predict the financial behavior of respondents in the context of economic resilience.

Table 4. Result of Full Model

Path	Coefficient
DI → FM	0.655 (12.663)***
DI → ER	0.324 (4.180)***
FM → ER	0.231 (3.777)***
FT → ER	0.213 (3.045)***
FT*FM → ER	-0.076 (1.824)

Source: data processed

Table 4 shows digital inclusion has a significant effect on economic resilience with a path coefficient of 0.324, a t-statistic value of 4.180, and a p-value of 0.000. This indicates that the higher the access and utilization of digital services (such as e-wallets, mobile banking, or financial applications), the stronger the economic resilience of female single-parent households. Digital inclusion not only impacts the financial aspects of individuals but also encourages broader economic participation. Through access to digital services, female single-parent households can more easily connect with small online business opportunities, expand their market networks, and increase their financial literacy capacity. Thus, digital inclusion does not only function as a technical instrument but also as a means of socio-economic empowerment that can reduce gender gaps in access to financial services. This supports the view that digital transformation has strategic implications in building a more inclusive and equitable economy. This finding is in line with the Global Findex 2021 report, which confirms that the use of digital financial services increases the ability to formally save and manage household risk. Recent research also shows that digital financial inclusion plays an important role in strengthening economic resilience, especially in vulnerable groups such as women (Ozili, 2024; Zetzsche et al., 2023).

Financial management has a significant effect on economic resilience with a path coefficient of 0.231, a t-statistic value of 3.777, and a p-value of 0.00010. This means that the better the respondents' ability to manage income, expenses, save, and manage debt, the higher their ability to withstand economic shocks. Good financial management is not only related to technical skills in managing income and expenses but also with disciplined attitudes and the ability to make wise financial decisions. Individuals who have a monthly budget plan, control over consumption, and a consistent savings strategy are more likely to be able to face crisis conditions, such as rising prices for basic needs or loss of income sources. Thus, financial skills function as a protective instrument that strengthens the economic resilience of households, especially in vulnerable groups with limited resources. This finding is in line with the financial capability framework from Sherraden (2013) states that financial skills are the foundation of economic resilience. Recent research also confirms that household financial management skills are closely related to a decrease in economic hardship and an increase in financial well-being (Ghaffar, 2024; Huang & Huang, 2023).

Table 4 shows the indirect effect test show that financial management can mediate the effect of digital inclusion on economic resilience, with a path coefficient of 0.151, a t-statistic value of 3.640, and a p-value of 0.000. This indicates that digital access does not only have a direct effect on resilience but also indirectly through the improvement of financial management skills. Digital inclusion essentially functions as an enabler that opens the door to access, but the quality of financial management determines the extent to which these benefits truly have an impact on economic resilience. Female single-parent households who not only use digital applications for transactions but are also able to prepare a budget, record expenses, and plan savings, tend to have higher resilience in the face of economic pressure. In other words, technology provides the means, but financial

management skills are the key mechanism that translates digital access into an increase in real well-being. This mediating role also emphasizes the importance of complementary interventions. Digital financial literacy programs, for example, can increase the ability of vulnerable groups to utilize technology not only for consumption but also for long-term financial planning. This finding strengthens the capability-outcome mediation framework from T. Liu et al (2024) where digital technology encourages an increase in financial literacy and skills, which then strengthens economic resilience. The latest empirical evidence also shows that the use of digital platforms expands access to savings and insurance, which translates into healthier financial practice (Marcelino & Sans, 2023; World Bank, 2021).

Financial trauma does not have a significant effect in moderating the relationship between financial management and economic resilience (path coefficient -0.076, t-statistic value 1.824, and p-value 0.068). Thus, this moderating variable is rejected. The insignificant role of financial trauma as a moderator in this study indicates that negative past experiences do not always weaken the relationship between financial management and economic resilience. This could be due to psychological adaptation, where individuals who have experienced financial difficulties are actually more strongly motivated to learn from the experience and improve their financial management strategies. Thus, instead of being an obstacle, financial trauma in some cases can be a catalyst that spurs individuals to be more careful, improve planning, and develop resilience in facing similar situations in the future. Theoretically, the experience of financial trauma should be able to affect financial behavior by increasing stress and decreasing self-confidence in making financial decisions (Marpaung et al., 2024). This study confirm that digital inclusion and financial management are important factors in building economic resilience. In addition, financial management is proven to be a significant mediator that strengthens the path from digital inclusion to economic resilience. In contrast, financial trauma is not proven to be a moderator, although previous literature linked negative financial experiences with economic vulnerability

Table 5. Result of Indirect Effect

Variable	Coefficient
DI → FM → ER	0.151 (3.640)***

Source: data processed

Table 5 shows financial management is proven to be able to mediate the relationship between digital inclusion and economic resilience with an indirect coefficient of 0.151, a t-statistic value of 3.640, and a p-value of 0.000. This indicates that the effect of digital inclusion on economic resilience is not only direct but also runs through the improvement of an individual's ability to manage finances. Because the direct path from digital inclusion to economic resilience remains significant, the type of mediation that occurs can be categorized as partial mediation. Thus, the higher the level of digital inclusion a respondent has, the better their economic resilience, both directly and through the intermediary of financial management skills.

5. Conclusion

Female single-parent households are a social group vulnerable to economic shocks due to limited access to resources, decent work, and social protection. Today's more digital economy, digital inclusion the access to, use of, and ability to leverage information and communication technologies plays a crucial role in improving women's economic outcomes. This study focuses on examining how digital inclusion contributes to strengthening the economic resilience of female single-parent households and investigates the role of household financial management as a mediating mechanism that connects digital inclusion with economic resilience, emphasizing how effective financial practices can enhance the benefits of digital access.

The funding of the study shows the digital inclusion plays a significant role in financial management and economic resilience in female single-parent households. The key findings show that financial management functions as a mediator, which means that digital access opens up various economic opportunities, but its impact on economic resilience will only be optimal if it is balanced with effective financial management skills. In addition, this study found that financial trauma has a direct effect on economic resilience, but it does not act as a moderator in the relationship between financial management and economic resilience. The model used in this study is proven to be valid, reliable, and have good predictive power. In conclusion, these findings reinforce that the combination

of access to digital technology and the mastery of financial management skills is the main key to strengthening the economic resilience of female single-parent families.

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