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## Financial Literacy, Digital Literacy, Self-Efficacy, and Autonomy in Shaping Financial Well-being

*Conocimientos financieros, conocimientos digitales, autoeficacia y  
autonomía en la configuración del bienestar financiero*

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### ABSTRACT

This study examines the effects of financial literacy, digital financial literacy, self-efficacy, financial autonomy, and impulsivity on financial well-being among women in West Sumatra, with financial behaviour as the mediating variable. Using a quantitative cross-sectional design, data were collected through an online survey of 405 working-age women and analysed with Partial Least Squares Structural Equation Modelling (PLS-SEM). The results indicate that financial literacy, digital financial literacy, self-efficacy, and financial autonomy significantly and positively affect financial behaviour, whereas impulsivity does not. Financial behaviour, in turn, has a significant positive impact on financial well-being and mediates the effects of literacy, digital literacy, self-efficacy, and autonomy, but not impulsivity. This research integrates the constructs of capability and agency within a matrilineal Southeast Asian context, showing that self-efficacy and autonomy play stronger roles in shaping financial practices than knowledge-based factors. These findings suggest that financial education should be coupled with initiatives that build confidence, autonomy, and consistent financial discipline among women.

Keywords: Financial Well-being; Financial Behaviour; Financial Literacy; Digital Financial Literacy; Self-Efficacy; Financial Autonomy; Women; SDG.

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## RESUMEN

Este estudio examina los efectos de la alfabetización financiera, la alfabetización financiera digital, la autoeficacia, la autonomía financiera y la impulsividad en el bienestar financiero de las mujeres en Sumatra Occidental, con el comportamiento financiero como variable mediadora. Mediante un diseño cuantitativo transversal, se recopilaron datos mediante una encuesta en línea dirigida a 405 mujeres en edad laboral y se analizaron con el modelo de ecuaciones estructurales de mínimos cuadrados parciales (PLS-SEM). Los resultados indican que la alfabetización financiera, la alfabetización financiera digital, la autoeficacia y la autonomía financiera afectan de manera significativa y positiva el comportamiento financiero, mientras que la impulsividad no lo hace. El comportamiento financiero, a su vez, tiene un impacto positivo significativo en el bienestar financiero y media los efectos de la alfabetización, la alfabetización digital, la autoeficacia y la autonomía, pero no de la impulsividad. Esta investigación integra los constructos de capacidad y agencia en un contexto matrilineal del sudeste asiático, mostrando que la autoeficacia y la autonomía desempeñan un papel más importante en la configuración de las prácticas financieras que los factores basados en el conocimiento. Estos hallazgos sugieren que la educación financiera debe ir acompañada de iniciativas que fomenten la confianza, la autonomía y una disciplina financiera constante entre las mujeres.

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Palabras clave: Bienestar financiero; comportamiento financiero; alfabetización financiera; alfabetización financiera digital; autoeficacia; autonomía financiera; mujeres; ODS.

Código JEL: G51, G53.

## INTRODUCTION

Well-being refers to the quality of life, which naturally differs across individuals. It spans accumulated wealth, career or occupational attainment, educational level, preparation of the next generation, and contribution to society. The main forms include physical, psychological, social, and financial well-being (Zemtsov & Osipova, 2016). Financial well-being is a condition that enables people to meet their financial obligations, feel secure in the present and the future, and make choices that allow them to enjoy life (Comerton-Forde et al., 2018, p. 6; 2022, p 137). Low financial well-being can undermine psychological, social, and physical health and may lead to poor efficiency, short-term mistakes, low productivity, and difficulty concentrating (Osman et al., 2018).

Financial well-being is shaped by social–affective and family relationships that guide how income and expenses are managed to maintain balance and avoid internal conflict (Rahman et al., 2021). Family structures have become more complex due to sociodemographic change. Social roles have also differed by gender: women often carry primary responsibility for childcare, the household, and family matters, while men are typically the main providers who work to meet the family’s economic needs. These role patterns influence household financial well-being. At the same time, as homemakers, women are expected to be creative and effective in managing household finances (Gonçalves et al., 2021).

This study places women at the centre of the analysis. Women have substantial potential for advancement, making their financial well-being an important topic to examine (Lawrence, 2022). West Sumatra offers a distinctive setting because it follows a matrilineal kinship system that traces descent through the mother. This sociocultural system places significant responsibilities on women to manage personal and family assets and make economic decisions.

Achieving financial well-being requires the ability to handle financial problems, cope with setbacks, and reach milestones and financial autonomy. Financial management encompasses planning, implementation, monitoring, evaluation, and control of income and its use to maximise financial well-being (She et al., 2024). Individuals who manage their finances well tend to avoid future difficulties and show healthy financial behaviour by setting priorities between needs and wants. A comprehensive view of financial well-being combines control over finances, financial resilience and security, and financial freedom, all of which guide decision-making toward financial goals (García & Félix, 2022).

Sound financial decisions require adequate money-management skills supported by financial literacy, healthy financial behaviour, and prudent spending habits. Together, these factors

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help prevent problems and support financial well-being (Fan & Henager, 2025). Financial literacy is the understanding of financial concepts and their application in daily life, including the ability to make decisions and recognise the risks associated with those decisions (Faturuhman et al., 2024). With advances in information technology, conventional financial literacy needs to be strengthened by digital capabilities.

Rapid developments in information technology have transformed finance. The rise of financial technology has changed how people plan, spend, borrow, and invest (Rahayu et al., 2022). In this environment, users need digital financial literacy, which covers knowledge of digital financial products and services, awareness of digital financial risks, knowledge of digital risk controls, and knowledge of consumer rights and redress procedures (Panos & Wilson, 2020; Morgan & Trinh, 2019; Liew et al., 2020). FinTech offers speed, cost savings, and convenience (Frame et al., 2018), but it can also trigger impulsive and consumptive behaviour that harms financial stability (Panos & Wilson, 2020). Limited knowledge can lead to product choices that do not fit needs. Such behaviour is more likely when individuals make decisions independently without guidance from parents or partners, which can lower financial well-being (Gantulga & Dashrentsen, 2023; Ahmadova & Nabiyeva, 2023). Impulsivity is the tendency to decide spontaneously without careful consideration, often ignoring long-term consequences (Frigerio et al., 2020). Self-efficacy helps regulate impulsivity and supports effective financial management; individuals with higher self-efficacy tend to show better self-control and make wiser financial decisions (Dare et al., 2023)

Prudent and responsible decisions reduce dependence on others and support financial autonomy, understood as the capacity to meet financial needs independently without relying on family members, partners, or institutions (Botha et al., 2021). Greater autonomy can empower individuals to make wiser choices and improve financial well-being (Siegfried & Wuttke, 2021). Good financial behaviour reflects rational decision-making, risk management, and commitment to long-term goals (Respati et al., 2023; Sajid et al., 2024). Conversely, impulsive spending and unhealthy debt management can disrupt financial stability and reduce financial well-being (Morris et al., 2022).

This study examines how financial literacy, digital financial literacy, impulsivity, self-efficacy, and financial autonomy relate to financial well-being among women in West Sumatra, with financial behaviour as a mediating variable. The focus on women is urgent because rapid digitalisation expands both opportunities and risks for female financial decision-makers, especially in contexts where women hold formal responsibilities in asset management. The research gap lies in the limited evidence that integrates digital capabilities and psychological factors with financial autonomy to explain women's financial well-being in Indonesia, particularly in a matrilineal setting. The novelty of this study is an integrated,

women-centred model that connects literacy, digital literacy, self-efficacy, impulsivity, autonomy, and behaviour to financial well-being in West Sumatra, offering context-specific insights that can inform strategies aligned with the Sustainable Development Goals on no poverty, good health and well-being, and reduced inequalities by 2030.

## THEORETICAL FRAMEWORK

This review is anchored in the Theory of Planned Behaviour, which states that behaviour is shaped by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). In our context, financial behaviour is the mechanism that connects what people know and believe with what they actually do, and it is expected to be a direct driver of financial well-being. Financial literacy and digital financial literacy provide knowledge and skills that help form favourable attitudes and strengthen perceived control in both conventional and digital settings (Sajid et al., 2024; Rahman et al., 2021; Setiawan et al., 2022; Prasad et al., 2018; Morgan & Trinh, 2019; Panos & Wilson, 2020; Liew et al., 2020). Self-efficacy is a person's belief in their capacity to organise and execute financial actions and is a core element of perceived control (Bandura, 1991; Tambunan et al., 2024). Financial autonomy reflects the ability to decide and act independently in managing resources and is another source of perceived control that supports responsible choices (Botha et al., 2021). Impulsivity operates in the opposite direction: quick decisions without careful consideration weaken control and lead to choices that do not serve long-term interests (Frigerio et al., 2020; Kumar et al., 2023).

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Financial well-being is understood as a condition in which people can meet obligations, feel secure now and in the future, and make choices that allow them to enjoy life (Comerton-Forde et al., 2018, p. 6; 2022, p. 137). In a rapidly digitalising economy, the pathway from knowledge to well-being increasingly runs through digital channels of saving, spending, borrowing, and investing (Rahayu et al., 2022). For this reason, digital financial literacy is a key capability that shapes behaviour and outcomes. At the same time, psychological factors such as self-efficacy and impulsivity, and structural factors such as financial autonomy, determine whether knowledge is translated into regular saving, careful budgeting, and prudent debt management. These behaviours are the practical steps that improve stability and support well-being, especially for those with limited resources (Rahman et al., 2021; Respati et al., 2023).

The study focuses on women in West Sumatra, a matrilineal society where women hold important roles in asset management and household economic decisions. This setting heightens the relevance of autonomy, capability, and behaviour to women's financial well-being and addresses a gap in the Indonesian evidence base that rarely analyses women as the primary unit in such contexts (Lawrence, 2022; Morgan & Trinh, 2019; Panos & Wilson,

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2020). Guided by this framework, the next subsections review the literature for each construct, explain the expected relationships with financial behaviour and financial well-being, and state the hypotheses that the empirical model will test.

### *Financial Literacy, Financial Behaviour, and Financial Well-being*

This study draws on the Theory of Planned Behaviour (Ajzen, 1991), in which financial literacy provides the knowledge and skills that shape attitudes and strengthen perceived control, thereby guiding financial behaviour (Sajid et al., 2024; Rahman et al., 2021). Empirical work consistently links higher literacy with better budgeting and lower consumer debt (Ramalho & Forte, 2019), stronger day-to-day money management and access to digital services that support long-term planning (She et al., 2024; Yang et al., 2023), healthier saving, debt management, and planning habits (Setiyani & Solichatun, 2019; Sajuyigbe et al., 2024; Yogantara et al., 2025), and even higher risk tolerance that encourages prudent action (Faturohman et al., 2024; Rahayu et al., 2023). Knowledge translates into outcomes through behaviour: literacy fosters planning and saving that raise well-being (Faturohman et al., 2024; Yeo et al., 2023), and its effect on well-being is strongest when appropriate behaviours are in place (Megananda & Faturohman, 2022; Mousavi & Rasaeimanesh, 2023). In a matrilineal setting, these mechanisms are expected to be salient among women who manage household assets and decisions.

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H1: Financial literacy has a significant effect on financial behaviour.

H7: Financial literacy has a significant effect on financial well-being through financial behaviour.

### Digital Financial Literacy, Financial Behaviour, and Financial Well-being

Within the TPB, digital financial literacy acts as a catalyst for attitudes, norms, and perceived control in digital settings. It extends conventional knowledge to the ability to navigate digital products and services (Setiawan et al., 2022). DFL improves decision quality in the digital ecosystem (Prasad et al., 2018; Rahayu et al., 2026), shapes adoption of tools such as BNPL when users understand features, benefits, and risks (Juita et al., 2023), and is associated with better saving, spending, and investing behaviour (Setiawan et al., 2022; Rahayu et al., 2022; Aryan et al., 2024). Effects may be nonlinear for some youth who struggle to control digital use (Ali et al., 2024). Most evidence, however, supports DFL as a prerequisite for healthy financial behaviour. Behaviour mediates the link to well-being: DFL strengthens prudent money management that improves well-being (Megananda & Faturohman, 2022), and behaviours such as awareness, saving, and investing have direct effects on well-being, including among women (Chavali et al., 2021; Sabri et al., 2022). High DFL builds favourable attitudes and perceived control that encourage the wise use of digital saving and investing, thereby enhancing well-being (Bushra & Mir, 2024; Morgan & Trinh, 2019; Panos

& Wilson, 2020; Liew et al., 2020). In West Sumatra, strengthening DFL is especially important for women who hold key financial roles.

H2: Digital financial literacy has a significant effect on financial behaviour.

H8: Digital financial literacy has a significant effect on financial well-being through financial behaviour.

#### *Impulsivity, Financial Behaviour, and Financial Well-being*

In TPB terms, impulsivity weakens attitudes and perceived control, leading to quick decisions without careful consideration. Impulsive tendencies produce less rational choices and unplanned spending (Kumar et al., 2023; Frigerio et al., 2020; Muller et al., 2021), failure to save (Fenton-O’Creevy & Furnham, 2022), and suboptimal choices captured by hyperbolic discounting (Katauke et al., 2023). These effects can persist even when literacy is adequate (Kumar et al., 2023b) and are a driver of overindebtedness (Frigerio et al., 2020). Poor behaviour is the main pathway from impulsivity to lower well-being, including uncontrolled spending and debt accumulation (Jalees et al., 2024; Pupelis & Šeinauskienė, 2023; Kumar et al., 2023). Given women’s central role in household finances in a matrilineal context, mitigating impulsive tendencies is crucial for their financial stability.

H3: Impulsivity has a significant effect on financial behaviour.

H9: Impulsivity has a significant effect on financial well-being through financial behaviour

#### *Financial Self-Efficacy, Financial Behaviour, and Financial Well-Being*

Perceived behavioural control in TPB aligns with financial self-efficacy, namely one’s belief in the ability to organise and execute financial actions toward set goals (Bandura, 1991; Tambunan et al., 2024). Self-efficacy supports rational decision-making and better money management among student entrepreneurs (Radianto & Pramudita, 2024) and predicts behaviour related to debt management and planning, sometimes more strongly than literacy or problem-solving skills (Chong et al., 2021). It is linked to saving (Dare et al., 2023) and to women’s investment management and overall financial behaviour (Farrell et al., 2016). Some youth samples show weaker effects, likely due to parental dependence or limited experience (Pramedi & Asandimitra, 2021; Nisa & Haryono, 2022). Self-efficacy also supports well-being by motivating saving and investing (Dewi, 2022) and by improving behaviour that raises well-being (Arquero et al., 2024; Faturrohman et al., 2024). These mechanisms are tested among women in West Sumatra.

H4: Financial self-efficacy has a significant effect on financial behaviour.

H10: Financial self-efficacy has a significant effect on financial well-being through financial behaviour.

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### *Financial Autonomy, Financial Behaviour, and Financial Well-being*

Financial autonomy strengthens perceived control by enabling independent decision making and resource management, including planning, investing, and risk management (Ajzen, 1991; Botha et al., 2021; Kumar et al., 2023). Greater autonomy improves positive financial behaviour among adolescents (S. Jariwala, 2020) and empowers women to make household saving and investment decisions (Nisar et al., 2022). Evidence shows that autonomy enhances women's capacity for resource management across settings (Bennett & Sung, 2013; Thankian, 2020), though education and access to resources are important supports. Autonomy raises well-being directly through more rational choices (Kumar et al., 2023) and indirectly by motivating healthy behaviour such as saving and avoiding excessive debt (Jariwala & Dziegielewska, 2017). Financial literacy can further strengthen autonomy and behaviour, improving well-being (Kochar et al., 2022; Aguiar & Zagalaz, 2022). In a matrilineal society, women's autonomy is expected to be a central lever for well-being.

H5: Financial autonomy has a significant effect on financial behaviour.

H11: Financial autonomy has a significant effect on financial well-being through financial behaviour.

### *Financial Behaviour and Financial Well-being*

10 Financial behaviour refers to the actions, decisions, and habits used to manage financial resources (Statman, 2008; Sufyati & Lestari, 2022). In the TPB, positive behaviours such as planning, budgeting, and prudent debt management translate beliefs and perceived control into outcomes and are thus central to well-being (Sajuyigbe et al., 2020). Evidence shows that responsible behaviour is a primary driver of well-being, especially for lower-income groups who depend on carefully balancing income and expenses (Rahman et al., 2021; Respati et al., 2023). Saving and spending control improve long-term (Younas, 2019), while budgeting and responsible debt management are linked to both well-being and life satisfaction (Mousavi & Rasaeimanesh, 2023; Oquaye et al., 2022). Behaviour also mediates the effects of literacy on well-being by converting knowledge into concrete practices and outcomes; financial education strengthens these behaviours and, through them, well-being (Megananda & Faturohman, 2022; Chong et al., 2021; Johan et al., 2021). For women in West Sumatra, these behaviours are the operational channel through which capabilities and autonomy translate into financial well-being.

H6: Financial behaviour has a significant effect on financial well-being.

## METHODOLOGY

This study employs a quantitative design, using primary data gathered through an online questionnaire administered via Google Forms and distributed via individual networks, WhatsApp groups, Instagram, and among colleagues. All items were rated on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), consistent with the use of Likert scales to measure attitudes, opinions, and perceptions (Sugiyono, 2018). The target population is women residing in West Sumatra. The sample consists of women who meet two criteria, namely residence in West Sumatra and productive age between 15 and 64 years. A non-probability purposive sampling technique was used to reach respondents who satisfied these criteria. The minimum required sample size was determined using Slovin's formula, with  $N = 2,856,900$  and a 5 per cent margin of error, yielding about 400 respondents (Sugiyono, 2018). The survey received 422 initial responses. After screening for eligibility and completeness, 405 valid cases remained for analysis. Data were first organised in Microsoft Excel, descriptive statistics were produced in SPSS 26.0, and the main analysis used partial least squares structural equation modelling in SmartPLS 4.2.9 to test the conceptual model and hypotheses.

Several constructs in the model are multidimensional, so the study specifies a hierarchical component model and estimates it with a two-stage approach (Hair et al., 2021). In the first stage, first-order constructs are estimated and assessed for measurement quality using indicator loadings, composite reliability, and convergent validity (average variance extracted), as well as discriminant validity based on the Fornell–Larcker criterion and cross-loadings (Fornell & Bookstein, 1982; Hair et al., 2021). In the second stage, latent scores from the first-order constructs serve as indicators of the higher-order constructs, which improves model stability and interpretability for complex structures.

Measures were adapted from established sources. Financial well-being follows Kumar et al (2023) and is modelled with two dimensions, financial security and financial stress, capturing the ability to meet needs, plan for the future and emergencies, and the perceived strain from debt or income instability. Financial literacy follows Rahman et al. (2021) across basic knowledge, saving, borrowing, investing, and insurance. Digital financial literacy draws on Kumar et al, (2023) and covers knowledge of fintech products, awareness of fintech risks, knowledge of digital risk controls, and understanding of consumer rights and redress. Financial self-efficacy, as defined by Megananda and Faturohman (2022), includes confidence in planning expenditures, managing money, handling financial challenges, and beliefs about future financial conditions. Impulsivity refers to Powell et al (2023) and includes spontaneity, limited attention to consequences, and a tendency toward hasty

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purchases. Financial autonomy, according to Jariwala (2020), comprises reflective, emotional, and functional autonomy, encompassing independent financial decision-making and execution. Financial behaviour adapts Dare et al. (2023), and includes daily money management, long-term planning, risk planning, and saving and investing practices. All items were measured on the same five-point Likert scale.

The structural model was evaluated after confirming acceptable measurement quality. Collinearity diagnostics were checked, path coefficients and explained variance were estimated, and statistical significance was assessed using nonparametric bootstrapping in SmartPLS. Indirect effects were tested to assess the mediating role of financial behaviour between the capability and psychological constructs and financial well-being as specified in the conceptual framework (Hair et al., 2021). Participation was voluntary and anonymous, informed consent was obtained before the survey, and only the final screened sample of 405 respondents was used in the analysis.

## ANALYSIS AND RESULT

### *Respondent Profile*

12 Below is the profile of the respondents by age, city of residence, residential status, educational level, occupation, marital status, average income, and spending.

**Table 1**  
**Respondent Profiles**

Category	Frequency	%
<b>Age</b>		
15–19 years	63	15.56
20–29 years	257	63.46
30–39 years	44	10.86
40–49 years	21	5.19
50–59 years	17	4.20
> 60 years	3	0.74
<b>Regency/City of Residence</b>		
Mentawai Islands Regency	12	2.96
Pesisir Selatan Regency	14	3.46
Solok Regency	11	2.72
Sijunjung Regency	8	1.98
Tanah Datar Regency	12	2.96
Padang Pariaman Regency	11	2.72
Lima Puluh Kota Regency	10	2.47
Pasaman Regency	15	3.70
South Solok Regency	3	0.74
Dharmasraya Regency	11	2.72

Category	Frequency	%
West Pasaman Regency	13	3.21
Agam Regency	19	4.69
Padang City	212	52.35
Solok City	8	1.98
Sawahlunto City	8	1.98
Padang Panjang City	7	1.73
Bukittinggi City	13	3.21
Payakumbuh City	7	1.73
Pariaman City	11	2.72
<b>Residential Status</b>		
Parents' home	201	49.63
Own home	84	20.74
Relatives' home	31	7.69
Rented house	29	7.16
Boarding/Hostel	60	14.81
<b>Educational Level</b>		
Primary school (SD)	0	0.00
Junior high school (SMP)	4	0.99
Senior high school / Vocational HS (SMA/SMK)	140	34.57
Diploma I/II/III	45	11.11
Bachelor's / Diploma IV	180	44.44
Master's (S2)	34	8.40
Doctoral (S3)	2	0.49
<b>Occupation</b>		
Student	135	33.33
Civil servant / SOE employee	61	15.06
Entrepreneur	51	12.59
Private-sector employee	99	24.44
Contract employee	15	3.70
Not employed	44	10.86
<b>Marital Status</b>		
Married	113	27.90
Never married	288	71.11
Divorced	4	0.99
<b>Average Monthly Income</b>		
< Rp 2,000,000	159	39.26
Rp 2,000,000 – Rp 4,000,000	86	21.23
Rp 4,000,000 – Rp 6,000,000	80	19.75
Rp 6,000,000 – Rp 10,000,000	61	15.06
Rp 10,000,000 – Rp 15,000,000	11	2.72
> Rp 15,000,000	8	1.98
<b>Average Monthly Expenditure</b>		

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Category	Frequency	%
< Rp 2,000,000	183	45.19
Rp 2,000,000 – Rp 4,000,000	134	33.09
Rp 4,000,000 – Rp 6,000,000	65	16.05
Rp 6,000,000 – Rp 10,000,000	19	4.69
Rp 10,000,000 – Rp 15,000,000	2	0.49
> Rp 15,000,000	2	0.49

Source: Own elaboration.

The study analysed 405 women residing in West Sumatra. Nearly four in five respondents were young adults: 15–19 years (15.50%) and 20–29 years (63.45%), followed by 30–39 years (10.86%), 40–49 years (5.18%), 50–59 years (4.19%), and above 60 years (0.74%). More than half lived in Padang City (52.35%), with the remainder distributed across other cities and regencies, including Agam (4.69%), Pesisir Selatan (3.46%), West Pasaman (3.21%), Pasaman (3.70%), and smaller shares elsewhere. Almost half lived with their parents (49.63%), while 20.74% owned their homes, 14.81% lived in boarding/hostel accommodation, 7.65% lived with relatives, and 7.16% rented houses (Table 1).

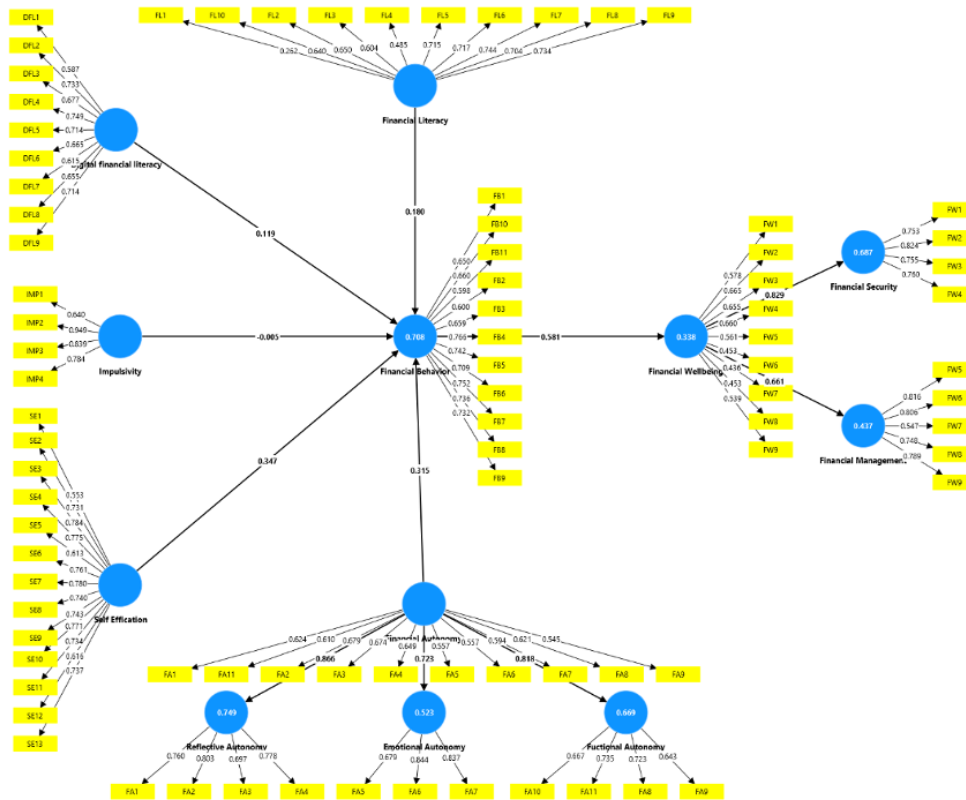
Educational attainment was relatively high: 44.44% held a bachelor's or diploma IV degree, 8.40% a master's degree, and 0.49% a doctoral degree; an additional 11.11% completed diploma I–III, 34.57% finished senior/vocational high school, and fewer than 1% reported junior high school as their highest level. In terms of occupation, 33.33% were students, 24.44% private-sector employees, 15.06% civil servant employees, 12.59% entrepreneurs, 3.70% contract employees, and 10.86% not employed. Most respondents were never married (71.11%), while 27.90% were married and 0.99% divorced.

Monthly income clustered at lower to middle brackets: 39.26% earned less than Rp 2,000,000, 21.23% earned Rp 2,000,000–Rp 4,000,000, 19.75% Rp 4,000,000–Rp 6,000,000, and 15.06% Rp 6,000,000–Rp 10,000,000; only 4.70% reported income above Rp 10,000,000. Expenditures showed a similar pattern, with 45.19% spending less than Rp 2,000,000 and 33.09% spending Rp 2,000,000–Rp 4,000,000 per month. Overall, the sample is predominantly young, urban, and relatively well-educated, with incomes and spending concentrated in lower to middle ranges—an appropriate profile for examining women's financial behaviour and well-being in a digitalising context.

### ***Outer model (first order)***

Convergent validity was assessed via outer loadings  $\geq 0.50$  (Hair et al., 2021). Two indicators were below the threshold: FL1 (0.262) and FL4 (0.485) (Figure 1). These were then removed from the model.

Figure 1  
Initial Outer Model

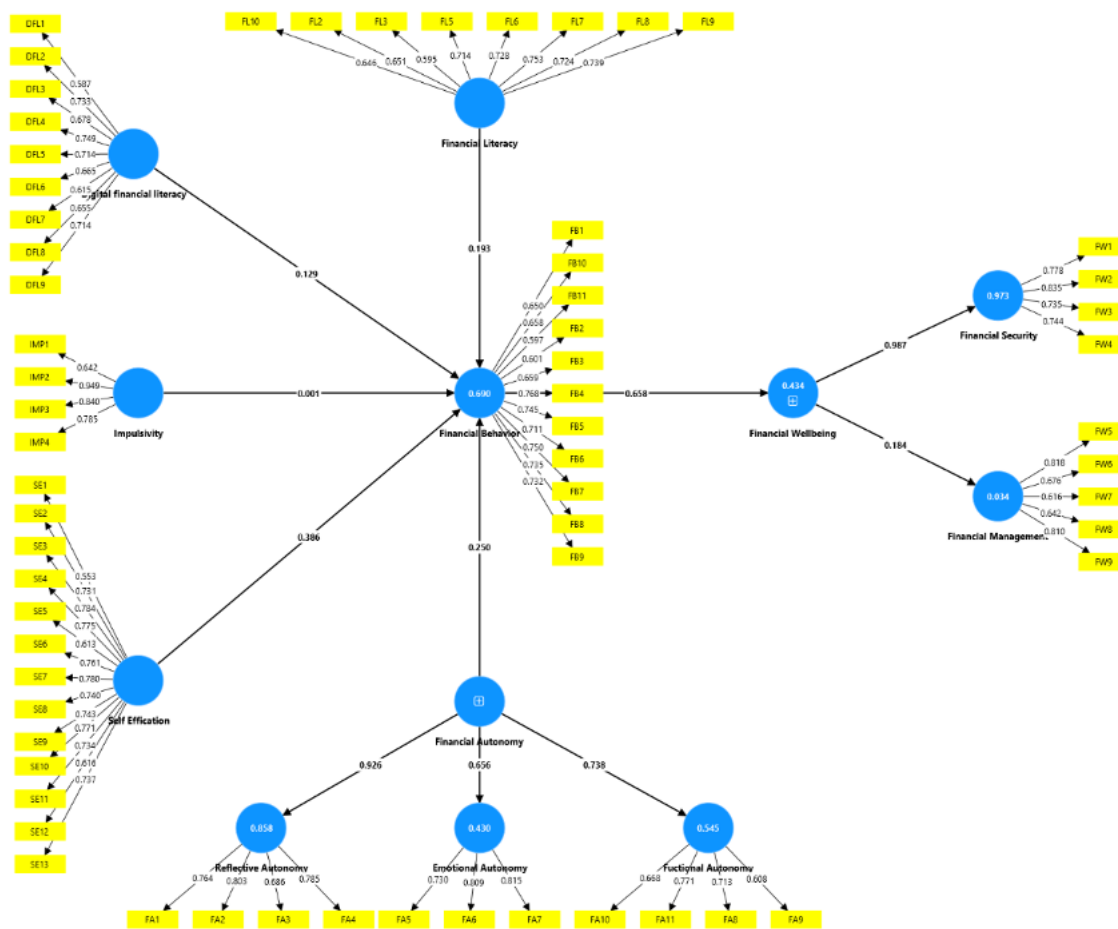


Source: Own elaboration.

After re-estimation, all retained indicators loaded  $\geq 0.50$  (see Figure 2; final loadings in Table 1).

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**Figure 2**  
**Final Outer Model**



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Source: Own elaboration.

**Table 2**  
**Recapitulation of the validity and reliability test**

Variable	Dimension	Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Financial Autonomy	Reflective Autonomy	FA1	0,764	0,756	0,846	0,579
		FA2	0,803			
		FA3	0,686			
		FA4	0,785			
	Emotional Autonomy	FA5	0,730	0,692	0,828	0,617
		FA6	0,809			
		FA7	0,815			
	Functional Autonomy	FA8	0,713	0,640	0,785	0,480
		FA9	0,608			
		FA10	0,668			
		FA11	0,771			
Financial Well-being	Financial Security	FW1	0,778	0,776	0,856	0,599
		FW2	0,835			
		FW3	0,735			
		FW4	0,744			
	Financial Management	FW5	0,818	0,796	0,840	0,515
		FW6	0,676			
		FW7	0,616			
		FW8	0,642			
		FW9	0,810			

Source: Own elaboration.

*Average Variance Extracted (AVE) (first order)*

Convergent validity was further evaluated using composite reliability ( $CR \geq 0.60$ ; Ghozali & Latan, 2020) and AVE ( $AVE \geq 0.40$ ; Huang et al., 2013). Across dimensions, CR exceeded 0.60, and AVE exceeded 0.40 (Table 2), indicating acceptable convergent validity—particularly appropriate for complex, hierarchical constructs when CR is adequate.

*Discriminant validity (first order)*

Discriminant validity met the HTMT criterion ( $< 0.90$ ). Most HTMT values were  $< 0.85$  (Table 3), indicating that constructs are empirically distinct and non-overlapping”.

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**Table 3**  
**Heterotrait Monotrait (HTMT)**

	Emotional Autonomy	Financial Management	Financial Security	Functional Autonomy	Reflective Autonomy
Emotional Autonomy					
Financial Management	0.315				
Financial Security	0.647	0.187			
Functional Autonomy	0.693	0.237	0.639		
Reflective Autonomy	0.540	0.188	0.438	0.855	

Source: Own elaboration.

### *Reliability (first order)*

Composite reliability ranged from 0.785 to 0.856 and Cronbach's alpha from 0.640 to 0.796, all above the recommended minimum (Hair et al., 2021), confirming that the first-order measures are reliable. Overall, the first-order measurement model satisfies standard criteria for indicator quality, convergent validity, discriminant validity, and reliability, and is suitable for subsequent higher-order and structural analyses.

### 18 *Outer model (second order).*

We estimated a hierarchical component model using the two-stage approach. After removing two weak first-order indicators in the preliminary step (see Figure 1), all retained second-order indicators met the loading criterion (outer loadings  $\geq 0.50$ ; Hair et al., 2021). As reported in Table 4, internal consistency and convergent validity are satisfactory: Cronbach's alpha ranges from 0.739 to 0.922 and composite reliability (CR) from 0.678 to 0.933, both above recommended minima ( $\geq 0.60$ ). Average variance extracted (AVE) falls between 0.463 and 0.659. Although Financial Literacy (AVE = 0.484) and Digital Financial Literacy (AVE = 0.463) are slightly below 0.50, their AVE values exceed 0.40, and both constructs show adequate CR; under complex higher-order specifications, this is acceptable (Huang et al., 2013; Hair et al., 2021). Discriminant validity is supported: all HTMT ratios are  $< 0.90$  (most  $< 0.85$ ), indicating empirically distinct constructs (Table 4). Collinearity diagnostics do not indicate concern: inner-model VIFs for the structural paths range from 1.000 to 3.177 (Table 5), well below conventional thresholds.

**Table 4**  
**Recapitulation of the validity and reliability test (Second order)**

Variable	Indicator	Factor loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Financial Literacy	FL2	0,651	0.846	0,882	0,484
	FL3	0,595			
	FL5	0,714			
	FL6	0,728			
	FL7	0,753			
	FL8	0,724			
	FL9	0,739			
	FL10	0,646			
Digital Financial Literacy	DFL1	0,587	0.855	0,885	0,463
	DFL2	0,733			
	DFL3	0,677			
	DFL4	0,749			
	DFL5	0,714			
	DFL6	0,665			
	DFL7	0,615			
	DFL8	0,655			
	DFL9	0,714			
Impulsivity	IMP1	0,642	0.882	0,928	0,659
	IMP2	0,949			
	IMP3	0,840			
	IMP4	0,785			
Self-Efficacy	SE1	0,553	0.922	0,933	0,521
	SE2	0,731			
	SE3	0,784			
	SE4	0,775			
	SE5	0,613			
	SE6	0,761			
	SE7	0,780			
	SE8	0,740			
	SE9	0,743			
	SE10	0,771			
	SE11	0,734			
	SE12	0,616			
	SE13	0,737			
Financial Autonomy	RA	0,812	0.739	0,852	0,658
	EA	0,752			
	FA	0,866			
Financial Behavior	FB1	0,650	0.891	0,910	0,481
	FB2	0,601			
	FB3	0,659			
	FB4	0,767			
	FB5	0,745			
	FB6	0,710			
	FB7	0,751			
	FB8	0,734			
	FB9	0,732			
	FB10	0,658			
	FB11	0,598			
Financial Well-being	FM	0,698	0.795	0,678	0,553
	FS	0,974			

Source: Own elaboration.

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### *Structural model (inner model)*

We assessed the inner model with bias-corrected bootstrapping (two-tailed, 5,000 resamples), reporting path coefficients ( $\beta$ ), t-values, p-values, and 95% confidence intervals for all direct and indirect effects. Effect sizes ( $f^2$ ) were computed to gauge the substantive impact of each predictor, and predictive relevance ( $Q^2$ ) was examined via blindfolding; we also inspected out-of-sample predictive power using PLSpredict. The model explains substantial variance in Financial Behaviour ( $R^2 = 0.715$ ;  $R^2_{\text{adjusted}} = 0.712$ ) and moderate variance in Financial Well-being ( $R^2 = 0.430$ ;  $R^2_{\text{adjusted}} = 0.429$ ), aligning with benchmarks for strong, moderate, and weak explanatory power (Ghozali, 2021). Mediation was tested through bootstrapped indirect effects with confidence intervals and variance accounted for (VAF), following current PLS-SEM recommendations. Model fit indices (e.g., SRMR, d\_ULS, d\_G, NFI, RMS\_theta) were inspected to complement the PLS-SEM evaluation and are available upon request. Potential common-method bias was addressed procedurally (anonymity, randomised item order) and diagnostically (e.g., full-collinearity VIF and Harman's single-factor check), with no indications of a substantive threat.

**Table 5**  
**Path Coefficient Result**

	Original sample (O)	T statistics ( O/STDEV )	P values
Financial Literacy -> Financial Behaviour	0,176	3,363	0,000
Digital financial literacy -> Financial Behaviour	0,122	2,554	0,011
Impulsivity -> Financial Behaviour	-0,012	0,343	0,732
Self-Efficacy -> Financial Behaviour	0,321	6,077	0,001
Financial Autonomy -> Financial Behaviour	0,345	7,403	0,000
Financial Behaviour -> Financial Well-being	0,656	18,630	0,000
Financial Literacy -> Financial Behaviour -> Financial Well-being	0,116	3,202	0,001
Digital financial literacy -> Financial Behaviour -> Financial Well-being	0,080	2,601	0,009
Impulsivity -> Financial Behaviour -> Financial Well-being	-0,008	0,343	0,732
Self-Efficacy -> Financial Behaviour -> Financial Well-being	0,211	5,389	0,000
Financial Autonomy -> Financial Behaviour -> Financial Well-being	0,226	6,884	0,000

Source: Own elaboration.

Table 5 reports standardised coefficients, t-statistics, and p-values from bias-corrected bootstrapping. Financial Behaviour shows a strong and statistically significant effect on Financial Well-being ( $\beta = 0.656$ ,  $t = 18.630$ ,  $p < 0.001$ ). This confirms the central role of Financial Behaviour as the transmission channel to well-being in the specified model.

Among the antecedents of Financial Behaviour, Financial Autonomy is the strongest predictor ( $\beta = 0.345$ ,  $t = 7.403$ ,  $p < 0.001$ ), closely followed by Self-Efficacy ( $\beta = 0.321$ ,  $t = 6.077$ ,  $p = 0.001$ ). Financial Literacy also exerts a positive effect of smaller magnitude ( $\beta = 0.176$ ,  $t = 3.363$ ,  $p < 0.001$ ), as does Digital Financial Literacy ( $\beta = 0.122$ ,  $t = 2.554$ ,  $p = 0.011$ ). Impulsivity is not related to Financial Behaviour in this sample ( $\beta = -0.012$ ,  $t = 0.343$ ,  $p = 0.732$ ). Substantively, a one-standard-deviation increase in autonomy or self-efficacy is associated with about one-third of a standard deviation increase in prudent financial behaviour, while literacy-based capabilities have smaller but significant associations.

The indirect effects from the capability and psychological constructs to Financial Well-being through Financial Behaviour are significant for Financial Literacy ( $\beta_{\text{ind}} = 0.116$ ,  $t = 3.202$ ,  $p = 0.001$ ), Digital Financial Literacy ( $\beta_{\text{ind}} = 0.080$ ,  $t = 2.601$ ,  $p = 0.009$ ), Self Efficacy ( $\beta_{\text{ind}} = 0.211$ ,  $t = 5.389$ ,  $p < 0.001$ ), and Financial Autonomy ( $\beta_{\text{ind}} = 0.226$ ,  $t = 6.884$ ,  $p < 0.001$ ). The indirect effect of Impulsivity is not significant ( $\beta_{\text{ind}} = -0.008$ ,  $t = 0.343$ ,  $p = 0.732$ ). Because the model specifies no direct paths from these antecedents to well-being, their total effects on well-being operate entirely through Financial Behaviour. Overall, the pattern of results aligns with the Theory of Planned Behaviour: perceived control and decision authority, complemented by financial and digital knowledge, translate into healthier financial actions, which in turn improve financial well-being.

## DISCUSSION

### *Financial Literacy, Financial Behaviour, and Financial Well-being*

H1 is supported. Financial literacy is positively related to financial behaviour ( $\beta = 0.176$ ,  $t = 3.363$ ,  $p < 0.001$ ), indicating that greater financial knowledge is associated with more deliberate budgeting, spending control, and planning even after other determinants are included (Ramalho & Forte, 2019; Sabri et al., 2023; She et al., 2024). H7 is also supported. The indirect effect from financial literacy to financial well-being through financial behaviour is significant ( $\beta_{\text{ind}} = 0.116$ ,  $t = 3.202$ ,  $p = 0.001$ ), confirming that literacy improves well-being primarily when it is converted into concrete actions such as preparing a budget, keeping expenditures within targets, saving regularly, and planning for contingencies (Faturohman et al., 2024; Mousavi & Rasaeimanesh, 2023; Sabri et al., 2023; Megananda & Faturohman, 2022). This mechanism accords with the Theory of Planned Behaviour, in which literacy strengthens attitudes and perceived control, and behaviour delivers outcomes (Ajzen, 1991). In this sample of women who are relatively well educated but concentrated in lower to middle income brackets, literacy appears to help convert scarce resources into protective choices that stabilise finances. The literacy coefficient is smaller than that for autonomy and self-efficacy, suggesting that capability building should be paired with confidence and decision authority to shift daily actions. Mixed findings in prior work likely reflect contextual constraints: some

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studies do not find a significant literacy to behaviour link (Gunawan & Chairani, 2019; Pratama, 2024), while others highlight external limits such as income, access to financial services, and infrastructure that condition whether knowledge can be acted upon (Budastra et al., 2022). Overall, financial literacy functions as an enabling condition whose value for well-being depends on its conversion into regular, disciplined behaviour within the opportunities and constraints women face.

### *Digital Financial Literacy, Financial Behaviour, and Financial Well-being*

H2 is supported. Digital financial literacy is positively and significantly associated with financial behaviour ( $\beta = 0.122$ ,  $t = 2.554$ ,  $p = 0.011$ ), indicating that stronger digital knowledge and skills relate to more disciplined budgeting, spending, and planning in digital contexts (Rahayu et al., 2022; Respati et al., 2023; Setiawan et al., 2022). In the Theory of Planned Behaviour perspective, digital literacy fosters favourable attitudes toward financial technologies and strengthens perceived behavioural control, which supports intentions to use tools for budgeting, saving, and investing (Ajzen, 1991). The respondent profile helps explain this effect: many are young, well-educated women, often aged 20 to 29, living in Padang City with adequate digital infrastructure and a matrilineal context that assigns women central roles in household finance. These conditions facilitate the translation of digital knowledge into routine use of banking applications, digital payments, and online investments. H8 is also supported. The indirect effect from digital financial literacy to financial well-being via financial behaviour is significant ( $\beta_{\text{ind}} = 0.080$ ,  $t = 2.601$ ,  $p = 0.009$ ). Digital literacy does not raise well-being on its own; it operates through concrete actions such as consistent saving, planned investing, and disciplined use of credit. Prior research reaches the same conclusion, emphasising the safe and informed use of digital products and cybersecurity practices such as strong passwords and two-factor authentication (Abdallah et al., 2025; Aryan et al., 2024; Bushra & Mir, 2024; Kumar et al., 2023). Taken together, digital financial literacy is an enabling capability that supports healthier behaviour and, through that channel, improves financial well-being.

### *Impulsivity, Financial Behaviour, and Financial Well-being*

Surprisingly, H3 and H9 are not supported. The direct path from impulsivity to financial behaviour is insignificant ( $t = 0.343$ ,  $p = 0.732$ ), and the indirect path to financial well-being via behaviour is likewise insignificant. Thus, impulsivity shows no detectable association with day-to-day financial actions in this sample, nor does it translate into well-being, despite descriptive indications of moderate-to-high impulsivity. A plausible explanation lies in the respondent profile: most participants are young, well-educated women in an urban setting, conditions that favour deliberation and planning. Education and the practical demands of city living likely provide cognitive and institutional brakes that temper impulsive urges. Within the Theory of Planned Behaviour, these factors strengthen attitudes and perceived control so that transient impulses do not materialise into behaviour (Ajzen, 1991). The null results are

consistent with studies reporting limited effects of impulsivity once financial knowledge and self-regulation are considered (Kumar et al., 2023; Mustikasari and Septina, 2023) and with evidence that impulsivity may not influence well-being through behaviour in certain contexts (Tahir et al., 2021). Other work finds the opposite—impulsivity predicting unplanned spending and over indebtedness, and impatience predicting suboptimal choices (Frigerio et al., 2020; Hastings & Mitchell, 2020; Katauke et al., 2023; Ottaviani & Vandone, 2018), suggesting strong context dependence. Substantively, capabilities and decision authority appear to dominate behaviour formation here, while impulsive tendencies add little explanatory power. Future work should test moderation by education, digital financial literacy, self-efficacy, and autonomy, and consider multi-group or longitudinal designs.

#### *Financial Self-Efficacy, Financial Behaviour, and Financial Well-Being*

H4 is supported. Self-efficacy has a positive and significant effect on financial behaviour ( $\beta = 0.321$ ,  $t = 6.077$ ,  $p = 0.001$ ), indicating that stronger confidence in one's ability to manage money is associated with more consistent budgeting, spending control, saving, and planning. H10 is also supported. The indirect effect of self-efficacy on financial well-being via financial behaviour is significant ( $\beta_{\text{ind}} = 0.211$ ,  $t = 5.389$ ,  $p < 0.001$ ), indicating that its contribution to well-being is realised through concrete daily actions. This accords with the Theory of Planned Behaviour, where self-efficacy aligns with perceived behavioural control and facilitates the translation of intentions into behaviour (Ajzen, 1991). Prior studies report similar patterns, including links to money management, saving, and women's investment behaviour, and downstream effects on well-being (Chong et al., 2021; Dare et al., 2023; Farrell et al., 2016; Faturohman et al., 2024; Handayati et al., 2023; Radianto & Pramudita, 2024). Some work finds weaker or non-significant effects where financial experience is limited, pointing to moderation by experience and literacy (Mardiana et al., 2023; Nisa & Haryono, 2022).

#### *Financial Autonomy, Financial Behaviour, and Financial Well-being*

H5 is supported. Financial autonomy exerts a positive and significant effect on financial behaviour ( $\beta = 0.345$ ,  $t = 7.403$ ,  $p < 0.001$ ) and is the largest antecedent in the model. H11 is also supported. The indirect effect from autonomy to financial well-being via financial behaviour is significant ( $\beta_{\text{ind}} = 0.226$ ,  $t = 6.884$ ,  $p < 0.001$ ), indicating that autonomy improves well-being by enabling disciplined saving, planned investing, and prudent debt management. In the Theory of Planned Behaviour, autonomy strengthens perceived control and fosters favourable attitudes toward money management, which increases intention and follow-through (Ajzen, 1991). The results align with evidence that greater decision rights and resource control are associated with wiser conduct across contexts, including among women (Botha et al., 2021; Jariwala, 2020; Thankian, 2020), and with the view that autonomy connects capabilities to optimal choices in everyday finance (Kumar et al., 2023a; Kumar et al., 2023b). Impacts can depend on the surrounding environment, as external

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conditions such as public policy, social support, and income inequality may condition the autonomy-to-well-being link.

### *Financial Behaviour and Financial Well-being*

H6 is supported. Financial behaviour has a positive and significant effect on financial well-being ( $\beta = 0.656$ ,  $t = 18.630$ ,  $p < 0.001$ ). Descriptive statistics indicate generally sound practices in the sample, with a mean of 36 for financial behaviour, a minimum of 17, a maximum of 45, and a standard deviation of 4.699, suggesting relatively consistent conduct across respondents. Substantively, budgeting, regular saving, and careful debt management create a healthier balance between income and expenditures, reduce financial stress, and strengthen security, which are central to financial well-being. The pattern is consistent with the Theory of Planned Behaviour, where favourable attitudes, supportive norms, and perceived control translate into intentions and actions that produce well-being outcomes (Ajzen, 1991). Prior studies reach similar conclusions and underscore the value of financial education and training that build sustained habits (Megananda & Faturohman, 2022; Mousavi & Rasaeimanesh, 2023; Rahman et al., 2021; Respati et al., 2023).

## CONCLUSION

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Using a second-order PLS SEM model on survey data from 405 women in West Sumatra, this study shows that financial behaviour is the primary pathway through which capabilities translate into financial well-being. The model explains a large share of variance in financial behaviour ( $R^2$  adjusted = 0.712) and a meaningful share in financial well-being ( $R^2$  adjusted = 0.429). Among the antecedents of behaviour, financial autonomy and self-efficacy exert the largest effects ( $\beta = 0.345$  and  $\beta = 0.321$ ), while financial literacy and digital financial literacy contribute with smaller yet significant coefficients ( $\beta = 0.176$  and  $\beta = 0.122$ ). Financial behaviour is strongly associated with well-being ( $\beta = 0.656$ ). Mediation tests confirm that literacy and digital literacy improve well-being primarily when converted into regular actions such as budgeting, disciplined spending, saving, and planned use of credit and investment tools. Impulsivity does not predict behaviour or well-being in this context.

The study offers three contributions. First, it advances theory by showing within the Theory of Planned Behaviour that agency-related factors, namely autonomy and self-efficacy, are stronger drivers of day-to-day financial actions than knowledge alone in a matrilineal setting. Second, it adds empirical evidence from an understudied population of women in West Sumatra and clarifies the size ordering of effects across five antecedents within one model. Third, it contributes methodologically by applying a hierarchical component model with second-order constructs and by documenting the mediated pathway from literacy and digital literacy to well-being through behaviour.

The practical implications are direct. Policies and programs should not stop at knowledge transfer. They are most effective when they combine conventional and digital literacy with interventions that build confidence and decision authority, so that women can act on what they know. For education providers, brief courses that pair budgeting and saving tasks with goal setting and progress feedback can strengthen self-efficacy. For financial institutions and fintech firms, product features that support healthy habits, clear disclosures, and basic cybersecurity practices can help users sustain prudent behaviour. For local government and community organisations, initiatives that strengthen women's control over household resources are likely to raise both sound behaviour and well-being.

Future research should strengthen causal inference and external validity. Longitudinal or experimental designs can track how changes in autonomy, self-efficacy, and literacy translate into durable behaviour and well-being. Studies should test moderation by education, digital access, bargaining power in the household, and income volatility, and conduct multi-group analyses across age bands, marital status, and urban and rural residence. Measurement can be improved by refining indicators to raise average variance extracted and by adding objective outcomes drawn from administrative or banking data. Finally, predictive assessments such as PLSpredict, mixed method designs that include qualitative interviews, and replication in other provinces will help confirm generalizability and guide targeted interventions.

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## **Driving Customer Orientation in the Precast Construction Industry: An AHP-Based Model of Internal Marketing Factors and Strategic Initiatives**

*Impulsando la orientación al cliente en la industria de la construcción prefabricada: un modelo basado en AHP de factores de marketing interno e iniciativas estratégicas*

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### **ABSTRACT**

While internal marketing has been studied extensively in customer-facing roles and service industries, there is limited evidence on its effective application in technical, non-customer-facing contexts such as construction, creating a critical gap in the literature. Addressing this, the study identifies the most influential internal factors, key actors, and strategic initiatives that drive customer-oriented behaviour in the precast concrete sector. Using the Analytic Hierarchy Process (AHP) with SuperDecisions software (version 3.2), data were collected from 14 industry experts to assess and prioritise these variables. Findings show that the organisational environment is the most dominant factor shaping internal customer orientation. The results highlight the need for firms to move beyond symbolic initiatives toward measurable, executive-supported strategies, providing a foundation for future cross-industry and cross-cultural comparisons.

**Keywords:** Customer orientation; Internal marketing; Precast construction industry; AHP (Analytic Hierarchy Process); Strategic initiatives.

Jel Code: M31, M12



### RESUMEN

Aunque el marketing interno ha sido ampliamente estudiado en funciones de atención al cliente y en industrias de servicios, existe evidencia limitada sobre su aplicación efectiva en contextos técnicos y no orientados directamente al cliente, como el de la construcción, lo que genera una brecha crítica en la literatura. Para abordar esta cuestión, el estudio identifica los factores internos más influyentes, los actores clave y las iniciativas estratégicas que impulsan el comportamiento orientado al cliente en el sector del concreto prefabricado. Mediante el Proceso de Jerarquía Analítica (AHP) con el software SuperDecisions (v3.2), se recopilieron datos de 14 expertos de la industria para evaluar y priorizar dichos elementos. Los resultados muestran que el entorno organizacional es el factor más determinante en la configuración de la orientación interna al cliente. Este estudio contribuye al amplio abordaje de la investigación sobre marketing interno en una industria y en roles poco explorados, ofreciendo un modelo estructurado y multiactor para incorporar la orientación al cliente. Los resultados resaltan la necesidad de que las empresas trasciendan las iniciativas simbólicas hacia estrategias medibles con apoyo ejecutivo, lo cual proporciona una base para futuras comparaciones interindustriales e interculturales.

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Palabras clave: Orientación al cliente; Marketing interno; Industria de la construcción prefabricada; AHP (Analytic Hierarchy Process); Iniciativas estratégicas.

Código JEL: M31, M12.

## INTRODUCTION

The Indonesian construction sector is experiencing rapid growth and transformation, driven by the government's massive infrastructure agenda and rising demand for more efficient and cost-effective construction methods (Granviewresearch, 2024). In this context, the precast concrete industry has emerged as a pivotal player, offering accelerated construction timelines, standardised quality, and scalable solutions (Mark et al., 2021). However, despite its operational advancements, the industry continues to face challenges and stagnant domestic consumption, driven by infrastructure projects and efficiency demands (Granviewresearch, 2024). This situation is related to customer satisfaction (often leads to customer loyalty), service responsiveness, and relationship quality, particularly in business-to-business (B2B) environments where project complexity is high, and coordination is essential (Afif et al., 2021; Lertputtarak & Treepob, 2023). These conditions increasingly require companies to go beyond technical excellence and develop organisational cultures centred on customer needs and value co-creation (Yashchenko et al., 2024).

To remain competitive, precast firms must go beyond technical excellence and develop organisational cultures centred on customer needs and value co-creation (Yashchenko et al., 2024). Customer orientation, defined as an organisational commitment to understanding and fulfilling customer needs, has been consistently linked to business performance, client retention, and long-term competitiveness (Gonu et al., 2023).

A well-established body of literature shows that when employees internalise customer-centric values, they are more likely to engage in behaviours that promote loyalty and trust, even in indirect or non-customer-facing roles (Al Samman & Mohammed, 2020; Ebunoluwa et al., 2025). Thus, Al Samman & Mohammed (2020) have proposed that internal marketing treats employees as internal customers, and that aligning internal capabilities with external promises is a crucial enabler of customer orientation. Internal marketing is believed to promote employee motivation, role clarity, and a sense of strategic purpose.

However, much of this literature is rooted in service or retail industries, where customer interactions are frequent and immediate (Gonu et al., 2023; Jawabreh et al., 2022; Zhao, 2022). In contrast, industrial settings such as the precast sector are highly technical, project-based, and hierarchical (Mark et al., 2021). Employees are often several steps removed from direct customer contact, raising unresolved questions about how customer-oriented thinking can be instilled across the organisation (Grassi et al., 2022; Zhao, 2022). Furthermore, unlike standardised service environments, precast companies operate in long-term project-based relationships with institutional clients, requiring a different operationalisation of customer orientation (Lertputtarak & Treepob, 2023; Mark et al., 2021). The current literature lacks

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empirical insights into how internal marketing strategies can be tailored to meet these unique challenges.

This disciplinary bias creates a clear gap, as the current literature provides limited empirical insights into how internal marketing strategies can be adapted for industrial, project-driven contexts such as the Indonesian precast industry. As Indonesian precast companies navigate rising client expectations and global competition, the urgency to identify effective internal strategies is increasing (Hidayawanti & Latief, 2023). While managers acknowledge the importance of fostering customer orientation, they often lack evidence-based guidance on where to focus their internal efforts. Not all internal marketing activities yield equal impact, and resources are usually limited (Al Samman & Mohammed, 2020). Therefore, there is a practical need for a clear, structured understanding of which strategies are most effective in encouraging customer-centric behaviour, particularly among non-frontline employees in technical settings. Without such clarity, internal marketing risks becoming a scattered or symbolic effort, disconnected from strategic business outcomes (Yashchenko et al., 2024).

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This study addresses this gap by investigating and prioritising the internal marketing strategies most relevant for enhancing customer orientation within the Indonesian precast concrete industry. The exploration expert views and contextual dynamics within precast operations; the research contributes both theoretically and practically. It advances current understanding by extending internal marketing and customer orientation frameworks into a new industrial setting and offers a structured perspective on which internal strategies should be emphasised.

The findings are intended to support decision-makers in building organisations that are more aligned, responsive, and customer-focused in a sector where such capabilities are increasingly critical. In line with these aims, the study pursues two main objectives: first, to identify and prioritise internal marketing strategies that effectively foster customer orientation in precast companies; and second, to provide practical guidance for managers in aligning internal initiatives with strategic business outcomes. Guided by these objectives, the research centres on the following central question: Which internal marketing strategies are most effective at fostering customer orientation within the Indonesian precast concrete industry, particularly in project-based and non-frontline contexts?

### LITERATURE REVIEW

#### *Customer Orientation*

Customer orientation is widely recognised as a key determinant of organisational competitiveness, as it emphasises the extent to which firms and their employees commit to

understanding and meeting customer needs (Gonu et al., 2023; Zhao, 2022). While early studies tended to conceptualise customer orientation as primarily a behavioural attribute of frontline employees, such as salespersons and service staff (Zhao, 2022), more recent work suggests that it is also shaped by organisational systems and cultural factors (Xu et al., 2023). For instance, Gonu et al. (2023) highlight that employees' personal characteristics—such as personality traits and prior experience—interact with organisational support to enhance customer-focused behaviour. This suggests a dual lens: customer orientation is not merely an individual disposition but also a collective capability embedded in organisational routines.

However, the literature remains fragmented regarding the outcomes of customer orientation. Some studies emphasise its effects on employee-related outcomes, such as job satisfaction and commitment (Gonu et al., 2023), while others highlight its direct impact on customer satisfaction, loyalty, and perceived service quality (Xu et al., 2023). These differences indicate the need for an integrated perspective that links employee-level orientation with organisational performance in competitive industries.

Despite its prominence in service sectors, customer orientation has been rarely examined in the construction and precast concrete industries, where the ability to anticipate and respond to client requirements is increasingly critical (Han et al., 2022). In this context, the application of lean tools offers an underexplored but promising mechanism for strengthening customer orientation. Bongomin (2024) argues that lean practices help precast firms eliminate non-value-added activities, thereby aligning operational processes more directly with customer value. Similarly, Dara et al. (2025) highlight that Just-in-Time (JIT), Continuous Improvement (CI), and Total Quality Management (TQM) collectively enhance efficiency and responsiveness by synchronising production with market demand, institutionalising continuous learning, and embedding quality standards across the organisation (Dara et al., 2024).

Compared with other approaches, JIT emphasises minimising waste and inventory while ensuring on-time delivery, directly reinforcing the timeliness aspect of customer orientation (Bongomin, 2024; Dara et al., 2024, 2025). CI (kaizen) stresses incremental, employee-driven improvements, reflecting the cultural dimension of customer responsiveness (Dara et al., 2024). TQM, in turn, integrates a firm-wide commitment to quality and customer satisfaction, making it the lean tool most explicitly connected to customer orientation (Dara et al., 2025). While these tools are well-documented individually, their conceptual integration with customer orientation remains underdeveloped, particularly in industrial contexts such as precast manufacturing. Addressing this gap is crucial for advancing both the theoretical understanding of customer orientation and its practical relevance in industries undergoing global competitive pressure.

### *Internal Marketing*

Internal marketing is increasingly recognised as a strategic orientation that aligns employees with organisational objectives by treating them as internal customers whose satisfaction and motivation underpin competitiveness. In the European construction-related SME context, Salguero et al. (2025) argue that internal practices, such as occupational health and workforce well-being, strengthen resilience and long-term sustainability, extending internal marketing beyond immediate service outcomes. In contrast, Luu et al. (2022) demonstrate that training, communication, and managerial commitment significantly enhance employee satisfaction and customer-oriented behaviours in the service sector in Vietnam. While this confirms the service–profit logic, its application to construction projects, which are characterised by temporary teams and subcontracting, remains uncertain. Compared with these service-based findings, Indonesian evidence by Widyanty et al. (2020) shows that construction productivity is more directly tied to a safety culture, positioning safety as the central internal value proposition. These cross-country insights suggest that internal marketing is consistently grounded in communication and managerial support. Still, its focal emphasis—well-being, satisfaction, or safety—varies across industry and national contexts.

40 The outcomes of internal marketing also diverge across construction environments. In service settings such as Vietnam, the focus is on individual job satisfaction, but in Indonesian construction, collective compliance with safety systems is identified as the foundation for competitive advantage (Nguyen & Nguyen, 2024; Widyanty et al., 2020).

Similarly, in the Dominican Republic, Reyes et al. (2022) highlight the slow adoption of digital tools in the construction sector, attributing it to capability gaps, while overlooking the behavioural alignment that internal marketing could provide. Without internal communication, incentives, and managerial commitment to support digital adoption, technical capabilities alone are unlikely to deliver impact. In comparison, Salguero et al. (2025) extend the scope of internal marketing by linking internal practices to organisational resilience in construction-related SMEs; however, they fall short of articulating the specific behavioural mechanisms involved. Collectively, the evidence suggests that although internal marketing has been associated with employee satisfaction, safety culture, digitalisation, and resilience, its application in the construction sector remains fragmented and underdeveloped, lacking a coherent and integrated framework.

Lean management practices provide a relevant perspective for embedding internal marketing more effectively into construction contexts. As previously encountered, Just-in-Time (JIT) requires disciplined communication and reliable coordination to minimise waste and synchronise on-site production flows, particularly critical in precast concrete operations (Dara et al., 2024).

Similarly, continuous Improvement (CI/Kaizen) depends on empowering workers and enabling cross-team collaboration to identify inefficiencies and enhance site productivity (Bongomin, 2024; Dara et al., 2024). Total Quality Management (TQM) necessitates organisation-wide engagement to uphold quality and safety standards, which are vital in large construction projects (Dara et al., 2024, 2025). Each of these lean practices assumes employee buy-in and commitment, which can be cultivated through internal marketing instruments such as training, internal communication, and recognition (Widyanty et al., 2020).

Evidence from Indonesia underscores the centrality of safety, while findings from the Dominican Republic highlight digital readiness; both cases demonstrate that without internal marketing as a behavioural foundation, lean practices risk being implemented only superficially. Internal marketing, therefore, functions as the cultural and motivational infrastructure that enables JIT, CI, and TQM to deliver value in construction industries across diverse national contexts (Nguyen & Nguyen, 2024; Reyes et al., 2022; Widyanty et al., 2020).

#### *Specific Case of Customer-Oriented in the Precast Industry*

Customer orientation in the precast concrete industry reflects a multi-level interaction between individual characteristics and organisational support. On the personal level, traits such as empathy, adaptability, and prior work experience shape employees' responses to customer needs (Ebunoluwa et al., 2025; Gonu et al., 2023; Xu et al., 2023; Zhao, 2022). Yet cross-country evidence shows that systemic practices must reinforce these traits. In Vietnam, managerial commitment, training, and internal communication significantly enhance satisfaction and customer-oriented behaviours, but such effects may be less durable in project-based industries with high turnover (Nguyen & Nguyen, 2024). In European SMEs, Salguero et al. (2025) underscore that internal practices linked to occupational health and wellbeing strengthen resilience, suggesting that customer orientation in precast must also account for workforce stability and safety as part of its internal value proposition. Collectively, these findings indicate that while individual dispositions matter, they require robust organisational frameworks to be translated into consistent customer-focused behaviours in the precast concrete industry.

Organisational mechanisms are therefore essential in embedding customer orientation into precast operations. Internal marketing practices—such as treating employees as internal customers through recognition, role clarity, and training—directly enhance motivation and service delivery (Ahmad et al., 2023; Kaewnaknaew et al., 2022; Qiu et al., 2022). Evidence from Indonesia illustrates how, when institutionalised through communication and leadership support, safety culture becomes a key internal product that underpins productivity in construction (Widyanty et al., 2020). In the Dominican Republic, Reyes et al. (2022) show

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that digital capability gaps limit efficiency in construction firms. Yet, the absence of internal alignment and behavioural buy-in hinders the adoption of tools that could improve customer responsiveness. Lean practices further reinforce this connection: Just-in-Time (JIT) ensures production aligns with client demand, Continuous Improvement (CI) empowers employees to identify inefficiencies, and Total Quality Management (TQM) embeds organisation-wide responsibility for quality (Bongomin, 2024; Dara et al., 2024, 2025). Each of these relies on employee engagement fostered through internal marketing, illustrating the interdependence of lean systems and workforce alignment in delivering customer value.

Beyond internal systems, customer orientation in precast also depends on social relationships, external awareness, and technological infrastructure. Positive supervisor–employee dynamics and peer collaboration enhance trust and knowledge sharing, while organisational citizenship behaviours (initiative and advocacy) extend service beyond formal roles (Qaisar & Muhamad, 2021; Qiu et al., 2022). Evidence from European SMEs underscores the role of resilience-building through wellbeing initiatives (Salguero et al., 2025) while Indonesian construction demonstrates that safety-focused HRM is critical for sustained competitiveness (Widyanty et al., 2020).

Dominican evidence highlights the importance of aligning digital transformation with employee attitudes to avoid resistance (Reyes et al., 2022), and Vietnamese findings emphasise the value of communication and managerial support in sustaining customer-oriented behaviour (Nguyen & Nguyen, 2024). Collectively, these cases reveal that customer orientation in precast requires a dual focus: internal alignment through internal marketing and lean tools, and external responsiveness through market insight and technological integration. Nonetheless, the industry continues to face challenges, including conceptual ambiguity, cultural rigidity, and fragmented implementation, which must be managed strategically to institutionalise sustainable customer orientation.

**Table 1**  
**Key Factors of Customer-Oriented Employees**

Dimensions	Key Factors	Citations	Sources
1. <b>Personal Characteristics</b>	- Personality traits (e.g., empathy, agreeableness, conscientiousness) - Work experience	3	(Dara et al., 2025; Gonu et al., 2023; Nguyen & Nguyen, 2024; Xu et al., 2023; Zhao, 2022)
2. <b>Organizational Environment</b>	- Customer-centric culture - Supportive leadership - Internal communication systems	4	(Asante et al., 2025; Qaisar & Muhamad, 2021; Qiu et al., 2022; Widyanty et al., 2020; Zhao, 2022)
3. <b>Employee Support System</b>	- Training and development - Rewards and motivation - Role clarity	5	(Nguyen & Nguyen, 2024; Qaisar & Muhamad, 2021; Qiu et al., 2022; Rafiq & Ahmed, 2000)
4. <b>Customer &amp; Market Understanding</b>	- Awareness of customer needs - Market and trend monitoring - Competitor analysis	3	(Asante et al., 2025; Han et al., 2022; Zhao, 2022)
5. <b>Employee Behavior &amp; Relationships</b>	- Organizational Citizenship Behavior (OCB) - Supervisor-employee relationship - Peer support	3	(Qaisar & Muhamad, 2021; Qiu et al., 2022)

Source: Own elaboration.

According to Table 1, developing customer-oriented employees in the precast concrete industry requires a strategic focus on five interconnected factors: personal characteristics, organisational environment, employee support system, customer and market understanding, and employee behaviour and relationships. First, individual characteristics, such as empathy, personality traits, and prior experience, directly influence how frontline employees perceive and respond to customer needs (Gonu et al., 2023; Salguero et al., 2025; Xu et al., 2023; Zhao, 2022). These individual traits must be supported by a strong organisational environment that promotes a customer-centric culture through empowering leadership and effective communication channels (Han et al., 2022; Nguyen & Nguyen, 2024; Zhao, 2022). Thus, when employees operate in an environment that reinforces customer value, they are more likely to consistently exhibit customer-focused behaviours.

Equally important is implementing internal marketing, which treats employees as internal customers by offering development opportunities, clear roles, and recognition systems. This approach fosters employee engagement and motivation, aligning internal efforts with customer satisfaction goals (Dara et al., 2024, 2025; Qiu et al., 2022). Additionally, employees must possess a deep understanding of customers and markets, allowing them to respond quickly to external changes, adapt service delivery, and contribute to value-driven innovations (Han et al., 2022; Zhao, 2022). Lastly, fostering proactive employee behaviours and strong interpersonal relationships, such as collaboration and voluntary service, helps sustain a culture of service excellence and strengthens the organisation's commitment to customer satisfaction (Nguyen & Nguyen, 2024; Qaisar & Muhamad, 2021; Qiu et al., 2022). Simultaneously, these five factors provide a strategic foundation for enhancing customer orientation in the precast industry.

To operationalise the key factors that influence the development of customer-oriented employees in the precast concrete industry, several targeted strategies can be adopted. First, implementing competency-based recruitment strategies that focus on personal characteristics such as empathy, conscientiousness, and relevant experience helps ensure that new hires possess the foundational traits needed for customer-oriented behaviour (Asante et al., 2025; Dara et al., 2024; Gonu et al., 2023; Xu et al., 2023).

This can be further supported by regular training and internal communication, which nurture a customer-focused organisational environment and reinforce cultural values that prioritise service excellence (Han et al., 2022; Zhao, 2022). In addition, adopting performance-based reward systems tied to customer service metrics—such as satisfaction scores or positive feedback—serves as an internal marketing mechanism that motivates and aligns employee behaviour with organisational service goals (Contreras & Gonzalez, 2021; Qiu et al., 2022).

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Furthermore, fostering customer and market understanding through training using real case studies and market scenarios can empower employees to respond to changing customer demands with greater agility (Asante et al., 2025; Han et al., 2022; Zhao, 2022). Coupling this with mentorship programs between experienced and junior staff not only strengthens employee relationships but also encourages organisational citizenship behaviour by promoting collaboration and knowledge sharing (Qiu et al., 2022).

The integration of digital tools, such as CRM systems, ensures that frontline employees have access to real-time customer data, enhancing responsiveness and workflow efficiency (Han et al., 2022). Lastly, cross-departmental service forums create a platform for diverse teams to exchange insights and co-develop innovations in customer service delivery, helping bridge silos and promote a unified customer experience (Qaisar & Muhamad, 2021; Qiu et al., 2022). Collectively, these strategies offer a comprehensive roadmap to institutionalise customer orientation within the unique operational and cultural contexts of the precast concrete industry.

### RESEARCH METHODOLOGY

#### 44 *Study Approach and Respondents*

This study adopts a semi-qualitative approach to explore strategic initiatives that can deepen customer-oriented behaviours among employees within the precast concrete industry in Indonesia. A Semi-quantitative method integrates qualitative expert judgments and quantitative analysis to assess complex systems (Amirshenava & Osanloo, 2019). This allows for a meaningful quantification of impacts while still incorporating expert knowledge, leading to a more robust and adaptable assessment of customer-orientation behaviour within the precast concrete industry (Amirshenava & Osanloo, 2019; Saaty, 2008).

Data collection was conducted through in-depth interviews guided by a structured AHP (Analytical Hierarchy Process) questionnaire (Saaty, 2008). The AHP instrument was used to prioritise and assess strategic options based on expert judgment. The interviews were designed to elicit expert evaluations of internal and external factors influencing the development of customer-oriented employees in the precast sector.

A total of 14 respondents participated in the study, comprising both internal industry professionals and external stakeholders in the Indonesian precast concrete industry (Table 2). In this study, although the number of respondents was limited (only 14), the primary focus was on the participants' expertise and informed judgment rather than on the sample size itself. This approach aligns with the methodology employed by Kim et al. (2016), who emphasised that the AHP values expert knowledge more than the number of respondents when

prioritising factors in complex decision-making contexts (including the precast construction industry).

The 14 respondents are the internal experts from large precast manufacturers who manage substantial financial responsibilities, with directors and general managers overseeing company assets ranging from USD 150 million to USD 500 million (IDR 2.48 – IDR 8.25 trillion). These firms operate at a national scale, supplying precast products for infrastructure projects, state-owned enterprises, and large private developers. Senior experts from mid-sized precast companies handle assets valued at USD 50–100 million (IDR 825 billion – IDR 1.65 trillion), reflecting their role in supporting specific project segments. External stakeholders, such as precast customers, typically own firms with valuations of USD 10–50 million (IDR 165–825 billion), while vendors and suppliers operate at more minor scales with assets of less than USD 20 million (IDR < 330 billion). Simultaneously, this distribution highlights the multi-layered economic responsibilities across the precast industry's value chain, ensuring representation from both high-level strategic decision-makers and operationally critical actors (See Table 2).

**Table 2**  
**Respondents of the Study**

No.	Category	Role/Position	Notes	Number of Respondents
1	Internal Experts (Company)	General Manager – Corporate Strategy	Handles assets approx. USD 500 million (IDR 8.25 trillion) in a tier-1 precast producer with nationwide operations.	1
2		Director – Business Development	Oversees market expansion in a firm valued at USD 200 million (IDR 3.3 trillion), serving SOEs and private developers.	1
3		Director – Operations	Responsible for operational assets worth USD 300 million (IDR 4.95 trillion) across multiple plants	1
4		Director – Human Capital and IT	Manages HR & IT systems in a company with workforce >1,000 and technology investments tied to assets of USD 150 million (IDR 2.48 trillion).	1
5		Director – Finance and Risk Management	Handles financial and project risk in a firm with annual turnover and assets > USD 250 million (IDR 4.13 trillion).	1
6		Senior Experts from Precast Companies	Work in medium-to-large firms with company valuations between USD 50–100 million (IDR 825 billion – IDR 1.65 trillion).	2
7	External Stakeholders	Company Owners (Precast Customers)	Own medium-sized construction firms valued at USD 10–50 million (IDR 165 billion – IDR 825 billion), using precast products.	4
8		Vendor and Supplier Representatives (Supporting Precast Industry)	Represent suppliers with smaller asset bases, typically < USD 20 million (IDR < 330 billion), supporting raw material and logistics supply.	3
<b>Total Respondents</b>				<b>14</b>

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Source: Own elaboration.

The diversity of respondents ensures a comprehensive perspective from various strategic, operational, and customer-facing angles. This triangulation strengthens the study's relevance and robustness in identifying actionable strategies to develop customer-oriented employees

## Driving Customer Orientation in the Precast Construction Industry: An AHP-Based Model of Internal Marketing Factors and Strategic Initiatives

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in the Indonesian precast concrete industry context. Therefore, this study was conducted in accordance with ethical research principles. Participation was voluntary, and informed consent was obtained from all respondents. Confidentiality of the participants' responses was strictly maintained, and no personally identifiable information was disclosed.

### *Analytical Hierarchical Process (AHP) Methods*

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making (MCDM) method developed by Thomas L. Saaty to help prioritise and select alternatives when multiple factors are involved (Saaty, 1977, 2008). AHP decomposes a complex decision problem into a hierarchical structure consisting of the goal, criteria, sub-criteria, and alternatives.

This study employed the AHP method because it integrates expert judgment in evaluating strategic priorities and enables a structured comparison of qualitative and quantitative factors. AHP is particularly suitable for this study because the goal is to identify the most strategic initiatives to deepen customer-oriented behaviour among employees in the precast industry (Indonesian market), based on expert knowledge and experience in the precast concrete industry.

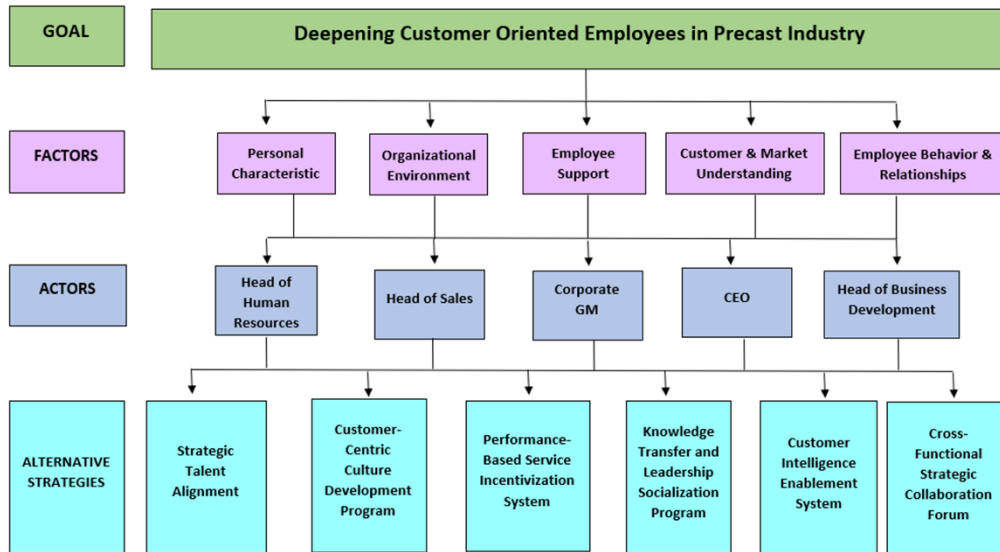
46 According to Saaty (2008) and Pandey et al. (2024), the AHP process consists of several steps. First, the decision problem is structured hierarchically—from the primary goal, down to criteria and alternatives (Figure 1). Next, experts are asked to perform pairwise comparisons between elements at each level of the hierarchy using a Saaty 1–9 scale (See Table 3), where 1 indicates equal importance, and 9 indicates extreme importance of one element over another.

The scale also includes reciprocal values (e.g.,  $1/3$ ,  $1/5$ ) when the second element is more critical. At this point, SuperDecisions Software is the tool to support the analysis by facilitating data input, computation, and analysis. SuperDecisions Ver 3.2 was employed for its ability to process complex hierarchical models, efficiently perform pairwise comparisons, and generate outputs such as priority weights, consistency ratios, and sensitivity analyses. The software also enabled the integration of multiple respondents' judgments using the geometric mean, ensuring reliable aggregation of expert insights across roles within and around the precast concrete industry.

The geometric mean calculation aggregated multiple expert responses from pairwise-comparison questionnaires to derive a single representative judgment value for each comparison. Since experts individually rated the relative importance of criteria and alternatives using Saaty's scale, the GM was calculated by multiplying all experts' responses for a given comparison, then taking the  $n$ th root (where  $n$  is the number of experts).

This method effectively balances variations among expert opinions while preserving the multiplicative relationships inherent in ratio scales, such as those used in AHP. The resulting geometric mean values were then used to populate the pairwise comparison matrices, ensuring consistency and reliability in the aggregated input data for the subsequent AHP analysis (Pandey et al., 2024)

**Figure 1**  
**Hierarchical Structure of the Study**



Source: Own elaboration.

Saaty (2008) continues that after forming the aggregated matrices, the next step is to compute the priority vector, which represents the relative weights of each criterion or alternative. A Consistency Ratio (CR) is then calculated to ensure the logical consistency of the judgments; a CR of less than 0.1 is considered acceptable. In this study, the pairwise comparisons were conducted among strategic dimensions and corresponding initiatives to identify the most influential strategies (Chiarini, 2019; Saaty, 1977, 2008).

Finally, a sensitivity analysis was conducted to assess the robustness of the results by examining how changes in weightings might affect the priority ranking (Chiarini, 2019). This provides confidence in the stability of the chosen strategies, which is particularly important for aligning cross-functional decisions across HR, operations, business development, and supply chain in the precast industry (Pandey et al., 2024).

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**Table 3**  
**Indicators used**

Numerical Value	Verbal Judgment	Explanation
1	Equal Importance	Two elements contribute equally to the objective.
2	Weak or Slight	Slight preference of one element over another.
3	Moderate Importance	One element is moderately more important than the other.
4	Moderate Plus	Moderate to strong importance.
5	Strong Importance	One element is strongly more important than the other.
6	Strong Plus	Strong to very strong importance.
7	Very Strong Importance	One element is very strongly more important; demonstrated dominance in practice.
8	Very Strong Plus	Very strong to extreme importance.
9	Extreme Importance	The highest level of dominance of one element over another.
1/2, 1/3, ..., 1/9	Reciprocal Values	Used when the second element is more important than the first.

Source: Own elaboration.

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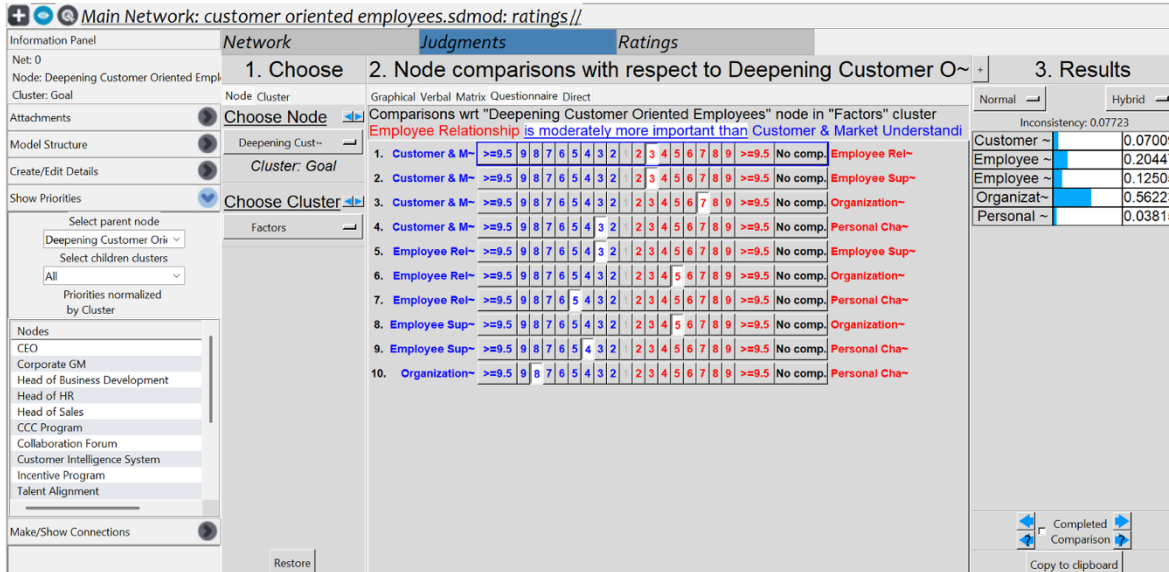
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## RESULTS AND DISCUSSIONS

This subsection presents the results of the Analytic Hierarchy Process (AHP), which starts with pairwise comparisons and the consistency ratio (CR). According to Pandey et al. (2024) and Saaty (1977), the pairwise comparison and the consistency ratio (CR) correspond to the third and fourth stages of the AHP analysis (Saaty, 2008). The authors distributed questionnaires and conducted in-depth interviews with 14 respondents (as shown in Table 2) to answer 160 questions: Goal has 10 questions, dimensions to actors have 15 questions per actor, and 15 questions reflect each actor's questions about alternative strategies. To synthesise the responses, the study employed the Geometric Mean method to aggregate the data, which was then processed using the SuperDecisions software (Nimawat & Gidwani,

2021). An example of the visualisation of how the software can calculate pairwise comparisons is shown in Figure 2.

**Figure 2**  
**Visualization of Pairwise Comparison Computation with Superdecisions ver. 3.2**



Source: Own elaboration.

The objective of the analysis is to identify the most influential factors and actors in supporting the goal of “Deepening Customer-Oriented Employees.” The overall consistency of the judgment input is confirmed with a Goal Inconsistency Ratio (CR) of 0.07723, indicating a reliable level of coherence across comparisons (Pandey et al., 2024; Saaty, 2008). Among the five main factors evaluated, Organisational Environment holds the highest priority with a normalised weight of 0.562, followed by Employee Behaviour and Relationships (0.204), Employee Support System (0.125), Customer & Market Understanding (0.070), and Personal Characteristics (0.038). All factors have CR values below the acceptable threshold of 0.1, validating the consistency of the judgments (Saaty, 2008).

This supports the previous study, which found that an organisational environment that enhances leadership and internal marketing can encourage a shared commitment to customer-centric values, enabling the organisation to adapt effectively to market demands and sustain competitive advantage by embedding customer orientation into everyday practices (Asante et al., 2025).

Thus, Table 4 presents a detailed summary of pairwise computation. In the consistency assessment, the calculated Consistency Ratios (CR) for all comparison matrices fall within the acceptable threshold of 0.10 (Pandey et al., 2024; Saaty, 2008). At the first level, the CR for the goal-to-factors matrix is 0.07723, indicating acceptable consistency. At the second level, the CR values for factor-to-actor matrices range from 0.0394 to 0.0681, while actor-

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to-alternative matrices range from 0.0508 to 0.08361. These values confirm that the judgments used in the pairwise comparisons are reliable, and the decision structure can be trusted to reflect consistent preferences across all hierarchical levels (Saaty, 1977, 2008).

**Table 4**  
**Outer model analysis**

Goal	Goal's CR	Factors	Weights	Factor's CR	Actors	Actor's CR
Deepening Customer Oriented Employees	0.07723	1. Personal Characteristics	0.03815	0.04985	Head of Business Development	0.08361
		2. Organizational Environment	0.562235	0.0394	Head of HR	0.0791
		3. Employee Support System	0.125053	0.05761	Head of Sales	0.0508
		4. Customer & Market Understanding	0.07009	0.0681	CEO	0.05688
		5. Employee Behavior & Relationships	0.204472	0.06692	Corporate GM	0.07272

Source: Own elaboration.

Furthermore, the fifth step in AHP analysis is to determine the top-priority factors (See Figure 3). The primary goal of the model is to deepen customer-oriented employees, which refers to the strategic objective of instilling a customer-first mindset across the workforce (Qaisar & Muhamad, 2021; Qiu et al., 2022). This objective reflects a growing recognition that sustainable competitive advantage is achieved not only through products or technology, but also through human capital aligned with customer values and expectations.

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A customer-oriented employee proactively understands customer needs, delivers value, builds customer loyalty, and adapts to changing preferences (Zegullaj et al., 2023; Zhao, 2022). In the model, this goal is treated as the outcome, with a limiting value of 0.000000, indicating that it is not a causal element, but rather the endpoint influenced by multiple interdependent variables. In the construction sector, this orientation is particularly crucial as project success often depends on long-term client relationships, trust, and the ability to adapt services to highly specific and evolving project requirements (Ahmad et al., 2023).

Thus, the AHP model identifies five key factors contributing to this goal: Personal Characteristics, Organisational Environment, Employee Support System, Customer & Market Understanding, and Employee Behaviour & Relationships. Among these, Organisational Environment holds the highest impact, with a limiting value of 0.56 (56%). This suggests that culture, internal systems, and institutional norms are the most critical enablers of customer-oriented behaviour. A supportive environment fosters psychological safety, encourages initiative, and aligns organisational values with customer satisfaction (Olaleye et al., 2024).

Without such a foundation, even skilled employees may struggle to translate their potential into customer-focused action (Qaisar & Muhamad, 2021). Therefore, this result supports the previous study in the construction industry, which found that the organisational environment

fosters customer-centric behaviour among employees by emphasising the importance of responding to evolving customer preferences and expectations.

Firms in the construction industry, or specifically in the precast concrete industry, adopt market-oriented strategies that systematically collect and analyse customer information, encouraging employees to “think like a customer” and develop solutions that directly address client needs. This customer focus drives employees to acquire the relevant skills and knowledge to improve product quality, delivery, and cost-effectiveness, aligning their actions with customer-loyalty goals (Dara et al., 2025; Fang & Chen, 2016).

Employee behaviour and relationships emerge as another significant factor, comprising elements such as Employee Relationship and behaviour (0.20 – 20%). These indicate the importance of interpersonal dynamics and the strategic placement of human resources (Rafiq & Ahmed, 2000; Xu et al., 2023).

Employees in the concrete precast industry who are well-positioned in roles that match their capabilities and who enjoy strong peer relationships tend to be more engaged, cooperative, and motivated to serve customers effectively (Dara et al., 2024). This aligns with the concept that relational capital within the organisation can significantly influence customer outcomes (especially customer loyalty and word-of-mouth intention) (Agrawal et al., 2013; Ali & Alfayez, 2024; Zegullaj et al., 2023).

In construction (especially the precast industry), Employees’ relationships and behaviours significantly shape a customer-oriented culture by fostering effective communication, teamwork, involvement, and empowerment within the organisation (Alazzaz & Whyte, 2015; Kaewnaknaew et al., 2022).

Thus, employee support (0.12 – 12%) is also essential in creating customer-centric employees. Both monetary and non-monetary support can help employees serve customers very well (Einwiller et al., 2021). Conversely, personal characteristics (0.03) and customer and market understanding (0.07) have the lowest limiting values among the factors, indicating they are relatively less influential in creating a customer-oriented culture among employees.

While intrinsic motivation, personality traits, and market knowledge are essential, their effects are significantly amplified or diminished by the broader organisational context (in this case, the precast concrete industry). In this sector, product specifications, project timelines, and compliance with technical standards tend to dominate customer requirements, making individual empathy or deep market knowledge less relevant to performance outcomes. For instance, an employee with high empathy may still fail to satisfy customers in a rigid, technically driven, or fragmented environment (Rasool et al., 2021). Thus, while

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hiring the right individuals remains essential, the greater emphasis should remain on shaping an organisational ecosystem that empowers employees to deliver within the technical and service constraints of the precast industry (Chen et al., 2020).

**Figure 3**  
**AHP's Top Priority Results**

Icon	Name	Normalized by Cluster	Limiting
No Icon	CEO	0.31949	0.106495
No Icon	Corporate GM	0.22595	0.075318
No Icon	Head of Business Development	0.05452	0.018174
No Icon	Head of HR	0.28414	0.094714
No Icon	Head of Sales	0.11590	0.038632
No Icon	CCC Program	0.15992	0.053305
No Icon	Collaboration Forum	0.09536	0.031787
No Icon	Customer Intelligence System	0.08234	0.027446
No Icon	Incentive Program	0.12159	0.040530
No Icon	Talent Alignment	0.27206	0.090686
No Icon	Transfer Knowledge Program	0.26874	0.089579
No Icon	Customer & Market Understanding	0.07009	0.023363
No Icon	Employee Relationship	0.20447	0.068157
No Icon	Employee Support	0.12505	0.041684
No Icon	Organizational Environment	0.56224	0.187412
No Icon	Personal Characteristics	0.03815	0.012717
No Icon	Deepening Customer Oriented Employees	0.00000	0.000000

Source: Own elaboration.

Regarding key actors supporting the dominant factor (organisational environment), the analysis reveals that senior leadership, along with the human capital division, plays a leading role. The CEO (0.319 – 31.9%), Head of HR (0.284 – 28.4%), and Corporate GM (0.225 – 25.5%) are identified as the most influential stakeholders in the system (Henderikx & Stoffers, 2022). Their vision, commitment, and policy decisions establish the tone for the entire organisation, as the impact of top leadership on internal communication and employee outcomes is shaped by mindset and behaviour. It reveals that the CEO and senior executives are instrumental in directing organisational messages that emphasise the importance of customer focus (Lee & Kim, 2022). Their influence shapes how employees think and act

toward customers, fostering a culture in which customer orientation becomes a shared organisational value.

The CEO's leadership behaviours, particularly those that demonstrate support and empowerment, help create a psychologically safe work environment where employees feel comfortable sharing ideas and concerns without fear of negative consequences. This culture of trust and psychological safety reduces group conflicts and enhances employee engagement (Joo et al., 2023).

Employees who are engaged with the organisation, particularly in the precast industry, can contribute significantly to effective internal marketing, thereby fostering a stronger customer-centric focus (Yashchenko et al., 2024). Thus, the Head of Sales and Head of Business Development also play supporting roles, particularly in translating strategic goals into departmental practices. This reinforces the idea that leadership alignment is essential for effective cultural transformation, especially when the objective involves behavioural and attitudinal change among employees in the precast concrete industry.

Furthermore, their roles can be divided into three layers: top management, middle management, and lower management. In the Indonesian precast industry, the development of customer-oriented employees involves three key layers of management: the CEO as top management, the Corporate GM as middle-up management, and the Head of Human Capital as middle-low management (Martela, 2023).

Each layer plays a distinct yet interconnected role in ensuring the successful implementation of a customer-centric culture. The CEO or president director in the precast industry, positioned as the top-priority actor, is responsible for initiating and directing the cultural transformation toward customer orientation. This requires strong leadership to embed the correct values, set strategic direction, and ensure alignment across the organisation (Joo et al., 2023).

This finding is consistent with previous research showing that CEOs with adequate education and relevant experience can make effective strategic decisions, and it also demonstrates that in Vietnam, the CEO's role is critical in managing resources and making decisions that drive company growth and competitiveness (Nguyen & Nguyen, 2024).

In several countries, the findings support previous studies stating that CEOs play an instrumental role in driving digital innovation in construction by fostering digital leadership, adopting advanced technologies, and shifting toward data-driven business models that enhance efficiency and create new value streams. They lead infrastructural upgrades and champion cultural change, enabling their firms to navigate the challenges of Construction 4.0 and seize emerging opportunities for competitive advantage (Gledson et al., 2024).

The Corporate GM supports this direction by serving as a key figure in maintaining and monitoring the progress of strategic initiatives, ensuring cross-functional alignment and operational consistency (Alazzaz & Whyte, 2015). Meanwhile, the Head of Human Capital is responsible for the day-to-day technical implementation of critical strategies, including Strategic Talent Alignment, Knowledge Transfer, and Leadership Socialisation Programs. These strategies are essential in embedding customer-oriented behaviour into the workforce. Ultimately, fostering customer-oriented employees cannot be achieved by operational-level managers alone—it requires top-down commitment, continuous oversight, and hands-on execution from all three management layers (Fang & Chen, 2016; Joo et al., 2023).

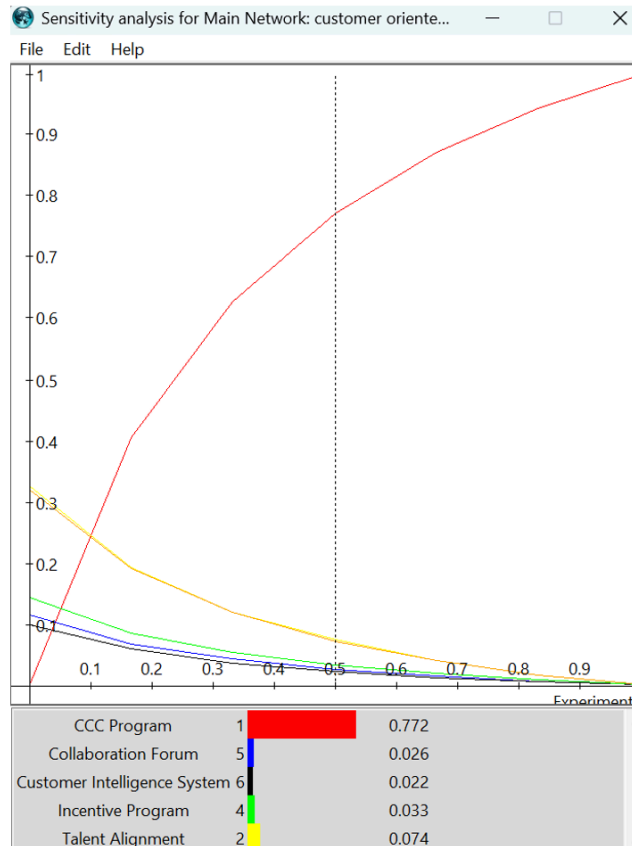
Finally, sensitivity analysis in AHP helps identify which variables have the most significant influence on a model's outcomes when small changes are made (Nimawat & Gidwani, 2021). In this context, although the AHP results (in top priority) showed that Talent Alignment had a substantial direct impact on customer orientation, the sensitivity analysis reveals that the CCC Program (Customer Centric Culture Development Program) is the most sensitive factor, with a value of 0.772 (see Figure 4). This means that even small changes in the CCC Program can significantly affect customer-oriented employees more than changes in other variables. Sensitivity analysis is particularly useful for identifying the most efficient intervention points and guiding decision-makers to allocate resources where they will have the greatest impact (Nimawat & Gidwani, 2021; Saaty, 2008).

Examples of small changes in the CCC Program that can generate significant impact include adding just two minutes to daily briefings to share positive customer service stories, placing visual reminders such as “What does the customer need today?” in precast companies' workspaces, and offering weekly recognition to employees who demonstrate strong customer-centric behaviour. Other changes could include appointing a “Customer Hero” each month and sharing their stories internally, or conducting short 10-minute training sessions on customer empathy every week. While these actions may seem minor, they can effectively strengthen a customer-oriented culture over time, especially since the CCC Program has been proven to be the most sensitive factor in this model. Furthermore, with the strong support of the CEO (President Director) in the precast industry, along with consistent monitoring by the Corporate GM, this initiative can be fully aligned and operationalised under the leadership of the Head of Human Capital (HC) to ensure sustainable cultural transformation throughout the organisation (Lee & Kim, 2022; Sypniewska et al., 2023).

This study contributes to theory by extending the application of internal marketing beyond customer-facing and service-oriented industries into a highly technical context, namely the precast construction sector. Unlike previous studies that primarily examined internal marketing in retail, hospitality, or education, this research addresses the gap by highlighting

how employee adoption of customer orientation within technical and non-customer-facing roles can influence organisational competitiveness. The findings suggest that internal marketing should not be viewed solely as a service-industry concept but rather as a broader organisational capability that drives global competitiveness.

**Figure 4**  
**Sensivity Analysis**



Source: Own elaboration.

The study's findings on the effect of accessibility of financial facilities on the financial performance of MSMEs in Bali revealed a path coefficient of 0.208 and a significance value of 0.038. Thus, it can be concluded that the accessibility of financial facilities positively impacts the financial performance of MSMEs in Bali, with an influence size of 0.047. The outcomes indicate that H1 is accepted.

The path coefficient is 0.022, and the significance value is 0.848, indicating that financial facilities influence the financial performance of MSMEs in Bali. The results show that the significance value is more than 0.05, so H2 is rejected. Finally, with a path coefficient of 0.254 and a significance value of 0.048, the results show that the quality of financial facilities positively affects the financial performance of MSMEs in Bali, with an effect size of 0.065. These results indicate that H3 is accepted.

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With the moderation of CPA culture, the path coefficient of 0.261 and the significance value of 0.011 were observed in the interaction between the accessibility of financial facilities and the financial performance of MSMEs. The results showed that the significance value was less than 0.05, indicating that the hypothesis was supported: CPA culture strengthens the relationship between the accessibility of financial facilities and the financial performance of MSMEs in Bali. Therefore, the direct influence coefficient of 0.038 is less than 0.05, and the moderating influence coefficient of 0.011 is also less than 0.05, indicating that the moderating effect of CPA culture is quasi-moderation.

A study examining the impact of financial facilities on the financial performance of MSMEs, moderated by CPA culture, revealed a path coefficient of 0.384 and a significant value of 0.046. The results suggest that although the direct influence may not be evident, CPA culture can attenuate the impact of financing facilities on MSMEs' financial performance. This analysis reveals that the essence of CPA culture is characterised by moderation.

Finally, with CPA culture moderated, the path coefficient is 0.319, and the significance is 0.010. The result confirms that the hypothesis is supported: CPA culture strengthens the relationship between financial service quality and the financial performance of MSMEs in Bali, with a significant value of 0.048, which is below 0.05. Therefore, the test result shows that the nature of CPA moderation is quasi-moderation, as both the direct effect coefficient (0.048) and the moderation effect coefficient (0.010) are less than 0.05.

### CONCLUSION

The study advances the customer-orientation literature by demonstrating, with AHP, a sector-specific prioritisation of factors–actors–strategies in the Indonesian precast industry. The key innovative insight is the systemic primacy of the organisational environment over individual traits: customer orientation is shaped less by who employees are and more by how work is organised, led, and reinforced in project-based, technically stringent settings (Kaewnaknaew et al., 2022).

Also propose a governance architecture—the CEO–Head of Human Capital (HC) dyad with Corporate GM oversight—as the proximal mechanism that translates internal marketing into customer-centric behaviours. This reframes internal marketing in industrial B2B contexts from a set of frontline practices to a culture-and-structure intervention that aligns talent, routines, and leadership socialisation. This study thereby addresses a critical gap in the internal marketing literature, which has predominantly concentrated on service industries and frontline employees, while offering limited attention to industrial, project-based, and non-customer-facing contexts.

In practice, the most prioritised strategies—Strategic Talent Alignment and Knowledge Transfer & Leadership Socialisation—are operationalised through the Customer-Centric Culture (CCC) Program, led by the Head of HC (CEO sponsor; Corporate GM monitoring). Applicable actions include: embedding customer-centric competencies in selection rubrics and onboarding; leader-led monthly “customer impact” sessions; cross-site communities of practice for precast detailing, scheduling, and quality; client-pulse checks (three questions, weekly) tied to rapid countermeasures; change-order Service Level Agreement (SLA) and pre-pour design/constructability huddles; visual boards that link on-time delivery, RFI cycle time, and defect rate to client outcomes; and lean NVA workshops mapped to client touchpoints to remove delays and rework. These routines convert abstract orientation into repeatable behaviours that improve responsiveness, technical accuracy, and service reliability (Dara et al., 2024, 2025).

Importantly, this study concludes that small behavioural shifts can yield outsized effects in precast operations. Examples include a 24-hour response standard for client queries, a two-minute “customer consequence” note in daily toolbox talks, a pre-pour checklist co-signed with the client, and a weekly joint schedule alignment to surface constraints early. Such micro-practices, owned by the Head of HC and reinforced by line leaders, institutionalise customer focus and sustain performance gains. These insights contribute theoretically by positioning internal marketing as a system-level capability that integrates leadership, culture, and human capital structures—an angle underexplored in prior studies that emphasised either job satisfaction or procedural improvements. Collectively, these insights articulate both a theoretical contribution—a system-level account of internal marketing in industrial, project-driven contexts—and a managerial playbook that makes customer orientation implementable on the shop floor and at the leadership table (Ahmad et al., 2023; Kaewnaknaew et al., 2022).

This concludes that the Head of Human Capital, at the operational level for employees, is not merely focused on job satisfaction but also on realising the vision of the strategic level (CEO and Corporate GM) (Sypniewska et al., 2023). Also, this study criticises previous studies that often focused on operational or front-line roles in driving customer responsiveness in the service industry and in precast or construction-related sectors. This study highlights a broader and more integrated view (Alsafadi & Altahat, 2021; Martela, 2023). It extends previous research by positioning leadership and internal organisational culture as primary enablers of customer orientation, rather than just procedural improvements or individual performance (Alsafadi & Altahat, 2021).

The findings support the notion that long-term customer-centric transformation must begin at the top and be supported through structured internal systems, aligning with strategic human capital practices and cultural reinforcement throughout the organisation (Gonu et al., 2023; Lee & Kim, 2022; Qiu et al., 2022). Henceforth, this study offers a novel theoretical

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contribution by challenging the prevailing service-sector paradigm and reframing customer orientation as a broader issue of organisational design and governance.

### **IMPLICATION, LIMITATION, AND FUTURE STUDY**

This study contributes to the existing body of knowledge by reinforcing the multi-layered role of organisational actors in achieving customer-oriented employee behaviour, particularly within the context of the precast concrete industry in Indonesia and other developing countries such as Vietnam, Pakistan, Dominican Republic, Nigeria, Thailand, and other countries (Ahmad et al., 2023; Ebuloluwa et al., 2025; Kaewnaknaew et al., 2022; Nguyen & Nguyen, 2024; Reyes et al., 2022; Widyanty et al., 2020).

Using AHP, the study identifies the significant influence of upper management—especially CEOs, Presidents and Directors—in shaping a customer-oriented culture and across cultures. This finding supports prior literature that emphasises top-down influence in cultural transformation, while integrating strategic alignment and knowledge transfer as central enablers (Gledson et al., 2024; Lee & Kim, 2022). Theoretically, the study extends the scope of customer orientation beyond service industries by positioning it as a central concern of organisational design and governance within construction and precast manufacturing, where efficiency, safety, and customer value must coexist.

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From a practical standpoint, the findings underscore the indispensable role of CEOs in spearheading customer-oriented cultural transformations not only in Indonesia but also across other developing economies. For example, evidence from Vietnam shows that managerial commitment and training are critical to sustaining satisfaction-driven customer orientation in service firms (Nguyen & Nguyen, 2024), while research in the Dominican Republic highlights how digital adoption in construction remains limited unless supported by internal practices that build employee buy-in (Reyes et al., 2022).

Similarly, studies in Indonesia stress the importance of safety culture in aligning workforce behaviour with organisational goals (Widyanty et al., 2020). Taken together, these cases demonstrate that in emerging economies, customer orientation must be embedded through leadership commitment, structured training, and supportive organisational systems. Extending this to the precast industry, the role of leadership in mobilising large-scale assets—often valued at hundreds of millions of USD—becomes essential for ensuring competitiveness, sustainability, and resilience in the face of market and environmental challenges.

Strengthening global competitiveness further requires CEOs and senior managers in the precast industry to lead infrastructural modernisation and to embed innovation-oriented cultures (Ebunoluwa et al., 2025; Nguyen & Nguyen, 2024). This is particularly relevant in cross-industry applications, such as property development, coastal protection, erosion control, and mega-infrastructure projects, such as sea walls and flood barriers, where precast solutions play a critical role. Beyond Indonesia, precast firms in other developing countries outside the G7 can leverage internal marketing, lean tools (JIT, CI, TQM), and digital transformation to scale their operations while ensuring long-term resilience in Thailand and other developing countries (Asante et al., 2025; Kaewnaknaew et al., 2022).

The leadership development programs tailored to enhance digital literacy, strategic agility, and customer orientation among top executives should be institutionalised across industries to ensure that customer-centric strategies are not fragmented but embedded holistically within organisational structures (e.g. in Pakistan, Nigeria, and Vietnam) (Ahmad et al., 2023; Ebunoluwa et al., 2025; Gledson et al., 2024).

Nevertheless, this study has limitations. First, the number of participants is relatively small (14 respondents), which constrains the breadth of perspectives and limits statistical generalizability. This is partly mitigated by purposive sampling of informants with substantial expertise and direct involvement in the precast sector, ensuring contextual richness and credibility (Kim et al., 2016). Second, the study is industry-specific, focusing on the precast concrete industry in Indonesia. While this provides in-depth insights, it limits generalisation to other sectors such as IT services, high-tech manufacturing, or logistics.

Future research could address these limitations by expanding the sample size, incorporating multiple organisational levels, and comparing findings across industries and geographies. Further study, which might include cross-country comparisons—particularly among developing nations outside the G7—would clarify how cultural, institutional, and technological contexts shape customer orientation strategies.

Comparative research could, for instance, examine how customer orientation in precast interacts with large-scale property development in Vietnam, market competitiveness of Nigerian construction firms, digital modernisation in the Dominican Republic, or coastal infrastructure resilience in Indonesia (Ebunoluwa et al., 2025; Nguyen & Nguyen, 2024; Reyes Veras et al., 2022; Widyanty et al., 2020).

Longitudinal studies could also trace how aligning leadership, culture, and human capital development sustains competitive advantage and organisational resilience over time (Asante et al., 2025; Bongomin, 2024; Dara et al., 2024). In doing so, future scholarship can bridge fragmented approaches and build an integrated framework that connects satisfaction, safety,

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digitalisation, and resilience, thereby enhancing both theoretical robustness and practical relevance for the global construction and precast industries.

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## Financial Resources, The National Science and Technology System, and Innovation Performance: Colombian Manufacturing Firms

*Recursos financieros, Sistema Nacional de Ciencia y Tecnología y desempeño innovador: evidencia en la manufactura colombiana*

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### ABSTRACT

This study presents a theoretical model that analyses the relationship between financial resources, the National Science and Technology System, and innovation performance in Colombian manufacturing companies. Four hypotheses were formulated and approved, demonstrating a positive relationship between these factors. The research was based on an empirical, cross-sectional sample of 1,572 units, whose data were analysed using the PLS-SEM statistical package. The results confirm that the proposed theoretical model is acceptable and significant, suggesting that financial resources and the support of the science and technology system have a crucial impact on the innovation capacity of Colombian companies. Furthermore, the proposed theoretical model, derived from an integrated design of three factors informed by the theoretical consultation, aims to serve as a reference for future studies across different sectors and regions where manufacturing companies operate.

Keywords: Financial Resources, National Science and Technology System, Innovation Performance, Manufacturing.

Jel Code: O31, O32, O38.



## **RESUMEN**

En este estudio se presenta un modelo teórico que analiza la relación entre los recursos financieros, el Sistema Nacional de Ciencia y Tecnología y el desempeño de la innovación en las empresas manufactureras de Colombia. Para ello, se formularon cuatro hipótesis que se validaron, lo que evidenció una relación positiva entre dichos factores. La investigación se basó en una muestra empírica y transversal de 1572 unidades, cuyos datos se analizaron con el paquete estadístico PLS-SMART. Los resultados confirman que el modelo teórico propuesto es aceptable y significativo, lo que sugiere que los recursos financieros y el apoyo del sistema de ciencia y tecnología tienen un alto impacto en la capacidad de innovación de las empresas colombianas. Además, el modelo teórico propuesto, derivado de un diseño integrado de tres factores a partir de la búsqueda de literatura especializada, pretende ser de referencia para futuros estudios en diferentes sectores y regiones donde operen las empresas manufactureras.

Palabras clave: recursos financieros, sistema nacional de ciencia y tecnologías, desempeño en la innovación, manufactura.

## INTRODUCTION

Companies face growing consumer demands, forcing them to meet increasingly high expectations. To remain competitive, they must continually propose innovative products, services, business models, and marketing strategies that deliver real added value (Chatzinikolaou & Vlados, 2026). This process of continuous improvement requires organisations to constantly adapt, aligning their internal capabilities with the needs and expectations of their customers. In addition, business innovation is strengthened when companies collaborate closely with actors in the National Science and Technology System, which allows them to access key knowledge, infrastructure, and technical support to drive their innovations. However, to respond effectively to these market demands and develop creative solutions, companies also need the necessary financial resources to sustain their innovation and technological development processes (Kim, 2024; Chervinska et al., 2025; Yogantara et al., 2025).

The current business environment is increasingly pressurised by clients who demand that companies meet their needs optimally. It also raises questions about how organisations make financing decisions, especially since innovation involves investing resources with the expectation of a good return. A foundational framework for understanding these decisions is the Pecking Order Theory (Myers & Majluf, 1984; Konstantinos & Werner, 2025), based on the asymmetry of information between managers and external investors. This theory holds that companies follow a hierarchy of preferences when choosing their sources of financing: they initially resort to retained earnings, then to debt, and, as a last resort, to issuing shares. This theory posits that companies prefer internal sources because of lower costs arising from information asymmetry. However, for manufacturing SMEs, the subject of this study, this scenario does not fully reflect their reality. These companies are affected by transaction costs, information asymmetries, high interest rates, a decline in profits due to the Covid-19 crisis, and obstacles to obtaining external financing. Hence, these factors compel them to seek financing sources that do not necessarily follow the order proposed by the Pecking Order Theory.

Since the Pecking Order Theory struggles to adequately account for financing choices in manufacturing SMEs, it is more appropriate to turn to the Theory of Credit Rationing, as demonstrated by Jin and others (2024). This theory explains that financial constraints in micro and small enterprises arise mainly because of information asymmetry in the credit market. Lenders, unable to accurately assess the credit risk of these companies, impose restrictions on access to credit, limiting their ability to finance themselves, even when they are willing to pay higher interest rates or provide additional collateral. In addition, the Credit Rationing Theory (Rebel et al., 2024; Stiglitz & Weiss, 1981) complements the arguments

by highlighting the difficulties SMEs face in accessing external financing due to information asymmetry between lenders and borrowers. Here, banks and other financial institutions restrict access to credit, even for solvent companies, due to perceived risks and a lack of accurate information about their financial condition. Therefore, SMEs face high interest rates or a contraction in profits due to inflationary phenomena artificially created by lenders.

Additionally, some studies have explored the elements that drive innovative performance, recognising both internal and external factors. Among the external factors, recent studies have described the importance of aligning different actors' capacities and expectations as an essential element for ensuring its effective functioning (Broekel & Bednarz, 2018; Capone & Lazzeretti, 2018; Wang, Feng, & Liu, 2024; Mingting et al., 2020; Guo et al., 2022). In Colombia, the National Science and Technology System (NSTS) operates as an integrated framework of laws, policies, strategies, and methodologies that coordinates human, material, and financial resources across the public and private sectors. This system, led by Minciencias, aims to promote the development of science, technology, and innovation, thereby contributing to the country's competitiveness and productivity (Heredia & Mesa, 2018). Within the NSTS, participating actors create a diverse set of links and flows, aiming to shape an innovation ecosystem. Among the internal factors, aspects such as organisational culture, knowledge management, dynamic capabilities, and the availability of financial and human resources stand out (Pincheira & Araujo, 2023).

Therefore, investment in R&D plays a central role, as it articulates both types of factors, allowing companies to leverage their innovative capacity. Here, effective management of financial and human resources is key to facilitating research and development processes, thereby increasing the potential for business innovation (Shi et al., 2019; Xiao & Wang, 2025). According to Demirkan (2018), SMEs with greater financial resources tend to take better advantage of external opportunities and invest more in innovation than those with limitations. In addition, idle resources beyond those required for core operations also positively impact innovation.

Hence, the objective of this study is to analyse the relationship between Financial Resources (FR) and the National Science and Technology System with Innovative Performance (IP) in manufacturing SMEs (Figure 1). To explore this relationship, the study seeks to answer: are managers or owners of these types of companies aware of the importance of constantly investing in innovation? And do they have a good understanding of their customers' needs? The paper is structured in six sections. The first section introduces the topic and develops the research problem. The second section presents the literature review and the theoretical frameworks which explain the core concepts. The third section details the methodology, showing the process used for data collection and analysis. The fourth section presents the

principal results and hypothesis testing. The fifth section elaborates in the discussion, and the last section provides conclusions, implications and further research.

## LITERATURE REVIEW

As introduced in the previous section, the Pecking Order theory (Konstantinos & Werner, 2025) posits that companies follow a hierarchical order when prioritising their sources of financing. According to this theory, companies first resort to retained earnings, then to debt, and finally to issuing shares. Although this approach is useful for explaining companies' financial decisions, it does not always fit the reality of manufacturing SMEs due to market imperfections and the difficulties these companies often face in accessing credit. In this context, the theory of Credit Rationing (Rebel et al., 2024) is particularly relevant for SMEs. This theory addresses how information asymmetries between lenders and borrowers limit access to credit, even for potentially solvent companies. In the case of manufacturing SMEs, these constraints may explain the difficulties they encounter in financing their innovation processes and their impact on innovative performance.

Although previous theories explain financial issues, innovation in organisations should also be explained in light of the Theory of Resource-Based View (RBV) (Grant & Yeo, 2024), which posits that variations in organisational performance can be attributed to resources and capabilities. These resources and capabilities should be valuable, rare, difficult to imitate, and non-substitutable (VRIN). Hence, the RBV helps us understand how organisations gain a sustainable competitive advantage over their rivals, which is essential for analysing the innovative behaviour of manufacturing SMEs (Grant & Yeo, 2024; Wang et al., 2025).

In this sense, the RBV enriches the explanation of the process of resource acquisition as an evolutionary and cumulative one, fundamental to innovation (Yogantara et al., 2025). In the context of manufacturing SMEs, the ability of these companies to innovate not only depends on internal resources but also on the availability of external resources dedicated to Science, Technology, and Innovation (STI), which are closely related to the production, promotion, and dissemination of new technologies and ideas. The availability of resources is closely linked to the generation, promotion, dissemination, and use of scientific and technical knowledge (Cheng & Wang, 2019; Grant & Yeo, 2024; Wang et al., 2025).

To summarise, the Pecking Order and Credit Rationing theories together explain why manufacturing SMEs face structural barriers in financing their innovation, as information asymmetries limit their access to external capital. Thus, it constrains their ability to invest in R&D. However, the RBV shifts the focus inward, explaining how firms that do secure financial resources can convert them into rare, inimitable capabilities that drive innovative

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performance. The original contribution of our model lies in its explicit recognition that this conversion is not direct, but it is mediated by the National Science and Technology System (NSTS). The NSTS provides the external institutional infrastructure, technology centres, universities, patent databases, and R&D networks that allow firms to translate financial inputs into innovation outputs. By situating the NSTS as a mediator, this study moves beyond treating financial resources as sufficient for innovation and highlights the systemic conditions required for their effective use. The following paragraphs define the variables used in this study.

### *Innovative Performance (IP)*

Innovative performance (IP) can be defined as a resulting variable that reflects the outputs of the innovation process and measures an organisation's ability to transform its resources into tangible results. According to Dalimunthe et al. (2025) and Argothy et al. (2024), IP is directly associated with the outputs of innovative efforts, whereas Rehman et al. (2019) link it to firms' results. For manufacturing SMEs, this implies the ability to convert their resources into innovative products, processes, or business models.

70 In the context of Latin America and the Caribbean, innovative performance is analysed by considering both the inputs and outputs of innovation, highlighting the importance of investment in R&D and the interaction of internal factors, such as human capital and knowledge management, with external factors, such as innovation policies and regional ecosystems (Pincheira & Araujo, 2023). This approach highlights the importance of efficient resource use to maximise innovative outcomes, which is crucial in emerging economies where innovation gaps persist compared to more developed countries.

### *Financial resources (FR)*

The financing sources available to any company to carry out innovation processes are varied (Zuzek, 2019; Mariane et al., 2024; Chen et al., 2024; Adegboye et al., 2018). These resources can come from internal and external sources. For example, organisations can finance operations using shareholders' wealth, banks and financial institutions, venture capital funds, angel investors, stock and bond issues, government support, and funding from non-profit organisations or universities. According to Kramer and Wrightson (2016), financing sources should enable organisations to develop key capabilities for creating new products and services. Along these lines, Mingting et al. (2020) posit that companies typically prefer external sources due to various barriers, including market failures, intense competition, a lack of corporate capital, and ineffective management, which hinder the development of innovative activities. However, each potential source presents specific challenges that must be considered before undertaking any actions.

For this study, both internal and external sources are considered without discrimination, as both play a crucial role in financing Research and Development (R&D) activities, which are essential for carrying out the entire innovation process (Mingting et al., 2020; Guo et al., 2022). For the context of this research, Shi et al. (2019) analysed and found that financing has a positive impact on the innovative performance of manufacturing companies. They found that these resources enable organisations to navigate the competitive environment and promote the development of new products and services. This reinforces the importance of proper management of both internal and external financial resources to ensure the success of innovation processes. Similarly, Mingting et al. (2020) and Guo et al. (2022) highlight that greater investment in innovation-related activities creates incentives for companies to accelerate their innovation processes.

#### *National Science and Technology System (NSTS)*

The National Science and Technology System (NSTS) is an open and inclusive system comprising programs, strategies, activities, organisations, and mechanisms directly related to science, technology, and innovation. This group of actors aims to produce and disseminate science and technology in a specific territory. The actors in the system interact at various levels, such as technical, commercial, legal, social, and political, establishing multiple links and flows.

According to Erzurumlu et al. (2022), these actors are organised into four main levels. The first level comprises public, private, and governmental organisations, as well as educational institutions, that function as an integrated social, technological, and economic system. The second level comprises government institutions responsible for regulating interactions between organisations and actors within the system. The third level comprises knowledge infrastructure, including research and educational institutions that provide essential resources and skills to advance science and technology. Finally, the fourth level encompasses the relationships and interactions among all actors, which are key sources of cooperation and system strengthening.

Thus, financing activities are crucial to innovation processes, as they contribute to the development of innovation capabilities. However, the literature widely recognises various barriers to achieving optimal innovative performance, one of the most relevant being the lack of financial resources (Gardocka-Jałowiec & Wierzbicka, 2019; Corchuelo & Carvalho, 2020; Wipulanusat et al., 2019). Based on the postulates, H1 is proposed as follows:

*H<sub>1</sub>: Financial resources (FR) allocated to the innovation process have a positive relationship with innovative performance (IP).*

The convergence of all actors distributed across the levels proposed by Erzurumlu et al. (2022) provides fertile ground for innovation. The system thus operates efficiently when

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some of these actors interact to generate new knowledge and new ideas that enable the creation of new products, services, and business models. In this process, the system plays a mediating role by creating links and relationships among the actors of the National Science and Technology System. These links, together with each actor's capabilities, play a pivotal role in the entire innovation process. Hence, H2 is proposed as:

*H<sub>2</sub>: Financial resources (FR) allocated to the innovation process have a positive relationship with innovative performance (IP).*

Organisations require investment in equipment, infrastructure, training, and product development to perform adequately in the market by generating designs that satisfy customers (Dalimunthe et al., 2025; Argothy et al., 2024). In this sense, the connection between financial resources and understanding the functioning of the National Science and Technology System raises H3:

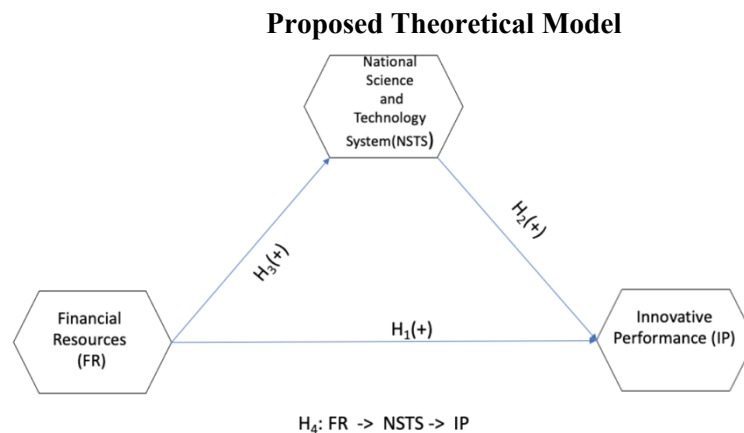
*H<sub>3</sub>: Financial resources (FR) allocated to the innovation process have a positive relationship with innovative performance (IP).*

Regions undoubtedly require support in terms of external financing, which is generated by private initiatives, associations, and the government. Its impact is significant for the realisation of business projects, leading to substantial improvements in innovation performance aligned with the set objectives (Zuzek, 2019; Mariane et al., 2024; Chen et al., 2024; Adegboye et al., 2018). Hence, H4 proposes:

*H<sub>4</sub>: Financial resources (FR) allocated to the innovation process have a positive relationship with innovative performance (IP).*

Finally, the hypotheses are integrated into the following theoretical model (Figure 1).

Figure 1



Source: Own elaboration.

## METHODOLOGY

The objective of this study is to analyse the relationship between Financial Resources (FR), the National Science and Technology System (NSTS), and Innovative Performance (IP) in manufacturing SMEs. The following methodology outlines the processes used to collect, analyse, and interpret relevant data on these variables. Initially, a review of the literature was conducted to construct the theoretical framework underpinning the study, followed by the definition of the research variables, data collection instruments, and analysis approach. Then decided that the methodological approach should follow a quantitative, cross-sectional logic, using a representative sample of manufacturing SMEs. Using statistical techniques, evaluated the relationships among the variables and validated the proposed hypotheses. In addition, we carried out comparative analyses to identify differences in access to financial resources and their impact on innovation.

### *Design*

This empirical study builds on the work of Hair et al. (2019, 2020, 2022) and adopts an explanatory research design to analyse the determinants of innovation in Colombia's manufacturing sector. Specifically, it examines how independent variables, such as financial resources and participation in the National Science and Technology System (NSTS), affect companies' innovative performance. To test these relationships, the study uses structural equation modelling (SEM) with latent variables, enabling the representation of associations among unobservable constructs within a unified system of equations. The methodological framework adopts a quantitative orientation, using partial least squares (PLS), which aims to maximise the explained variance of dependent constructs through a sequence of partial regressions (Hair et al., 2022). The PLS-SEM method is particularly appropriate for moderate sample sizes or data that deviate from the conventional assumptions of multivariate normality and homoscedasticity, offering greater robustness and flexibility relative to covariance-based SEM.

The unit of analysis in this study comprises Colombian manufacturing companies with at least 10 employees. The data were sourced from the Survey on Technological Development and Innovation in the Manufacturing Industry (EDIT) conducted by DANE (2019). The sample included 8,062 companies, of which complete information was available for 7,529. However, minor variations in response rates were observed across specific items in the EDIT IX questionnaire (2017–2018). This dataset offers a robust representation of the Colombian manufacturing sector, facilitating a detailed examination of the influence of financial resources and participation in the National Science and Technology System (NSTS) on

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innovative performance, as well as the identification of key constraints and barriers to innovation faced by companies.

### *Data source*

To carry out this study, the EDIT IX (DANE, 2019, period 2017-2018) survey on Technological Development and Innovation in the Manufacturing Industry was used as the main data collection tool. This survey has been established as the main source of statistical information on technical and organisational transformation and change processes in the Colombian manufacturing industry. Thus, it provides specific data on innovation practices and strategies, presenting a comprehensive overview of the context in which companies operate. A defining feature of this survey is its focus on the articulation of economic activity and knowledge, which are fundamental elements in the production process. This implies that companies are not only implementing technologies but also integrating specialised knowledge to optimise operations and enhance competitiveness in a dynamic environment.

Selected indicators are presented in Table 1, which serve as critical metrics for measuring and evaluating the study's variables. These indicators enable the quantification of innovative performance among manufacturing companies and the assessment of how financial resources contribute to it. Defining a comprehensive set of indicators supports systematic comparison and evaluation of results, thereby advancing understanding of the drivers and constraints influencing innovation in the manufacturing industry. To summarise, choosing the EDIT IX survey as a data collection tool provides a solid basis for analysing innovative performance in the sector, allowing us to capture both current trends and the challenges faced by manufacturing companies in their technological transformation process.

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**Table 1**  
**Indicators from the EDIT IX questionnaire**

<i>Construct</i>	<i>Indicator</i>
<b><i>Financial Resources</i></b>	
rfri01	Total invested in scientific, technological, and innovation activities, according to the original source of the resources used to finance these investments in 2017 and 2018
<b><i>NSTS</i></b>	
rsnt01	R&D Department
rsnt02	Specific interdisciplinary groups for innovation
rsnt03	Scientific and technological databases
rsnt04	Technical standards and regulations
rsnt05	Universities
rsnt06	Seminars and conferences
rsnt07	Books, journals and brochures
rsnt08	Industrial property information system (patent database)
rsnt09	Technology based business incubators
rsnt10	Technology centers
rsnt11	Training centers and technology platforms
rsnt12	Technology development centers
<b><i>Innovative performance</i></b>	
dein01	Total innovations in new goods and services in 2017 and 2018.
dein02	New or significantly improved processes, production methods, distribution, delivery, or logistics systems introduced in your company in 2017 and 2018.

Source: Own elaboration.

### *Sample*

It should be noted that the sample adopted is part of a study conducted by the National Administrative Department of Statistics of Colombia (DANE), which measures innovation through the Technological Development Survey in the Manufacturing Industry (EDIT) for the 2017–2018 period. This survey is designed to conduct a census of the sector. Accordingly, the universe of companies surveyed through the DANE questionnaire totalled 8,062 firms, of which complete data were obtained for 7,529.

It should be clarified that the unit of analysis for this study comprises Colombian industrial manufacturing companies with at least 10 employees. The exclusion criteria used to finalise the sample selection required that the company must have had, at a minimum, the intention to innovate, meaning that such intention had to have materialised into at least one concrete project. Therefore, after excluding potentially innovative firms, the final sample comprised 1,572 companies. This sample selection enabled a robust representation of the Colombian manufacturing sector, allowing analysis of the impact of financial resources and the National Science and Technology System (NSTS) on innovation, as well as the constraints and barriers that companies face in their innovative performance.

### *Data analysis*

The statistical analysis in this study was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM), implemented with SmartPLS 4.1.1.4 software (Ringle et al., 2024). PLS-SEM is particularly appropriate for modelling complex relationships among latent constructs and enables a rigorous assessment of the proposed hypotheses. The analytical procedure encompassed two core stages: the evaluation of the measurement model and the assessment of the structural model, which together provide a comprehensive examination of the model's reliability, validity, and causal relationships. The measurement model focused on establishing the relationship between observable indicators and latent constructs defined in the literature review.

The Innovative Performance construct was treated as reflective, given that its indicators are mutually interchangeable and represent manifestations of an underlying phenomenon (Hair et al., 2020; Hair et al., 2022). In contrast, the other constructs were treated as formative, allowing the indicators to contribute distinct aspects to the construct's definition. The quality of the model was assessed by examining indicator collinearity using the variance inflation factor (VIF), ensuring that all values remained below 3 to avoid multicollinearity issues (Hair et al., 2022). In addition, the bootstrapping method was used to evaluate the statistical significance of the indicators' external weights and to determine their relative contribution to the construct. The following procedure allows identification of statistically significant indicators essential for the analysis.

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On the other hand, the structural model explored the relationships between latent variables, evaluating predictive relevance using the coefficient of determination R<sup>2</sup>. This index indicates the proportion of variance in the dependent variable that is explained by the independent variables. Other fit coefficients were also considered to evaluate the overall quality of the model and its ability to adequately reflect the postulated theoretical relationships (Hair et al., 2022). In summary, the statistical analysis performed using PLS-SEM offers a robust and flexible approach, allowing researchers to better understand the dynamics between financial resources, the National Science and Technology System, and Innovative Performance in the context of manufacturing SMEs. This methodological approach not only ensures the validity of the results but also contributes to a deeper understanding of the factors that influence innovation within the sector.

## RESULTS

This section presents the results of the analysis of the collected data, which allow evaluation of the hypotheses proposed in the study. It presents the relevant findings on the influence of financial resources, the National Science and Technology System (NSTS), and other variables on the innovative performance of Colombian manufacturing SMEs.

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### *Measurement Model Evaluation*

The dimensions related to the interactions with the National Science and Technology System (NSTS) were conceptualised as reflective measurement constructs. The weights for each indicator are reported in Table 2, where all indicators associated with the proposed constructs are statistically significant. The evaluation of the measurement model followed the guidelines established by Hair et al. (2022). Accordingly, several criteria were examined, including internal consistency, assessed through Cronbach's alpha and composite reliability. Convergent validity was assessed using the average variance extracted (AVE), while discriminant validity was evaluated using the HTMT ratio, which compares the average correlations of indicators across constructs with the average correlations of indicators within the same construct. Each criterion is discussed in detail in the following sections.

**Table 2**  
**Measurement Model with Significant Indicators**

Construct	Indicator	External Weight	Loading	t-value	Significance
NSTS	rsnt01	0.193	0.630	29.878	p < 0.001
	rsnt02	0.207	0.666	26.584	p < 0.001
	rsnt03	0.131	0.638	25.970	p < 0.001
	rsnt04	0.148	0.639	30.543	p < 0.001
	rsnt05	0.268	0.660	24.803	p < 0.001
	rsnt06	0.173	0.704	32.293	p < 0.001
	rsnt07	0.163	0.670	36.376	p < 0.001
	rsnt08	0.239	0.648	26.357	p < 0.001
Innovative Performance (IP)	dein01	0.845	0.891	14.974	p < 0.001
	dein02	0.457	0.541	5.974	p < 0.001

Source: Own elaboration.

Cronbach's Alpha and Composite Reliability: Cronbach's Alpha ( $\alpha$ ) is a widely used parameter to evaluate the internal consistency of a construct, estimating reliability based on the inter-item correlations of observed variables. In the present analysis, the NSTS construct yielded  $\alpha=0.816$ , indicating acceptable reliability. This value is reported in Table 3 alongside the Omega-a ( $\rho_A$ ) and Composite Reliability (CR) coefficients to allow a comprehensive assessment of measurement quality. Cronbach's Alpha was not calculated for single-item or formative constructs (Financial Resources), as it is not applicable in such cases. Regarding the Omega-a coefficient ( $\rho_a$ ), this indicator is appropriate when all items are assumed to measure the same underlying construct, and there is no theoretical justification to consider them as capturing different components.

Unlike Alpha,  $\rho_a$  relies on factor loadings, providing more robust and stable estimates that reflect the true reliability of the measure without being affected by the number of items (Roco et al., 2024). For the Omega coefficient to be considered acceptable, its value should fall between 0.70 and 0.90 (Campo & Oviedo, 2008; Roco et al., 2024). Composite Reliability (CR) serves as a complementary measure and is interpreted similarly to Cronbach's Alpha. As shown in Table 3, the indicators range from 0.698 to 0.859. It is worth noting that values exceeding 0.9 are undesirable, as they may indicate that the items are essentially redundant and measure the same phenomenon, which is not suitable for assessing the construct (Hair et al., 2019).

Convergent validity: This concept assesses the extent to which a construct correlates positively with alternative measures that assess the same construct. In the context of a reflective construct, the indicators are interpreted as different ways of measuring the same phenomenon. Therefore, items representing a particular reflective construct should converge and share a high proportion of variance. A high value in the external loadings of a construct indicates that the associated indicators have much in common, which is effectively captured by the construct. To assess this validity, the Average Variance Explained (AVE) is used. The AVE results presented in Table 3 show that the construct associated with the National Science and Technology System explains 43.2% of the variance. In contrast, for Innovative Performance, the AVE rises to 54.5%. This indicates that each latent variable explains a substantial portion of the variance in the indicators, thereby reinforcing the convergent validity of the constructs analysed.

Discriminant validity: This concept refers to the extent to which a construct is distinct from others. The first approach applied was the criterion proposed by Fornell and Larcker (Hair et al., 2022; Radomir & Moisescu, 2020), which involves comparing the square root of the AVE with the correlations among the latent variables. According to this criterion, the square root of the AVE should exceed the inter-construct correlations. However, due to limitations of

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this approach, the HTMT (Heterotrait-Monotrait Ratio) criterion was employed. HTMT is considered the most robust method in PLS-SEM for evaluating discriminant validity and requires values below 0.85 (Henseler et al., 2015).

Additionally, to enhance the reliability of the analysis, the Bootstrapping technique was applied. This method generates the sampling distribution of the HTMT statistic by creating multiple random subsamples from the original dataset. Each subsample is used to re-estimate the model, and the process is repeated numerous times. As a result, a 95% confidence interval for the HTMT values is obtained, indicating the range within which the true value is likely to fall. Because the resulting interval does not include the value of 1, it can be concluded that discriminant validity is present, confirming that the constructs defined in the model are conceptually distinct and appropriate for the analysis (Hair et al., 2022).

**Table 3**  
**Correlation Matrix, Reliability, Convergent and Discriminant Validity, And Heterotrait-Monotrait Ratio (HTMT)**

	Alpha	rho	A	CR	AVE	NSTS	IP	FR	95% CI	Relation
Relations with <i>NSTS</i> Innovative Performance Heterotrait-monotrait ratio (HTMT)	0.816	0.859	0.859	0.432						
Financial Resources				0.698	0.545			0.753	[0.179;0.389]	FR NSTS
Relation with <i>NSTS</i> Innovative Performance							0.861	0.301	[0.120;0.395] [0.164;0.566]	NSTS IP FR IP

Source: Own elaboration.

### *Structural model evaluation*

To evaluate this model, followed the proposal made by Hair et al. (2022). Initially, the collinearity of the structural model is evaluated, followed by an assessment of the significance and relevance of the model's relationships. Thus, R2 is evaluated repeatedly, as well as its predictive relevance.

Collinearity Assessment of the structural model: used the Variance Inflation Factor (VIF) to assess multicollinearity among the predictors. The VIF is defined as the reciprocal of the tolerance and indicates the extent to which independent variables are correlated within a regression model. When multicollinearity is present, meaning that two or more predictors share substantial variance, it can distort the estimation of regression coefficients and compromise the model's stability. The VIF quantifies how much the variance of a coefficient is inflated due to this issue. As a general criterion, VIF values should be below 5 to rule out problematic collinearity. In this analysis, both the Financial Resources and Relations with

the National Science & Technology System constructs had VIF values below this threshold, indicating no multicollinearity concerns. The results are presented in Table 4.

Relevance of model relationships: This measure shows the strength of the relationships between the independently proposed constructs and the dependent variable. In this case, Financial Resources and Relationships with the National Science & Technology System are independent variables, and Innovative Performance is the dependent variable. These standardised values range from -1 to +1. The further these values are from zero, the greater the impact on the dependent variable in the direction of the sign, i.e., affecting it positively or negatively. It should be noted that values close to zero have no impact. As shown in Table 4, the relationship weights are significant, supporting the validity of the proposed model. To assess whether these standardised coefficients are truly significant, bootstrapping was used. Based on the coefficients calculated for each subsample, the standard error and standard deviation can be estimated to obtain the corresponding values. In this way, it is feasible to calculate the t-statistic (Student's t-test) and the p-value, which are presented in Table 4.

Another indicator of the statistical significance of the coefficients associated with the relationships among the model constructs (external loads) is the confidence intervals constructed via bootstrapping. These intervals provide additional information on the stability of the estimated coefficients. Using a 95% confidence interval, the central idea is that this interval does not include zero. As can be seen in Table 4, none of the confidence intervals for the constructs contains zero, thereby complementarily validating their significance.

Coefficient of Determination ( $R^2$ ): It is one of the most used measures. This coefficient measures the model's predictive power. It represents the latent exogenous variables, along with the effects of the endogenous variables. Therefore, it represents the amount of variance in the endogenous variable explained by the exogenous constructs. The value of this coefficient ranges from 0 to 1. For the present model, we have an  $R^2$  of 0.184. According to Hair et al. (2022), this is considered satisfactory.

Predictive Relevance ( $Q^2$ ): It is the final indicator used to evaluate the structural model, and it was proposed to measure its relevance. When a model has predictive relevance, i.e., when the  $Q^2$  value is greater than zero, it indicates that the independently specified constructs can predict the valudent variable. In other words, both the Financial Resources construct and the National Science and Technology System construct predict the outcome of the Innovative Performance construct because their  $Q^2$  values are greater than zero (Danks & Ray, 2018).

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**Table 4**  
**Assessment of The Measurement Model**

	IP	NSTS	VIF	<i>t-value</i>	<i>p-value</i>	95% CI	Predictive Relevance Q <sup>2</sup>
<b>Innovative performance</b>				FR->IP 3.582	0.000	FR->IP [0.083;0539]	0.086
<b>Financial Resources</b>	0.268	0.291	FR->IP 1.093	FR->NSTS 7.3770	0.000	FR-> NSTS [0.151;0.412]	
<b>Relation with NSTS</b>	0.266		NSTS ->IP 1.093	FR->NSTS 6.764	0.000	NSTS->IP [0.119;03.83]	0.032
<b>Innovative performance</b>		0.698	FR-> NSTS 0.545				

NSTS: National Science and Technology System; IP: Innovative Performance; FR: Financial Resources. VIF: variance inflation factor, CI: Confidence interval 95% Source: Own elaboration.

The model presented in Figure 1 shows how the National Science and Technology System mediates the relations between Financial Resources and Innovative Performance. To test this mediation, Bootstrap was used, which utilises sample distributions of indirect effects to avoid the difficulties presented by the Sobel Test (Murad et al., 2020). This technique does not assume any distribution of the variables. Thus, the methodology proposed by Hair et al. (2022), which assesses mediation through direct and indirect effects, is used to test this mediation. The results can be seen in Table 5, where it can be analysed that there is ultimately complementary mediation, indicating that the relationship between innovative performance and financial resources is not only explained by changes in resources but is also affected by changes associated with the National Science and Technology System. To summarise, Table 6 presents each hypothesis formulated and its results.

**Table 5**  
**Mediation Test Between Proposed Constructs**

Relation	Indirect effect	95% CI	<i>t-value</i>	<i>p-value</i>
FR->NSTS->IP	0.078	[0.037;0.131]	5.509	0.000

NSTS: National Science and Technology System; IP: Innovative Performance; FR: Financial Resources. Source: Own elaboration.

**Table 6**  
**Hypotheses Results**

Hypothesis	Description	Result
<b>H<sub>1</sub></b>	Financial resources (FR) allocated to the innovation process have a positive relationship with innovative performance (IP).	Confirmed
<b>H<sub>2</sub></b>	The National Science and Technology System (NSTS) has a positive relationship with innovative performance (IP).	Confirmed
<b>H<sub>3</sub></b>	Financial Resources (FR) have a positive relationship with the National Science and Technology System (NSTS).	Confirmed
<b>H<sub>4</sub></b>	The National Science and Technology System (NSTS) mediates between financial resources and innovative performance.	Confirmed

Source: Own elaboration.

## DISCUSSION

Regarding the relationship between financial resources and innovative performance, Mariane et al. (2024) highlight the importance of identifying appropriate strategies that enable firms to reduce financial risks and enhance operational efficiency. This is consistent with the findings of the present study, which show that a sustained flow of financial resources positively influences innovation outcomes. Similarly, Chen et al. (2024) consider that the innovative performance of SMEs is shaped by the financial improvements they implement to maintain stability and balance. In the same vein, Guo et al. (2022) highlight the relevance of external support, particularly that provided through public policies and initiatives, to strengthen financial capabilities, which ultimately contribute to enhanced innovative performance.

On the other hand, another factor that positively impacts companies' innovative performance is support from the National Science and Technology System. As noted by Erzurumlu et al. (2022), these types of institutions aim to strengthen the strategies implemented in companies from a systemic perspective, as evidenced by the results of this study and by entrepreneurs. The NSTS brings together a group of actors that make it possible to achieve better innovative performance. The role of research groups, universities, and the intellectual property system is noteworthy. These actors are fundamental elements in building R&D capabilities for manufacturing SMEs.

Findings of this study support theories such as RBV, the Theory of Capital Cost, the Evolutionary Theory of Innovation, and the Theory of National Innovation Systems (TNIS). For instance, according to Zuo (2022), the Theory of Resource-Based View (RBV) posits that financial resources improve innovation capabilities and that, as companies secure greater resource flows, they can increase their investment in R&D. This results in a propensity to generate more innovations reflected in new products, processes, or services. Complementarily, the Evolutionary Theory of Innovation, based on principles of evolutionary biology, explains how changes driven by different determinants enable the effective materialisation of innovation processes. Within this theory, financing is a predictor of innovation in companies (Kruglov & Shaw, 2024). Similarly, the Theory of Innovation Systems (TSNI) argues that cooperation, mutual learning, and alliances between different actors in the system, such as those proposed in this research, enable the generation of knowledge and innovative solutions (Wu & Huang, 2024).

## CONCLUSIONS

This study set out to analyse the relationships among financial resources, the National Science and Technology System (NSTS), and innovative performance in Colombian manufacturing SMEs. The results from the PLS-SEM analysis confirm all four hypotheses, yielding three key findings. First, financial resources exert a direct and positive influence on innovative performance (H1 confirmed,  $\beta = 0.268$ ,  $p < 0.001$ ), underscoring that adequate investment is a necessary, though not sufficient, condition for innovation in this sector. Second, the NSTS itself positively and significantly predicts innovative performance (H2 confirmed,  $\beta = 0.266$ ,  $p < 0.001$ ), indicating that institutional actors: universities, R&D centres, technology platforms, and patent systems play an independent and substantive role beyond the financial channel. Third, the NSTS functions as a complementary mediator between financial resources and innovative performance in the Colombian case (H4 confirmed, indirect effect = 0.078, 95% CI [0.037, 0.131]), meaning that the impact of financing on innovation is amplified when companies actively engage with the national science and technology ecosystem. Together, these findings advance the understanding of innovation in emerging-economy manufacturing firms and provide a robust empirical foundation for both managerial practice and public policy.

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### *Theoretical implications*

The findings contribute to the literature in three interconnected ways. First, they extend the RBV by demonstrating empirically that financial resources alone do not determine innovative performance. However, their effects are conditioned by a firm's integration into the national science and technology ecosystem. Second, the complementary mediation found provides nuanced support for the Theory of National Innovation Systems, confirming that systemic actors (universities, technology centres, incubators) serve not merely as background conditions but as active mediators that translate financial inputs into innovation outputs. Third, by situating the Credit Rationing and Pecking Order theories within an innovation context, this study adds to the nascent literature connecting financial constraints to SME innovation capacity in Latin America, a region where both access to credit and institutional development remain highly heterogeneous.

### *Practical implications*

For managers of manufacturing SMEs, the findings point to two actionable priorities. First, investment in innovation must be deliberate and structured rather than residual: firms that allocate dedicated budgets to scientific, technological, and innovation activities consistently outperform those that do not. Critically, however, the returns on this investment are conditional on institutional engagement. Second, managers should actively cultivate

relationships with NSTS actors. The measurement model reveals that among the twelve NSTS indicators, R&D departments (rsnt01), interdisciplinary innovation groups (rsnt02), universities (rsnt05), and seminars and conferences (rsnt06) carry the highest loadings, suggesting these are the most productive channels through which SMEs can amplify the value of their financial investments. For policymakers, the mediating role of the NSTS provides a strong rationale for public investment in institutional capacity. Strengthening the articulation between Minciencias, regional technology centres, and business incubators would lower the cost of NSTS access for small firms, thereby expanding the innovation premium that comes from financial investment. Tax incentives or co-financing schemes explicitly conditioned on NSTS engagement could be particularly effective instruments.

#### *Social implications*

In a national innovation system, the government occupies a central position as the main coordinating and steering actor. It is responsible for designing and implementing policies and allocating the financial, regulatory, and institutional resources needed to strengthen the innovation ecosystem. By formulating coherent science, technology, and innovation policies, the government can enhance and expand the institutional innovation capacities of the manufacturing sector, particularly SMEs, thereby promoting firm competitiveness, social well-being, and sustainable development.

#### *Limitations*

Despite its contributions, the study has limitations that must be considered when interpreting the results. First, the cross-sectional design based on EDIT IX (2017–2018) precludes causal inference and does not capture structural changes in science, technology, and innovation policy that may have occurred since that period, including disruptions associated with the COVID-19 pandemic. Second, the model focuses on two independent constructs (FR and NSTS), while other drivers of innovative performance, such as human capital, organisational culture, and dynamic capabilities, are not incorporated. Third, the analysis is confined to the Colombian manufacturing sector, which limits direct generalisation to other industries or national contexts.

#### *Future research agenda*

These limitations define a clear agenda for future research. First, longitudinal or panel analyses using successive EDIT waves (X, XI, XII) would allow researchers to examine whether the mediating role of the NSTS has strengthened or weakened in the post-pandemic policy environment, providing a dynamic picture of how systemic innovation capacity evolves. Second, incorporating moderating variables such as firm size, technological intensity (CIIU sector), or geographic proximity to technology clusters would reveal boundary conditions for the NSTS mediation effect and enrich the theoretical model. Third, replicating the model in other Latin American countries with comparable national innovation

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systems (e.g., Mexico, Chile, or Peru) would test the external validity of the findings and contribute to a comparative theory of innovation in emerging economies. Fourth, qualitative or mixed-methods studies examining the specific mechanisms through which NSTS actors translate financial resources into innovation outcomes would complement the quantitative evidence presented here and provide richer insights for practitioners and policymakers alike.

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## Virtual Influencer Credibility and Purchase Intention: The Mediating Role of Consumer Skepticism in China

*Credibilidad de influencers e intención de compra: el papel mediador del escepticismo del consumidor en China*

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### ABSTRACT

This study investigates how source credibility of virtual influencers affects purchase intention, with particular attention to the mediating role of consumer skepticism. An online survey was conducted among Chinese consumers who had prior exposure to virtual influencer content. Survey data collected from 350 valid respondents were analysed using structural equation modelling with AMOS 24.0. Results confirm that source credibility positively influences purchase intention and negatively influences consumer skepticism, which in turn negatively affects purchase intention. Bootstrap analysis with 5,000 resamples reveals that consumer skepticism partially mediates the credibility-intention relationship, with the indirect effect accounting for 26.53% of the total effect. These findings extend source credibility theory to the virtual influencer context and highlight the critical role of skepticism reduction in digital persuasion processes. The study contributes to the emerging literature on virtual influencer marketing by identifying consumer skepticism as a key psychological mechanism. Practical implications for brand managers in selecting, designing, and operating virtual influencers are discussed, along with directions for future research.

**Keywords:** Virtual influencers; Source credibility; Consumer skepticism; Purchase intention; Digital marketing; Persuasion.

Jel Code: M31; M37.



### RESUMEN

Este estudio investiga cómo la credibilidad de la fuente de los influencers virtuales incide en la intención de compra, prestando especial atención al papel mediador del escepticismo del consumidor. Se realizó una encuesta en línea entre consumidores chinos con exposición previa al contenido de influencers virtuales. Los datos de la encuesta, recopilados de 350 participantes válidos, se analizaron mediante el modelado de ecuaciones estructurales con AMOS 24.0. Los resultados confirman que la credibilidad de la fuente influye positivamente en la intención de compra y negativamente en el escepticismo del consumidor, lo que, a su vez, afecta negativamente la intención de compra. El análisis bootstrap con 5000 remuestreos revela que el escepticismo del consumidor media parcialmente la relación entre credibilidad e intención, con un efecto indirecto que representa el 26,53 % del efecto total. Estos hallazgos extienden la teoría de la credibilidad de la fuente al contexto de los influencers virtuales y resaltan el papel fundamental de la reducción del escepticismo en los procesos de persuasión digital. El estudio contribuye a la literatura emergente sobre el marketing de influencers virtuales al identificar el escepticismo del consumidor como un mecanismo psicológico clave. Se discuten las implicaciones prácticas para los gerentes de marca en la selección, el diseño y la gestión de influencers virtuales, así como las líneas de investigación futuras.

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Palabras clave: Influencers virtuales; Credibilidad de la fuente; Escepticismo del consumidor; Intención de compra; Marketing digital; Persuasión.

Código JEL: M31; M37.

## INTRODUCTION

In recent years, social media has become a vital channel for brand-consumer communication. Influencer marketing, as an emerging digital marketing strategy, is fundamentally reshaping traditional paradigms of brand promotion (Campbell & Farrell, 2020). Influencers publish content on platforms such as Instagram, TikTok, and YouTube, leveraging their expertise, credibility, and intimate relationships with followers to effectively shape consumer attitudes and purchasing decisions (Hudders et al., 2021; Vrontis et al., 2021). Research indicates that influencer credibility is a key determinant of marketing effectiveness, with consumers placing greater trust in product recommendations from influencers perceived as knowledgeable, trustworthy, and attractive (Lou & Yuan, 2019; Wiedmann & von Mettenheim, 2020). Against this backdrop, brands have increasingly incorporated influencer marketing into their integrated marketing communication strategies, seeking to enhance brand awareness and purchase intention through the parasocial relationships between influencers and consumers (Ki et al., 2020).

With the rapid advancement of artificial intelligence (AI) and computer graphics technology, virtual influencers have emerged as an entirely new category of digital spokespersons, quickly becoming a focal point of marketing research (Audrezet et al., 2025). Virtual influencers are digitally created personas developed through AI and computer-generated imagery (CGI) technologies. Examples include Lil Miquela, Imma, and AYAYI, who possess distinct personalities, lifestyles, and social media accounts, enabling them to interact with followers and promote brand products much like their human counterparts (Gerlich, 2023; Su, 2025).

Major brands such as Prada, Gucci, and Louis Vuitton have begun collaborating with virtual influencers, primarily because these digital entities offer high controllability, eliminate scandal risks, and can engage in brand communication around the clock (Sands et al., 2022; Thomas & Fowler, 2021). Studies show that 75% of social media users aged 18 to 24 follow at least one virtual influencer, with approximately 40% having purchased products recommended by virtual influencers (Lee et al., 2025). Nevertheless, the non-human nature of virtual influencers has sparked deeper discussions regarding authenticity, credibility, and consumer trust (Arsenyan & Mirowska, 2021).

Despite the rapid growth of virtual influencer marketing, existing research lacks a thorough understanding of the underlying mechanisms through which virtual influencers affect consumer behaviour (Davlembayeva et al., 2025). Source Credibility Theory (SCT) posits that the expertise, trustworthiness, and attractiveness of information sources are critical dimensions that determine the effectiveness of persuasion (Ohanian, 1990). This theoretical framework has been extensively applied in celebrity endorsement and human influencer

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research (Saima & Khan, 2020). However, as artificially created digital entities, virtual influencers may differ fundamentally from human influencers in how they construct source credibility and the pathways through which credibility operates (Kim & Wang, 2024).

Concurrently, consumer skepticism toward marketing messages represents a significant factor influencing purchasing decisions (Obermiller & Spangenberg, 1998). In the digital era, consumers have developed heightened knowledge of persuasion, enabling them to recognise and resist marketers' persuasive intent (Ringold, 2023). When confronted with virtual influencers as a novel marketing form, consumers may experience intensified skepticism, thereby affecting their acceptance of brand messages and purchase intention (Jamil et al., 2022). This raises the possibility that skepticism functions not merely as an outcome but as a mediating psychological mechanism that transmits and potentially attenuates the persuasive effects of source credibility. Yet, few studies have systematically examined the specific role of consumer skepticism in the virtual influencer marketing context.

Building on these research gaps and practical needs, this study focuses on the virtual influencer marketing context to examine the mechanisms through which source credibility influences consumer purchase intention, with particular emphasis on the mediating effect of consumer skepticism. Specifically, this research seeks to answer: Can the source credibility of virtual influencers effectively reduce consumer skepticism and subsequently promote purchase intention? To address this question, this study integrates SCT and consumer skepticism research to construct a theoretical model and empirically test it through survey methodology.

This study makes three contributions: (1) extending SCT to the virtual influencer context by examining whether expertise, trustworthiness, and attractiveness remain effective when the source is a digitally created entity rather than a human communicator; (2) identifying consumer skepticism as a key psychological mechanism that mediates the credibility-intention relationship, illuminating the process through which virtual influencers overcome consumers' resistance to persuasion; and (3) providing actionable managerial guidance for brands on enhancing virtual influencer credibility and reducing consumer skepticism through expertise signaling, transparency practices, and authenticity cultivation.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### *Virtual Influencer Marketing*

Virtual influencers are digitally created personas developed through computer graphics technology and AI, with human-like appearances, unique personality profiles, and social media accounts that enable them to publish content and interact with followers across various

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platforms (de Brito Silva et al., 2022). Compared to human influencers, virtual influencers offer several distinctive advantages: brands can exercise complete control over their image and behaviour, avoiding the scandal risks associated with human endorsers; virtual influencers are unconstrained by time and space, allowing for continuous brand communication; furthermore, their high customizability enables brands to craft ideal spokesperson images tailored to target audience preferences (Igarashi et al., 2024).

Research demonstrates that Millennials and Generation Z consumers exhibit high acceptance and interest in virtual influencers, which are closely related to their upbringing in digital environments and their familiarity with interacting with virtual characters (Angmo & Mahajan, 2024). However, the artificial nature of virtual influencers also presents unique challenges. Because consumers know that virtual influencers are created and controlled entities, they may question the authenticity and motives behind their recommendations, potentially developing resistance toward marketing messages (Barari et al., 2025). Therefore, understanding how virtual influencers establish credibility and effectively influence consumer behaviour has become a pressing issue in contemporary marketing research.

#### *Source Credibility and Purchase Intention*

SCT originated in the field of communication, initially proposed by Hovland and Weiss (1951), who argued that source credibility significantly influences audience acceptance of information and attitude change. Ohanian (1990) further developed this framework, proposing a three-dimensional model for measuring endorser credibility comprising expertise, trustworthiness, and attractiveness.

Expertise refers to the audience's perception of the source's knowledge and competence in a specific domain; trustworthiness reflects the audience's judgment of the source's honesty and reliability; attractiveness encompasses the source's physical appearance and the charm of its personality that appeals to audiences. This theoretical framework has been extensively applied in research on celebrity endorsement, advertising communication, and influencer marketing (Schouten et al., 2020).

In the context of influencer marketing, substantial research has confirmed the positive impact of source credibility on consumer purchase intention. When consumers perceive influencers as highly expert, trustworthy, and attractive, they tend to believe the influencer's product recommendations and subsequently develop stronger purchase intentions (Alcántara et al., 2024; Chetioui et al., 2020). In the virtual influencer context, although their non-human nature may raise consumer questions about authenticity, research indicates that carefully designed virtual influencers can similarly demonstrate expertise, build trust, and attract consumers through distinctive visual imagery (Kim & Park, 2023). Based on this analysis, this study proposes:

*H<sub>1</sub>: Higher source credibility of virtual influencers leads to stronger consumer purchase intention.*

## *Source Credibility and Consumer Skepticism*

Consumer skepticism is a stable psychological trait characterised by a general tendency to distrust advertising or marketing messages, manifesting as pervasive questioning of the truthfulness of marketing claims (Obermiller & Spangenberg, 2000). This sceptical attitude stems from consumers' accumulated marketplace experiences, in which they recognise that advertising and marketing messages typically carry persuasive intent, prompting them to exercise vigilance (Petty & Cacioppo, 1986).

According to the Persuasion Knowledge Model (PKM), consumers employ their knowledge of marketers' motives and strategies to evaluate and cope with persuasion attempts; when they identify obvious commercial intent, they tend to develop stronger resistance (Pham & Barretta, 2024). Source credibility plays a crucial role in reducing consumer skepticism. When information sources are perceived as possessing expertise and trustworthiness, consumers more readily believe the conveyed information is objective and reliable, thereby reducing skepticism toward marketing messages (Chen et al., 2021). Conversely, when source credibility is low, consumers become more alert to the commercial motives behind the message, thereby reinforcing their sceptical attitude. In the context of virtual influencer marketing, if virtual influencers demonstrate professional competence, sincere attitudes, and attractiveness, consumers may be more receptive to commercial promotions. Based on this reasoning, this study proposes:

*H<sub>2</sub>: Higher source credibility of virtual influencers leads to lower consumer skepticism.*

## *Consumer Skepticism and Purchase Intention*

Consumer skepticism significantly impacts purchasing decisions. Highly sceptical consumers tend to question the authenticity of advertising information and hold reservations about product claims, a psychological state that inhibits the formation of positive brand attitudes and purchase intention (Wu & Geylani, 2020). Research indicates that when consumers develop skepticism toward marketing messages, they scrutinise message content more carefully, searching for inconsistencies or exaggerations. This cognitive processing pattern typically leads to negative evaluations of brands and products (Cabeza et al., 2022).

In influencer marketing, consumer skepticism similarly undermines marketing effectiveness. When consumers question the genuine motives behind influencers' product recommendations, their interest in products and purchase propensity decline (Liu & Zheng, 2024). Given their artificial nature, virtual influencers are particularly prone to triggering

scepticism among consumers, who may perceive them as entirely brand-controlled entities whose recommendations lack an authentic experiential foundation. Therefore, this study proposes:

*H<sub>3</sub> Higher consumer skepticism leads to lower purchase intention.*

*The Mediating Role of Consumer Skepticism and the Conceptual Model*

Synthesising the theoretical analysis above, this study argues that consumer skepticism mediates the relationship between the credibility of virtual influencer sources and purchase intention. Specifically, the source credibility of virtual influencers operates through its effect on consumer skepticism, which subsequently influences purchase intention. When virtual influencers demonstrate high levels of expertise, trustworthiness, and attractiveness, consumers reduce their vigilance and questioning of marketing messages, and this diminished skepticism further promotes the formation of positive purchase intention (Kanaveedu & Kalapurackal, 2022).

This mediating mechanism reveals the psychological pathway through which source credibility influences purchase intention: credible information sources can effectively dissolve consumers' defensive psychology, making them more open to accepting product recommendation information. Authenticity perception research also supports this view, suggesting that when consumers perceive influencers as sincere and trustworthy, they are less likely to deploy persuasion knowledge to resist marketing messages, thereby becoming more easily persuaded (Lee & Eastin, 2021). Therefore, this study proposes:

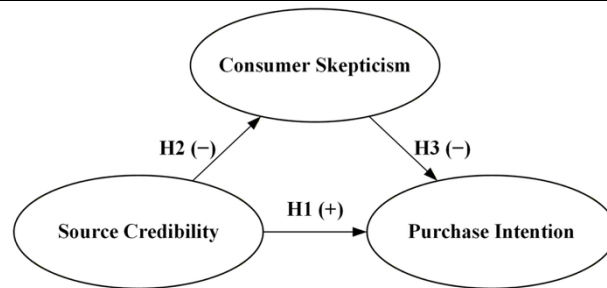
*H<sub>4</sub>: Consumer skepticism mediates the relationship between virtual influencer source credibility and purchase intention.*

Based on the literature review and hypothesis development presented above, this study constructs the research conceptual model shown in Figure 1. The model positions source credibility of virtual influencers as the independent variable, consumer purchase intention as the dependent variable, and consumer skepticism as the mediating variable. The model hypothesises that source credibility can directly positively influence purchase intention (H1) and indirectly promote it by reducing consumer skepticism (H2). In contrast, consumer skepticism negatively impacts purchase intention (H3), thereby forming a partial mediating effect pathway (H4).

**Figure 1**  
**Research Model**

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Source: Own elaboration.

## METHODOLOGY

### *Research Design*

This study employed a quantitative research approach, collecting data through survey methodology to test the proposed hypothetical model. Quantitative research methods are suitable for examining causal relationships between variables and can verify the validity of theoretical hypotheses through statistical analysis. Survey methodology is the most commonly used data collection approach in influencer marketing research, offering advantages such as cost-effectiveness, broad sample coverage, and high data standardisation (Vrontis et al., 2021).

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This study designed a structured questionnaire containing measurement items for three core variables, namely virtual influencer source credibility, consumer skepticism, and purchase intention, along with background information on respondents' demographic characteristics and social media usage behaviour. To ensure respondents could answer based on authentic experiences, the questionnaire employed scenario simulation, presenting virtual influencer social media content as stimuli before the measurement items, enabling respondents to complete the questionnaire on a unified cognitive basis.

### *Stimulus Selection*

This study selected a representative virtual influencer as the experimental stimulus. Stimulus selection followed these criteria: first, the selected virtual influencer should possess high visibility and follower base to ensure respondents have some familiarity; second, the virtual influencer's image should be human-like, meaning the appearance approximates real humans rather than cartoon or anime styles, as research indicates human-like virtual influencers are more comparable to human influencers in marketing effectiveness (Kim & Wang, 2024); finally, the selected virtual influencer should have brand collaboration and product promotion experience to align with this study's marketing context.

Based on these criteria, this study selected AYAYI, a prominent Chinese virtual influencer created by Ranmai Technology, as the stimulus. AYAYI debuted on Xiaohongshu (RED) in

May 2021 and quickly gained widespread attention for her hyper-realistic appearance. She has collaborated with major brands including Guerlain, Louis Vuitton, and L'Oréal, making her highly relevant to the marketing context of this study.

The stimulus material consisted of a screenshot of AYAYI's brand collaboration post featuring a beauty product from her official Xiaohongshu account. The post included a product image, AYAYI's endorsement text, and typical social media engagement indicators (likes and comments). In the formal questionnaire, respondents first read a brief explanation of virtual influencers to understand their non-human digital identity, then viewed the stimulus post for approximately 30 seconds, and finally answered subsequent measurement items based on the content they viewed.

#### Sample and Data Collection

The target sample for this study consisted of consumers with experience with social media and some awareness of virtual influencers. Given that virtual influencer audiences primarily consist of younger demographics, this study focused data collection on consumers aged 18 to 45 (Angmo & Mahajan, 2024). Sample size determination followed the basic requirements for Structural Equation Modelling (SEM) analysis, stipulating that the sample size should be 5 to 10 times the number of measurement items, with a total sample size of at least 200. This study's questionnaire contained 29 core measurement items, yielding a required sample size of 145-290. To ensure analytical robustness and account for potential invalid questionnaires, the study planned to collect at least 350 questionnaires.

Data collection employed online survey methods, distributed through Credamo, a professional survey platform widely used in Chinese consumer research. Respondents were recruited using a combination of convenience sampling and snowball sampling. To ensure that respondents had genuine exposure to virtual influencers, a screening question was included at the beginning of the survey: "Have you ever seen content posted by a virtual influencer on social media?" Only respondents who answered "Yes" were allowed to proceed to the formal questionnaire.

No strict demographic quotas were imposed; however, sample composition was monitored during data collection to ensure adequate representation across age and gender groups. The questionnaire used an anonymous format, with respondents reading informed consent statements before completing the questionnaire to understand the research purposes, data usage, and privacy protection measures, and voluntarily clicking "Agree to Participate" before entering the formal questionnaire. To ensure data quality, the questionnaire included two attention-check items (e.g., "Please select Strongly Agree for this item") and recorded the completion time for each questionnaire. Data cleaning removed questionnaires that failed

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attention checks, had completion times under 120 seconds, or showed obvious patterned responses (e.g., selecting the same option for all items).

### *Measurement Instruments*

All variable measurements in this study employed validated, established scales with appropriate contextual modifications for the virtual influencer marketing context. All items used a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). The measurement instruments, sources, and adaptation notes for each variable are shown in Table 1.

**Table 1**  
**Measurement Model, Reliability, Validity, and Discriminant Validity**

Variable	English Name	Scale Source	Original Items	Items Used	Adaptation Notes
Source Credibility	Source Credibility	Ohanian (1990)	15	15	Changed “celebrity” to “virtual influencer”
Consumer Skepticism	Consumer Skepticism	Obermiller & Spangenberg (1998)	9	9	Changed “advertising” to “virtual influencer’s recommendation”
Purchase Intention	Purchase Intention	Spears & Singh (2004)	5	5	Changed “brand” to “product recommended by virtual influencer”

Source: Own elaboration.

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Source credibility was measured using the classic scale developed by Ohanian (1990), which comprises three dimensions: Expertise, Trustworthiness, and Attractiveness, with five semantic differential scale items per dimension, totalling 15 items. This scale represents the most widely cited measurement instrument in endorser credibility research and has been adopted by numerous influencer marketing studies (Wiedmann & von Mettenheim, 2020). This study replaced “celebrity” with “virtual influencer” to better fit the research context.

Consumer skepticism was measured using the advertising skepticism scale (SKEP) developed by Obermiller and Spangenberg (1998), which defines consumer skepticism as a general tendency to distrust advertising claims, containing 9 items. This study adapted references to “advertising” to “virtual influencer recommendations” to suit the specific context. Purchase intention was measured using the scale developed by Spears and Singh (2004), specifically designed to measure consumer purchase intention toward brands or products, containing 5 items with demonstrated reliability and validity in advertising and marketing research. This study adjusted the measurement object to “products recommended by virtual influencers.” Additionally, gender, age, education level, monthly income, duration of daily social media use, and familiarity with virtual influencers were included as control variables to exclude potential confounding effects on the research results.

Since the original scales were in English and data collection targeted Chinese respondents, scale translation was necessary. This study followed standard translation-back-translation

procedures: first, a researcher proficient in English with a marketing academic background translated the English scales into Chinese; subsequently, another independent bilingual researcher back-translated the Chinese version into English; finally, the back-translated version was compared with the original English scales, and both researchers jointly discussed and corrected items with semantic deviations to ensure translation accuracy and conceptual equivalence.

#### *Pilot Study*

Prior to formal data collection, a pilot study was conducted to examine questionnaire comprehensibility, measurement instrument reliability, and reasonableness of completion time. The pilot sample consisted of 50 respondents who matched the target group's characteristics and were recruited via the online survey platform. After the pilot study, feedback was collected on item clarity, potential ambiguities, and the smoothness of the completion process. Based on feedback, wording adjustments were made to items with unclear expressions.

Simultaneously, reliability analysis was conducted on pilot data, calculating Cronbach's  $\alpha$  coefficients for each scale. Results showed  $\alpha$  coefficients of 0.87, 0.89, and 0.85 for the three source credibility dimensions (Expertise, Trustworthiness, and Attractiveness), 0.83 for consumer skepticism, and 0.91 for purchase intention, all exceeding the acceptable threshold of 0.70, indicating good internal consistency of the measurement instruments. Furthermore, the average questionnaire completion time recorded during the pilot was approximately 8 minutes, indicating an appropriate questionnaire length that would not cause respondent fatigue.

#### *Data Analysis Methods*

Data analysis was conducted using SPSS 26.0 and AMOS 24.0 software, following these analytical steps. First, frequency analysis was performed on the sample demographic characteristics, and descriptive statistics were computed for each variable, including means, standard deviations, skewness, and kurtosis, to understand the basic distribution of the data. Second, the measurement model reliability and validity were examined. Reliability analysis used Cronbach's  $\alpha$  coefficients to assess scale internal consistency, with  $\alpha$  values greater than 0.70 indicating acceptable reliability. Validity analysis included convergent validity and discriminant validity testing: convergent validity was assessed through Confirmatory Factor Analysis (CFA), examining standardized factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE), requiring standardized factor loadings greater than 0.50, CR greater than 0.70, and AVE greater than 0.50; discriminant validity was evaluated by comparing the square root of each variable's AVE with inter-variable correlation coefficients, with the former exceeding the latter indicating good discriminant validity.

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Since this study used self-report questionnaires and collected all variables at a single time point, Common Method Bias (CMB) testing was necessary to assess whether it posed a threat to the research results. This study employed Harman's single-factor test, entering all measurement items into exploratory factor analysis; if the first unrotated factor explained less than 50% of variance, CMB was not considered a serious concern (Podsakoff et al., 2003). Acknowledge that Harman's single-factor test has limited sensitivity in detecting CMB. Therefore, several procedural remedies were also implemented during questionnaire design and data collection: (a) respondent anonymity was assured to reduce social desirability bias, (b) predictor and criterion variables were placed in separate sections of the questionnaire to create psychological separation, and (c) item order within each scale was randomised to reduce consistency motif. Additionally, the hypothesised model involves both positive and negative pathways, a pattern that CMB alone cannot artificially produce, and mediation effects tested via bootstrap are less susceptible to CMB inflation than simple bivariate correlations. Hypothesis testing employed SEM analysis. Model goodness-of-fit was first assessed using fit indices and acceptable criteria shown in Table 2.

**Table 2**  
**Model Fit Indices and Acceptable Criteria**

Fit Index	Full Name	Acceptable Criteria
$\chi^2/df$	Chi-square/Degrees of Freedom	< 3.00
CFI	Comparative Fit Index	> 0.90
TLI	Tucker-Lewis Index	> 0.90
RMSEA	Root Mean Square Error of Approximation	< 0.08
SRMR	Standardized Root Mean Square Residual	< 0.08

Source: Own elaboration.

With adequate model fit established, H1 through H3 were verified by testing the significance of the path coefficients. Mediation effect (H4) testing employed the Bootstrap method, which does not require data to meet normal distribution assumptions and is suitable for mediation effect testing (Preacher & Hayes, 2008). This study set 5,000 resampling iterations to calculate 95% bias-corrected confidence intervals for the mediation effect; if the confidence interval did not include 0, the mediation effect was considered significant. Additionally, by comparing changes in direct effects before and after adding the mediator variable, the type of mediation was determined: if the direct effect became non-significant after adding the mediator, full mediation was indicated; if the direct effect remained significant but weakened, partial mediation was indicated.

## RESULTS

### *Descriptive Statistics*

A total of 400 questionnaires were distributed through the online survey platform, with 387 returned, yielding a response rate of 96.75%. After data cleaning, which removed questionnaires failing attention checks (23), having completion times under 120 seconds (8), and showing obvious patterned responses (6), 350 valid questionnaires were obtained, representing an effective rate of 90.44%.

Sample demographic characteristics are shown in Table 3. Regarding gender distribution, female respondents comprised a slightly higher proportion (58.29%), consistent with virtual influencer fan demographics being predominantly female. For age distribution, respondents aged 18-25 and 26-35 together accounted for 82.00%, indicating the sample concentrated on younger consumer groups, aligning with the target sample positioning.

**Table 3**  
**Sample Demographics (N = 350)**

Variable	Category	Frequency	Percentage (%)
Gender	Male	146	41.71
	Female	204	58.29
Age	18-25	143	40.86
	26-35	144	41.14
	36-45	63	18.00
Education	High school or below	28	8.00
	Associate degree	77	22.00
	Bachelor's degree	191	54.57
	Master's or above	54	15.43
Monthly Income (CNY)	≤3,000	72	20.57
	3,001-6,000	106	30.29
	6,001-10,000	98	28.00
	≥10,001	74	21.14
Daily Social Media Usage	<1 hour	31	8.86
	1-2 hours	85	24.29
	2-4 hours	199	56.86
	>4 hours	35	10.00
VI Familiarity	Very unfamiliar	19	5.43
	Somewhat unfamiliar	52	14.86
	Neutral	114	32.57
	Fairly familiar	117	33.43
	Very familiar	48	13.71

Source: Own elaboration.

Concerning education level, respondents with bachelor's degrees comprised the highest proportion (54.57%), followed by associate degrees (22.00%). Monthly income distribution was relatively balanced, with the 3,001-6,000 CNY range showing the highest proportion

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(30.29%). Regarding daily social media usage, over half of respondents (56.86%) used social media 2-4 hours daily, indicating high social media activity in the sample. Regarding virtual influencer familiarity, respondents who were fairly or very familiar with each other accounted for 47.14%, indicating that nearly half of the respondents had a good understanding of virtual influencers.

Descriptive statistics for each variable are shown in Table 4. Source credibility had a mean of 4.53 and a standard deviation of 1.12, indicating that respondents perceived virtual influencer credibility as moderately high. Consumer skepticism had a mean of 3.89 and a standard deviation of 1.21, indicating respondents held some degree of skepticism toward virtual influencer recommendations. Purchase intention had a mean of 4.21 and a standard deviation of 1.35, indicating moderate purchase intention among respondents. All variables had absolute skewness values below 2 and absolute kurtosis values below 7, indicating that the data met the assumptions of a normal distribution.

**Table 4**  
**Descriptive Statistics and Correlation Matrix**

Variable	Mean	SD	Skewness	Kurtosis	1	2	3
1. Source Credibility	4.53	1.12	-0.31	-0.42	—		
2. Consumer Skepticism	3.89	1.21	0.18	-0.56	-0.47**	—	
3. Purchase Intention	4.21	1.35	-0.22	-0.68	0.52**	-0.44**	—

Source: Own elaboration.

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### *Reliability and Validity Analysis*

Cronbach's  $\alpha$  coefficients and CR were used to assess measurement instrument reliability, while CFA was employed to assess validity. As shown in Table 5,  $\alpha$  coefficients for the three source credibility dimensions (Expertise, Trustworthiness, and Attractiveness) were 0.85, 0.87, and 0.83, respectively, with a total scale  $\alpha$  of 0.91; consumer skepticism scale  $\alpha$  was 0.84; purchase intention scale  $\alpha$  was 0.89. All scale  $\alpha$  coefficients exceeded the acceptable threshold of 0.70, indicating good internal consistency. CR values for all variables ranged from 0.84 to 0.91, all exceeding the 0.70 threshold, further confirming scale reliability.

**Table 5**  
**Reliability and Convergent Validity**

Variable	Dimension	Items	Cronbach's $\alpha$	CR	AVE
Source Credibility	Expertise	5	0.85	0.86	0.55
	Trustworthiness	5	0.87	0.88	0.59
	Attractiveness	5	0.83	0.84	0.52
	Total Scale	15	0.91	0.91	0.55
Consumer Skepticism		9	0.84	0.85	0.51
Purchase Intention		5	0.89	0.90	0.64

Source: Own elaboration.

Regarding convergent validity, CFA results showed all measurement item standardised factor loadings ranged from 0.62 to 0.86, all exceeding the 0.50 threshold and significant at

$p < 0.001$ . AVE values for all variables ranged from 0.51 to 0.64, all exceeding the 0.50 acceptable threshold, indicating good convergent validity. Discriminant validity was assessed using the Fornell-Larcker criterion, requiring each variable's AVE square root to exceed its correlations with other variables. As shown in Table 6, the diagonal values represent the square roots of AVEs, all exceeding the correlations within their respective rows and columns, indicating good discriminant validity among variables.

**Table 6**  
**Discriminant Validity (Fornell-Larcker Criterion)**

Variable	1	2	3
1. Source Credibility	0.74		
2. Consumer Skepticism	-0.47	0.71	
3. Purchase Intention	0.52	-0.44	0.80

Source: Own elaboration.

#### *Common Method Bias Test*

Since independent, mediating, and dependent variables were all collected via a single questionnaire at a single time point, CMB testing was necessary to assess whether it threatened the research results. Harman's single-factor test was employed by entering all 29 measurement items into an exploratory factor analysis using unrotated principal components extraction. Results revealed 5 factors with eigenvalues greater than 1; the first factor explained 32.47% of variance, below the 50% critical threshold, indicating that CMB did not pose a serious concern in this study.

#### *Hypothesis Testing*

SEM was employed to test the hypotheses. Structural model goodness-of-fit was first assessed, and the results are shown in Table 7. The chi-square to degrees of freedom ratio ( $\chi^2/df$ ) was 2.34, below the 3.00 acceptable threshold; CFI was 0.931, and TLI was 0.923, both exceeding the 0.900 threshold; RMSEA was 0.062, and SRMR was 0.054, both below the 0.080 threshold. Collectively, these indicators demonstrated good structural model fit, enabling subsequent path analysis.

**Table 7**  
**Discriminant Validity (Fornell-Larcker Criterion)**

Fit Index	Results	Criteria	Assessment
$\chi^2/df$	2.34	< 3.00	Acceptable
CFI	0.931	> 0.900	Acceptable
TLI	0.923	> 0.900	Acceptable
RMSEA	0.062	< 0.080	Acceptable
SRMR	0.054	< 0.080	Acceptable

Source: Own elaboration.

Structural model path analysis results are shown in Table 8 and Figure 2. H1 hypothesised that higher source credibility leads to stronger purchase intention. Path analysis revealed a significant direct effect of source credibility on purchase intention ( $\beta = 0.36$ ,  $p < 0.001$ ), supporting H1. H2 hypothesised that higher source credibility leads to lower consumer

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skepticism. Results showed a significant negative path coefficient from source credibility to consumer skepticism ( $\beta = -0.49, p < 0.001$ ), supporting H2. H3 hypothesised that higher consumer skepticism leads to lower purchase intention. Results indicated a significant negative path coefficient from consumer skepticism to purchase intention ( $\beta = -0.26, p < 0.001$ ), supporting H3. The model explained 38% of purchase intention variance ( $R^2 = 0.38$ ), indicating that source credibility and consumer skepticism together accounted for 38% of purchase intention variation.

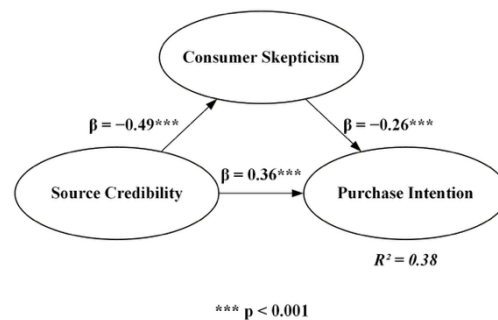
**Table 8**  
**Path Analysis Results**

H	Path	Std. $\beta$	SE	t	p	Result
H1	SC $\rightarrow$ PI	0.36	0.07	5.42	<0.001	Supported
H2	SC $\rightarrow$ CS	-0.49	0.06	7.83	<0.001	Supported
H3	CS $\rightarrow$ PI	-0.26	0.07	3.94	<0.001	Supported

Note: SC = Source Credibility; CS = Consumer Skepticism; PI = Purchase Intention.

Source: Own elaboration.

**Figure 2**  
**Structural Model Results**



Source: Own elaboration.

### Mediation Effect Analysis

H4 hypothesised that consumer skepticism mediates the relationship between source credibility and purchase intention. The Bootstrap method was employed for mediation testing, with 5,000 resampling iterations and 95% bias-corrected confidence intervals. As shown in Table 9, the indirect effect of source credibility on purchase intention through consumer skepticism was 0.13, with a 95% confidence interval of [0.07, 0.21] that did not include 0, indicating a significant mediation effect and supporting H4.

Further analysis of mediation type revealed that since the direct effect of source credibility on purchase intention remained significant after adding the mediator ( $\beta = 0.36, p < 0.001$ ), consumer skepticism partially mediated the relationship between source credibility and purchase intention. The indirect effect accounted for 26.53% of the total effect ( $0.13/0.49$ ), indicating that a substantial portion of source credibility's influence on purchase intention operates through reducing consumer skepticism.

**Table 9**  
**Mediation Effect Analysis (Bootstrap N = 5000)**

Effect Path	Effect	SE	95% CI LL	95% CI UL	% of Total
Total Effect (SC → PI)	0.49	0.06	0.37	0.60	—
Direct Effect (SC → PI)	0.36	0.07	0.23	0.49	73.47%
Indirect Effect (SC → CS → PI)	0.13	0.04	0.07	0.21	26.53%

Note: SC = Source Credibility; CS = Consumer Skepticism; PI = Purchase Intention; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit.

Source: Own elaboration.

## DISCUSSION

The empirical results reveal a noteworthy phenomenon in virtual influencer marketing: despite consumers' clear awareness that virtual influencers are artificially created digital entities, high-credibility virtual influencers can still effectively drive purchase intention. More importantly, this influence does not occur entirely directly; rather, a substantial portion (26.53%) operates through the psychological mechanism of reducing consumer skepticism. This indicates that over one-quarter of source credibility's impact on purchase intention is transmitted through skepticism reduction, underscoring the substantive role of this psychological pathway. This suggests that the persuasion process of virtual influencers is essentially a process of "dismantling psychological defences." When virtual influencers successfully establish professional, credible, and attractive images, consumers gradually lower their guard against commercial motives and adopt a more open mindset toward accepting product recommendation information.

The findings extend SCT to the virtual influencer context in two respects. On one hand, the results challenge the intuitive assumption that "virtual identity necessarily undermines credibility." Conventional wisdom holds that consumer trust in artificially created entities should be lower than trust in real humans; however, this study demonstrates that credibility construction does not depend entirely on the ontological attribute of "being human" but rather hinges more on the influencer's professional competence and sincere attitude.

This finding echoes the meta-analysis conclusions of M. M. Barari et al. (2025), who systematically analysed 71 studies and found that influencer credibility and attractiveness represent universal influence mechanisms that transcend different influencer types. On the other hand, the discovery of consumer skepticism as a partial mediator provides a new perspective for understanding persuasion resistance in digital marketing contexts. Consumer skepticism functions as a mechanism that both transmits and attenuates the persuasive effect of source credibility: high credibility lowers consumers' defensive barriers and facilitates persuasion, while low credibility activates skepticism that inhibits purchase intention. Similar

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to Casaló et al.'s (2021) finding of the positive emotions' mediating role in Instagram marketing, this study identifies skepticism as a "negative emotional pathway," with both together constituting dual psychological channels for influencer marketing effectiveness.

The research conclusions offer actionable strategic guidance for virtual influencer marketing practice. When evaluating virtual influencers, brands should establish systematic credibility assessment frameworks that focus on their accumulated professional image and trust capital among target audiences, rather than relying solely on superficial metrics such as follower counts and engagement rates.

Patmawati and Miswanto's (2022) research confirmed that influencer credibility significantly enhances brand awareness and purchase intention; extending this logic to virtual influencers suggests that carefully cultivated high-credibility virtual influencers may possess greater commercial value than those with massive follower bases but lacking trust foundations.

At the content operations level, virtual influencer teams should focus on reducing consumers' sense of "being manipulated." Specific strategies include: (1) enhancing expertise signaling by having virtual influencers demonstrate product knowledge through detailed reviews, usage tutorials, or behind-the-scenes content rather than simple endorsements; (2) adopting transparency practices with clear but non-intrusive sponsorship disclosures, as overly defensive or hidden disclosures may heighten skepticism; (3) cultivating authenticity by displaying virtual influencers' "growth" and "personalization" characteristics through consistent narrative arcs, genuine fan interactions, and content that extends beyond promotional material. These strategies enable consumers to gradually view virtual influencers as trustworthy sources of information rather than mere advertising vehicles.

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This study employed a cross-sectional survey design with single-source self-report data, which, while able to test variable associations, cannot entirely eliminate common method bias and cannot capture the dynamic evolution of consumer trust-building with virtual influencers; future research could adopt longitudinal tracking designs to examine the trajectory of skepticism attitude changes and their long-term effects on purchase behaviour as consumers continuously engage with virtual influencer content.

This study's sample focused on young Chinese consumers, and cultural differences in attitudes toward AI, technology, and digital personas may influence how consumers respond to virtual influencers, limiting the generalizability of the findings to other cultural contexts. Future research could conduct cross-cultural comparisons to examine how cultural values moderate the effectiveness of virtual influencer persuasion.

This study treated source credibility as an aggregate construct, but the relative importance of the expertise, trustworthiness, and attractiveness dimensions in the virtual influencer context may differ from those of human influencers; future research could analyse the unique contributions of each dimension and their interaction effects in greater depth. Other promising directions include experimental designs that manipulate credibility dimensions, comparisons across product categories, and studies directly comparing virtual versus human influencers.

## CONCLUSIONS

The rise of virtual influencers marks digital marketing's entry into a new stage where human-machine boundaries grow increasingly blurred. Through empirical testing, this study reveals a seemingly contradictory yet profoundly meaningful phenomenon: consumers do not naturally reject virtual influencers' recommendations simply because they know of their "virtual nature"; what truly determines the effectiveness of persuasion is whether influencers can establish credible professional images and overcome consumers' internal defence mechanisms. The mediating role of consumer skepticism indicates that the core challenge in virtual influencer marketing lies not in "how to make the virtual appear more real," but in "how to make recommendations seem more credible." This finding shifts the research perspective from influencers' ontological attributes to their relational construction capabilities, offering a new theoretical entry point for understanding consumer persuasion in the AI era.

From a broader perspective, virtual influencers' effectiveness reflects profound transformations in contemporary consumer-technology relationships. As younger generations grow up in digital environments and become accustomed to interacting with various virtual characters, the traditional dichotomy between "real" and "virtual" is being redefined. Virtual influencers are no longer merely products of technology but have become a new form of social existence, with their influence boundaries continuing to expand alongside the evolution of AI technology and the enhancement of consumer digital literacy. In marketing practice, this means brands need to embrace this transformation with greater openness while thoughtfully balancing commercial value with consumer trust.

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## Resilience, Entrepreneurial Success, and Life Satisfaction among Syrian Refugee Entrepreneurs in Türkiye

*Resiliencia, éxito emprendedor y satisfacción con la vida en emprendedores  
refugiados sirios en Turquía*

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### ABSTRACT

The main purpose of this study is to examine the mediating role of entrepreneurial success in the relationship between resilience and life satisfaction among Syrian refugee entrepreneurs who migrated to Türkiye due to the civil war and social conflicts in Syria and currently live in Gaziantep. The study population comprises 383 Syrian refugee entrepreneurs registered with the Gaziantep Chamber of Commerce. To test the research hypotheses, a path analysis based on the Bootstrap method—claimed to provide more reliable and valid results than the classical method—was conducted. Furthermore, structural equation modelling was used to test the research hypotheses. The findings suggest that refugee entrepreneurs with higher resilience levels achieve greater entrepreneurial success and experience higher life satisfaction. These results contribute to a better understanding of the economic and psychological adaptation processes of refugee entrepreneurs.

Keywords: Refugee entrepreneurship; Resilience; Entrepreneurial success; Life satisfaction; Competitiveness, SDG.

Jel Code: L20, L26, L29.



### RESUMEN

El objetivo principal de este estudio es examinar el papel mediador del éxito emprendedor en la relación entre la resiliencia y la satisfacción con la vida de los emprendedores refugiados sirios que migraron a Turquía debido a la guerra civil y los conflictos sociales en Siria y que actualmente viven en Gaziantep. La población del estudio está compuesta por 383 emprendedores refugiados sirios registrados en la Cámara de Comercio de Gaziantep. Para probar las hipótesis de investigación, se realizó un análisis de trayectoria basado en el método Bootstrap, que se afirma que proporciona resultados más fiables y válidos que los del método clásico. Además, se utilizó el modelado de ecuaciones estructurales para contrastar las hipótesis de investigación. Los hallazgos sugieren que los emprendedores refugiados con mayores niveles de resiliencia alcanzan un mayor éxito emprendedor y experimentan una mayor satisfacción con la vida. Estos resultados contribuyen a una mejor comprensión de los procesos de adaptación económica y psicológica de los emprendedores refugiados.

Palabras clave: Emprendimiento de refugiados; Resiliencia; Éxito empresarial; Satisfacción con la vida; Competitividad; ODS.

## INTRODUCTION

Wars, especially civil wars, which constitute one of the most significant issues on the world agenda, keep the refugee issue on the agenda, demonstrating the importance of refugees, whose numbers have reached record levels globally. Civil wars erupting in many countries in the Middle East have forced millions of people to migrate. The Syrian civil war, which erupted in early 2011, has intensified over time, forcing millions of people to flee their homes and seek refuge in other countries (Erturk et al., 2023). The concept of refugees, which encompasses individuals who leave their country and seek international protection from another country, differs from other types of migrants due to the necessity rather than choice behind their displacement (Pehlivan & Karaatli, 2020).

Türkiye is among the countries most significantly impacted by the large-scale influx of Syrian refugees (Pehlivan & Karaatli, 2020). According to Provincial Immigration Administration data, Istanbul ranks first among the provinces with the highest number of Syrian refugees under temporary protection (530.170). Gaziantep ranks second (427.563), Sanliurfa ranks third (291.081), and Hatay ranks fourth (275.084) (www.goc.gov.tr, 11.03.2024). Since 2011, the impacts of settled Syrian refugees in Türkiye on the economic, social, health, cultural, and other domains continue to increase. Therefore, it is important to alleviate the socio-economic burden caused by Syrian refugees and increase their positive contributions to the Turkish economy (Pehlivan & Karaatli, 2020). Cetin et al. (2022) highlight the critical role of entrepreneurship in generating positive social and economic outcomes for both refugees and host countries.

The entrepreneurship literature shows that the entrepreneurial activities undertaken by refugees constitute a driving force for socio-economic development—particularly in host countries—as well as for job creation and innovation (Turkina & Thai, 2013). Moreover, the businesses established by refugees to sustain their livelihoods and improve their welfare levels also enhance their integration into the host society. In relation to integration, it can be argued that refugees' engagement in entrepreneurial activities significantly contributes to employment and local economic development by creating new job opportunities (Pacaci, 2024). Indeed, the share of Syrian-owned companies among all companies in Türkiye (3.4%) is very close to the share of the Syrian population in Türkiye's total population (approximately 4.3%). Syrians have begun to integrate into the labour market to a certain extent and have demonstrated their presence in this regard (Erturk et al., 2023).

In this context, refugee entrepreneurship should be evaluated not only in terms of social integration and individual well-being, but also in terms of business performance and market dynamics. Entrepreneurial activities generate tangible outcomes in local economies through

## Resilience, Entrepreneurial Success, and Life Satisfaction among Syrian Refugee Entrepreneurs in Türkiye

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competitiveness indicators such as firms' sustainability, growth capacity, employment-creation potential, and market access. In this respect, refugee entrepreneurship has become an important component of the entrepreneurial ecosystem in host countries.

An entrepreneur is someone who starts a business or venture, taking on financial risks to earn a profit. However, these risks do not guarantee success, as entrepreneurial ventures can sometimes fail. At this point, the high level of resilience among entrepreneurs is important for their survival and success. This is because resilience enables individuals to overcome challenges and perform better than expected (Sachdev, 2023). Entrepreneurship entails numerous risks and uncertainties, which is why it is important for entrepreneurs to possess positive psychological resources such as resilience.

Resilience, which acts as a protective factor in enhancing the subjective well-being of refugees (Yildirim et al., 2024), is a complex notion that encompasses not just individual traits but also support from family and community (Karaman et al., 2023). Refugees are at a significantly higher risk for compromised resilience due to their traumatic experiences and relocation to a foreign environment. As a result, refugees may pursue greater life satisfaction by starting their own businesses.

116 Although life satisfaction is a concept frequently examined in the literature, studies focusing on disadvantaged groups, such as refugees, remain limited (Karaman et al., 2023). The literature includes studies investigating the relationships between psychological resilience and life satisfaction (Liu et al., 2012; Akbar et al., 2014; Uz Baş & Yurdabakan, 2017; Alibekiroglu et al., 2018; Santilli et al., 2020; Khalid, 2021; Yıldırım et al., 2024; Karaman et al., 2023; Isgor et al., 2023), between psychological resilience and entrepreneurial success (Ayala & Manzano, 2014; Fisher et al., 2016; Fatoki, 2018; Santoro et al., 2020), and between entrepreneurial success and life satisfaction (Przepiorka, 2017; Cetin et al., 2022). However, it is observed that the majority of these studies have been addressed within the frameworks of organisational behaviour and psychology literature.

In contrast, a larger body of research exists on the relationship between resilience and life satisfaction. However, many of these studies are often conducted with student populations. Furthermore, the literature review revealed a lack of studies examining the mediating role of entrepreneurial success in the connection between resilience and life satisfaction among refugee populations. The forced displacement of individuals due to factors such as conflict can lead to detrimental effects on their lives. Therefore, exploring the impact of resilience and entrepreneurial success on refugees' life satisfaction is vital for advancing positive psychology research.

However, entrepreneurial success should be associated not only with indicators of individual well-being but also with business performance and competitiveness outcomes. In this context, entrepreneurial success can be evaluated through criteria such as firm survival, growth, formalisation, sales performance, and employment generation capacity. Therefore, understanding how resilience leads to economic outcomes through entrepreneurial success not only explains individual life satisfaction but also provides a market-oriented contribution to the entrepreneurship literature.

The main objective of this study is to examine the mediating role of entrepreneurial success in the relationship between psychological resilience levels and life satisfaction among Syrian refugee entrepreneurs who came to Türkiye as a result of the civil unrest in Syria and currently live in Gaziantep. In this context, the study aims to reveal the relationship between psychological factors and entrepreneurial outcomes, thereby providing findings at both the individual and economic levels.

## **THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT**

### *Resilience*

Throughout their lives, individuals may experience a range of negative circumstances, obstacles, and stress-inducing events. The responses or coping strategies of individuals experiencing these adversities can vary significantly. Some individuals may have trouble, such as anxiety and depression, in response to stressful and traumatic events, and this negative mood can persist for a considerable amount of time. Conversely, some individuals may rapidly bounce back from the negative emotions triggered by challenges and resume their normal lives (Dogan, 2015). In the positive psychology approach, which defines well-being and welfare rather than illness (Aboalshamat et al., 2018), the notion of resilience elucidates individuals' capacity to bounce back and swiftly resume their usual routines (Dogan, 2015).

Resilience is known effectively handle stress and recover from difficult experiences (Smith et al., 2008), the capability to effectively navigate through challenging circumstances and adjust to unfamiliar environments (Dogan, 2015), the individual's capacity to navigate challenges and attain positive outcomes following adversity (Fatoki, 2018), authors define resilience as the capacity to tackle challenges and bounce back from intricate situations (Sachdev, 2023). Resilience can be characterised by the capacity to efficiently handle challenges and adverse circumstances, mitigating the harmful impacts of stress and facilitating recovery.

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Resilience helps individuals cope with life's challenges, confront negative emotions, and build internal strength to face obstacles (Khalid, 2021). Individuals with high levels of resilience utilise their strengths and support systems to overcome challenges and solve problems (Sachdev, 2023). Key individual characteristics that enhance resilience include problem-solving skills, self-efficacy, and strong social skills. Furthermore, supportive family and peer relationships serve as important environmental factors that foster resilience (Uz Bas & Yurdabakan, 2017). Factors contributing to resilience are as follows (Sachdev, 2023):

- **Optimistic:** Optimistic individuals are more likely to remain positive in difficult situations, making them more resilient.
- **Devotion:** Resilient individuals often help others when they need to alleviate pressure and sustain their own lives.
- **Strong Moral Compass:** Individuals with a strong moral compass or steadfast beliefs about right and wrong often find it easier to heal.
- **Face with Fear:** Individuals who confront their fears and step out of their comfort zones are more likely to overcome obstacles.

### *Resilience And Life Satisfaction*

Life satisfaction reflects an individual's cognitive assessment of their living conditions, based on their subjective measures (Tagay et al., 2016). From a deductive perspective, life satisfaction is primarily assessed in broad terms, considering factors such as personality traits. In contrast, an inductive approach defines it as the cumulative satisfaction derived from various life domains, including work, family, and health (Kanbur & Ozdemir, 2017).

Life satisfaction is a crucial positive indicator of individuals' psychological and social well-being (Liu et al., 2012). Therefore, individuals' satisfaction with not only specific situations but also their entire life experiences explains both their satisfaction and well-being in work and social environments (Orucu & Hasirci, 2021). Life satisfaction, which encompasses various aspects of individuals' personal circumstances and criteria, is influenced by numerous factors, including work, income, health, education, environment, financial stability, and social connections. Individuals with high life satisfaction may experience changes in their perspectives on events and their communication skills, creative thinking capacities, levels of success, and work performances may increase (Kanbur & Ozdemir, 2017).

Life satisfaction is positively associated with factors such as hope, self-esteem, self-belief and the active pursuit of social support, all of which play a crucial role in sustaining resilience (Akbar et al., 2014). Refugees often necessitate greater psychological and social aid rather than purely financial assistance to acclimate to society, confront traumatic encounters, and assimilate into their new environment. Consequently, exploring protective factors such as

resilience and life satisfaction becomes imperative to provide enhanced social and psychological support to Syrian refugees (Karaman et al., 2023).

Life satisfaction and resilience are vital components of the overall quality of life. As a protective factor, resilience enhances life satisfaction (Liu et al., 2012; Steggemann, 2023). It significantly contributes to individuals' ability to lead fulfilling lives and maintain good mental health (Khalid, 2021). Those who demonstrate higher levels of resilience are more capable of overcoming life's challenges and generally experience greater contentment (Akbar et al., 2014). For example, Akbar et al. (2014) reported a positive correlation between resilience and life satisfaction among the nomadic population. Similarly, Yildirim et al. (2024) found in their study of 361 minority Syrian refugees residing in Iraq that factors such as resilience, hope, sense of belonging, and perceived social support significantly enhance life satisfaction and overall development. They have demonstrated the impact of equipping refugees with positive resilience on their life satisfaction and development.

Isgor et al. (2023) found a positive relationship between resilience and life satisfaction in their study of refugee children. In a similar vein, Karaman et al. (2023) found a positive correlation between life satisfaction and various resilience-related factors among Syrian refugee university students in Türkiye. These authors also highlighted that resilience partially mediates the relationship between alexithymia and life satisfaction. In their research on single mothers, Odaci et al. (2022) found significant positive associations among resilience, life satisfaction, hope, and forgiveness.

They also revealed that forgiveness and hope serve as mediators between resilience and life satisfaction. Moreover, the literature review emphasises that this relationship has largely been studied in the context of student populations (e.g., Liu et al., 2012; Uz Bas & Yurdabakan, 2017; Alibekiroglu et al., 2018; Aboalshamat et al., 2018; Santilli et al., 2020; Khalid, 2021; Caqueo et al., 2021; Yalcin et al., 2022; Wang et al., 2022; Tu et al., 2023). These studies indicate that individuals with higher levels of resilience generally experience increased happiness and overall life satisfaction. Research has demonstrated that resilience enhances life satisfaction both directly and indirectly. Based on previous findings, it is posited that resilience positively impacts life satisfaction, leading to the formulation of hypothesis (H1).

*H<sub>1</sub>: Resilience has a positive relationship with life satisfaction.*

#### *The Mediating Role of Entrepreneurial Success*

Entrepreneurship, considered a crucial factor in economic, cultural, and technological development, is widely acknowledged as a significant element in advancing nations. Therefore, it is highly important in the social sciences due to its role in the development of

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countries. Entrepreneurship involves the capability and readiness to launch, organise, and oversee a business venture, embracing the inherent risks in pursuit of financial prosperity (Sachdev, 2023).

Entrepreneurial success pertains to the achievement of a business endeavour or commercial initiative, often reflecting the success of the entrepreneur involved in the venture and is characterised by the perceived positive outcomes of the entrepreneur (Fisher et al., 2014). Entrepreneurial success can be reflected through multiple indicators. For example, financial returns are a major indicator of success in entrepreneurship (Bockorny & Youssef-Morgan, 2019). Yet, success in entrepreneurship isn't solely gauged by financial or economic benchmarks; it encompasses a blend of both financial and psychological indicators of performance (Fisher et al., 2014). Many individuals view entrepreneurship not only as a business opportunity but also as a way of life. Since entrepreneurship fulfils various social and psychological needs, an entrepreneur's level of satisfaction is a crucial indicator of overall success (Bockorny & Youssef-Morgan, 2019).

Due to the high risks associated with starting a business, many entrepreneurs fail because of factors such as a lack of funding, poor business decisions, economic crises, a lack of market demand, or a combination of these. For entrepreneurs to succeed, they require skills and qualities such as innovation, creativity, risk-taking, leveraging scientific and technological developments, social skills, and resilience (Sachdev, 2023).

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Resilience is an ongoing, adaptive process in which entrepreneurs develop the knowledge, skills, and capabilities to confront an unpredictable future with optimism, creativity, and self-reliance. It serves as a genuine strategy for entrepreneurial growth (Ayala & Manzano, 2014). Resilience reduces the fear of not succeeding and strengthens entrepreneurial intention (Ukil & Jenkins, 2023).

Entrepreneurs' resilience helps them remain forward-looking despite challenging market conditions and the destabilising events they constantly encounter. It enables them to embrace change rather than resist it, work diligently to achieve their goals, manage difficulties, take risks, and tolerate uncertainty. Entrepreneurs with high levels of resilience can acquire the tools and skills necessary for the success of their ventures. In this context, entrepreneurs' resilience can improve success at both the personal and organisational levels (Fatoki, 2018).

Although entrepreneurship has its advantages, it also entails many financial and emotional challenges. Entrepreneurs often must sacrifice aspects of their family, finances, and social life during this process, as they risk their capital and invest considerable time and effort into their ventures. It is suggested that, in addition to social, human, economic, and emotional capital, positive psychological capital also lays the groundwork for greater entrepreneurial

success (Bastak & Tekin, 2021). Research shows that psychological strengths greatly influence entrepreneurial behaviour. Resilience includes components such as self-efficacy, hope, optimism, and trust. Each of these elements plays a distinct role in fostering entrepreneurial success. It is hypothesised that entrepreneurs with higher psychological capital are more likely to achieve greater success than those with lower levels of psychological capital (Baluku et al., 2016). In their study, Baluku et al. (2016) found that psychological capital significantly influences entrepreneurial success. Furthermore, they discovered that higher levels of resilience enhance the likelihood of financial success and overall satisfaction among entrepreneurs.

Entrepreneurial success is commonly conceptualised in the literature through firm-level indicators, such as firm status (survival) and performance outcomes (e.g., sales). Prior studies emphasise that venture success is not limited to subjective well-being but is primarily assessed by objective business outcomes such as firm survival, sales growth, profitability, and market performance (Müller et al., 2023). In this context, entrepreneurial success is not limited to individual perceptions of achievement or satisfaction, but is also directly related to a firm's market performance and competitive strength. In particular, indicators such as sales volume, growth rate, business continuity, level of formalisation, employment generation capacity, and market access are regarded as key economic outcomes of entrepreneurship.

Accordingly, entrepreneurial success should be considered a multidimensional construct that generates both individual- and firm-level outcomes. Therefore, examining the effects of entrepreneurs' psychological characteristics on such firm performance and competitiveness indicators provides a market-oriented contribution to the entrepreneurship literature. In this way, it further strengthens the study's positioning within the business and competitiveness literature.

In entrepreneurship, which is characterised by efforts fraught with stress and negativity, individual-level resilience is paramount. The lack or inadequacy of resilience can undermine entrepreneurial efforts. In other words, entrepreneurs' resilience levels significantly influence their success (Fisher et al., 2016). As entrepreneurs need to skillfully navigate and overcome challenges to successfully launch and manage new ventures, there is a pressing need for research on their resilience. The literature review highlights that resilience is essential to the entrepreneurial journey, influencing the initiation, engagement, and results of entrepreneurial activities (Hartmann et al., 2022). Resilience positively affects entrepreneurial success, a notion corroborated by empirical research (e.g., Santoro et al., 2020; Fisher et al., 2016; Ayala & Manzano, 2014; Fisher et al., 2014). Therefore, based on theoretical insights and empirical evidence, hypothesis (H2) has been formulated.

*H<sub>2</sub>: Resilience has a positive relationship with entrepreneurial success.*

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Activating the entrepreneurial potential of Syrian refugees, placing them in sectors that utilise their talents, and emphasising education programs that support entrepreneurship are crucial for both the local and Turkish economies, as well as for the socio-economic integration of refugees (Pehlivan & Karaatli, 2020).

Supporting refugee entrepreneurship throughout different stages of business development and employment entry is crucial in policymaking. Attaining high success rates among refugee entrepreneurs is considered a vital instrument for enhancing the welfare of refugees, their families, and the broader community (Cetin et al., 2022). In their study of 172 refugee entrepreneurs in various sub-sectors of the tourism and hospitality industry in Türkiye and the United Kingdom, Cetin et al. (2022) found that perceived entrepreneurial success positively affects life satisfaction. Similarly, Przepiorka (2017) identified a positive relationship between entrepreneurial success and life satisfaction.

While numerous studies have examined factors influencing life satisfaction, there remains a gap in empirical research specifically addressing the impact of entrepreneurial success on life satisfaction. Based on existing findings, it is assumed that entrepreneurial success positively influences life satisfaction, leading to the development of hypothesis (H3). Building on the relationships among resilience, life satisfaction, and entrepreneurial success, it is proposed that entrepreneurial success serves as a mediator between resilience and life satisfaction, thereby formulating hypothesis (H4).

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*H<sub>3</sub>: Entrepreneurial success has a positive relationship with life satisfaction*

*H<sub>4</sub>: Entrepreneurial success has a mediator role in the relationship between resilience and life satisfaction.*

## **METHODOLOGY**

### *Research Design*

This cross-sectional study is a field-based study designed within the quantitative research paradigm, employing a correlational survey model to determine whether there is simultaneous change between two or more variables and/or the degree of such change. In the study, life satisfaction constitutes the dependent variable, resilience the independent variable, and entrepreneurial success the mediating variable.

### *Sampling And Data Collection*

Prior to data collection for this study, approval was obtained from the Nigde University Ethics Committee for Social and Humanities Research on July 30, 2025, under approval

number E-86837521-050.99-689193. The study's main population consists of 3,327 Syrian refugee entrepreneurs registered with the Gaziantep Chamber of Commerce. At the conclusion of the data collection process, data suitable for analysis was obtained from a total of 383 Syrian refugee entrepreneurs, exceeding the target number. This has enhanced the statistical representativeness and reliability of the analyses. An online survey method (Google Forms) was chosen as the data collection tool for the study. Due to time and cost constraints, as well as operational difficulties in reaching the entire population, convenience sampling and snowball sampling methods were used together during the sampling process. The following criteria were established for participants to be included in the study:

1. Being of Syrian origin and holding refugee status.
2. Being the owner or partner of a business registered with the Gaziantep Chamber of Commerce.
3. The business is actively operational.

During the recruitment process, a digital survey link was first sent to the entrepreneurs reached; each participant who completed the survey was asked to forward the link to at least one colleague meeting the same criteria, thereby creating a "snowball effect". 90.9% (n=348) of the Syrian refugee entrepreneurs participating in the research are male, while 9.1% (n=35) are female. Regarding marital status, 95.3% (n=365) are married. Most participants are aged 31-40 years (n=155), accounting for 40.5% of the total. In terms of educational level, 42% of the participants hold a bachelor's degree (n=162). Regarding the sectors of activity, 26.6% of Syrian refugee entrepreneurs are engaged in production (n=102), 40.5% in trade (n=155), and 32.9% in services (n=126).

#### *Measurement Instrument*

In this research, an online survey comprising demographic questions was used, employing three measurement instruments. The survey was first created in English and then translated into Arabic through back-translation. The first section of the survey includes five statements to determine demographic characteristics. In the second section, the research utilises the "Resilience Scale" created by Smith et al. (2008) to evaluate resilience. This scale comprises six items designed for individuals to self-assess their resilience. Items 2, 4, and 6 of the scale are reverse-coded. A high score on the scale indicates high resilience. In the third section, the "Entrepreneurial Success Scale" developed by Fisher et al. (2014) is used to measure entrepreneurial success.

The scale consists of four items that define not only individual but also macro-level entrepreneurial success. In the fourth section, the study employs the "Life Satisfaction Scale", developed by Diener et al. (1985), which has five items. All measurement tools used in the survey are constructed in a 5-point Likert style.

*Common Method Bias (CMB)*

CMB refers to the covariance among measures attributable to methodological designs and is generally believed to overestimate observed relationships (MacKenzie & Podsakoff, 2012). Therefore, it is recommended that researchers also assess the impact of CBM on their results. Harman's one-factor test is one of the most commonly used methods in this regard (Howard & Henderson, 2023). In this study, both procedural and statistical measures were taken to reduce the CMB. First, participants were clearly informed that they could withdraw from the study at any time during data collection, which was entirely voluntary. Participants were assured that their anonymity would be protected; this helped reduce the likelihood of receiving misleading responses. Secondly, Harman's one-factor test was conducted in the study to test for the presence of CMB in the scale prior to confirmatory factor analysis (Podsakoff et al., 2003).

In this approach, a model in which all observed items load onto a single common factor is tested. If the fit indices of this one-factor model are acceptable, this may indicate a serious CBM issue. If the explained variance value of the scale's first factor is less than 50%, there is no common method bias in the scale (Cavazotte, 2010). In this context, it was observed that the measurement instruments had a variance value of 36.32% for a single factor. This value is significantly below the 50% threshold, which is considered the critical limit for common method bias. Therefore, since the single-factor structure does not explain the majority of the variance, there is no CBM in the scale.

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*Data Analysis*

In this study, to test whether entrepreneurial success mediates the effect of resilience on life satisfaction, a path analysis using the Bootstrap method was conducted, following the two-step structural equation modelling (SEM) approach recommended by Anderson and Gerbing (1988). This approach involves, in the first stage, establishing the construct validity and reliability of the measurement model developed within the framework of SEM, and in the second stage, testing the structural model. Within the scope of the research, all statistical analyses were carried out using IBM SPSS 25.0 and IBM AMOS 24.0 software.

**RESULTS**

**Assessment of the Measurement Model**

Prior to analysing the research model, the validity and reliability of the scales utilised were assessed. This involved conducting reliability analysis, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) for each scale.

**Table 1**  
**Results of EFA**

Variables	Item	$\lambda$	CA	Skewness	Kurtosis
<b>Resilience</b>	R1	0.807	0.855	-0.660	0.092
	R2	0.585			
	R3	0.708			
	R4	0.752			
	R5	0.735			
	R6	0.815			
<b>Entrepreneurial Success</b>	ES1	0.754	0.737	-0.276	-0.254
	ES2	0.733			
	ES3	0.771			
	ES4	0.573			
<b>Life Satisfaction</b>	LS1	0.695	0.838	-0.599	0.363
	LS2	0.783			
	LS3	0.787			
	LS4	0.824			
	LS5	0.697			
<b>Total Variance Explained: % 61.02</b>					
<b>KMO: 0.869</b>					
<b>Bartlett's test of Sphericity: <math>\chi^2 = 2447.96</math> (<math>p &lt; 0.001</math>)</b>					

$\lambda$ : Factor Loading, CA: Cronbach's Alpha

Source: Own elaboration.

Table 1 presents the values for exploratory factor analysis, Cronbach's Alpha and normal distribution. It was seen that the data were suitable for normal distribution (Tabachnick & Fidell, 2013). As a result of EFA, the KMO value was found to be 0.869, and  $p = 0.000$ . The analyses revealed that the scales yielded significant results in Bartlett's test of sphericity. The total explained variance of the scales was 61.02. The Cronbach's Alpha value of each scale is above 0.70. In addition, the factor loadings for each scale were above 0.50.

#### *Measurement Model, Discriminant and Convergent Validity*

Hypothesis testing and analysis steps used by Ullman and Bentler (2003) were applied to the data. In this context, structural equation modelling (SEM) and confirmatory factor analysis (CFA) were applied to test the conceptual and structural model (Anderson & Gerbing, 1988).

A measurement model was created for these relevant variables. With the measurement model, the relationship between the variable and its elements is examined. First, the model is defined by confirmatory methodology. At this stage, the model can be estimated, evaluated and even modified. The purpose is to test the model, test hypotheses about the model, modify an existing model, or test a series of related models (Ullman & Bentler, 2023). However, model fit was taken into account when analysing the study. In this context, CFA analysis of the measurement model shown in Table 1 using AMOS 24 program; After the modifications suggested by the model, acceptable fit values (Hooper et al., 2008)  $\chi^2 = 227.612$ ,  $df = 84$ ;

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$\chi^2/df = 2.710$ ; RMSEA = 0.067, SRMR = 0.061, ARFI = 0.893, NFI = 0.908, TLI = 0.925, CFI = 0.940 were obtained.

**Table 2**  
**Model Validity Measures**

Variables	Mean	SD	CR	AVE	MSV	MaxR(H)	R	LS	ES
<b>R (1)</b>	4.35	0.55	0.850	0.490	0.329	0.856	$\sqrt{0.69}$	-	-
<b>LS (2)</b>	3.46	0.79	0.838	0.525	0.266	0.863	0.47***	$\sqrt{0.72}$	-
<b>ES (3)</b>	4.19	0.55	0.773	0.457	0.329	0.781	0.57***	0.52***	$\sqrt{0.67}$

\*\*\* $p < 0.001$ ,  $\sqrt{\phantom{x}}$  = Square Root AVE, R: Resilience, LS: Life Satisfaction, ES: Entrepreneurial Success.

Source: Own elaboration.

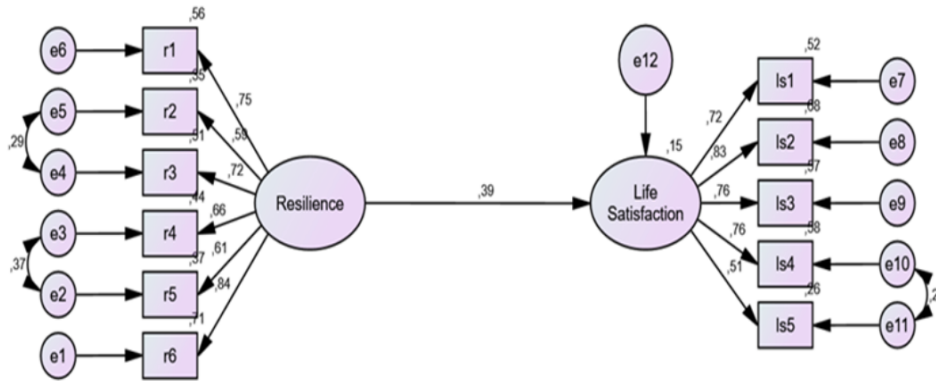
Following Anderson and Gerbing (1988), convergent validity was assessed using Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and Maximum Rho (MaxR). Composite Reliability (CR) was calculated for the construct reliability of the model. Afterwards, the model's discriminant validity was assessed using the Fornell-Larcker approach. Evaluations were made according to the criteria of  $CR > 0.70$ ,  $AVE > 0.50$ ,  $MSV < AVE$ , and  $MaxR(H) > MSV$  (Hair et al., 2009; Raykov, 2004). As shown in Table 2, the CR was greater than 0.70, but not all AVE values exceeded the 0.50 threshold. However, Fornell and Larcker (1981: 39) stated that if  $CR > 0.60$ , AVE values of mean explained variance  $> 0.40$  would be sufficient for convergent validity. Similarly, according to Psaila and Roland (2007), an AVE value of 0.40 or higher is acceptable only if the CR value exceeds 0.70.

Accordingly, AVE values are also higher than the acceptable threshold. Apart from this, it is concluded that the MSV values are lower than the AVE value and higher than the MaxR(H) MSV value. In addition, Square Root AVE values are higher than the correlation value in the relevant column. Finally, the standardised regression values of each construct were higher than 0.55. These were in the ranges of Resilience (0.60-0.80), Entrepreneurial Success (0.59-0.75), and Life Satisfaction (0.55-0.81). In light of these approaches, Table 2 shows that all scales have high combination reliability (all CR values are above 0.70). The fact that the AVE values of the scales are lower than the CR values and the AVE values are higher than the threshold  $AVE > 0.40$  accepted in the literature indicates that the scales have convergent/similarity validity.

### *Hypothesis Testing*

To test the research hypotheses, a path analysis based on the Bootstrap method—argued to yield more reliable and valid results than the classical method—was conducted. In the initial phase of the study, when examining H1, the association between the independent and dependent variables was evaluated without incorporating the mediator variable (Model 1). Subsequently, H2, H3, and H4 were tested using the bootstrap method (Model 2).

**Figure 1**  
**Structural Equation Model of R and LS**

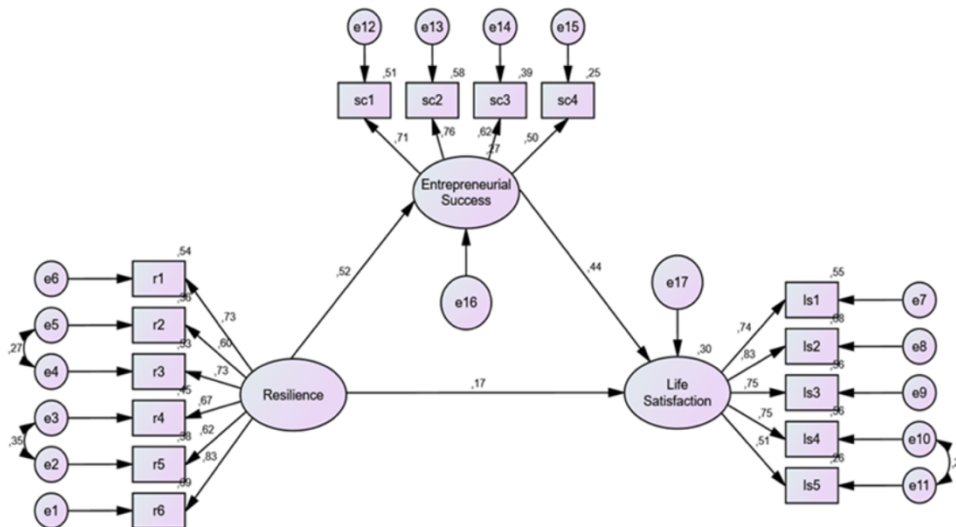


Source: Own elaboration.

The fit indices obtained from the test of the path analysis model in Figure 1 ( $\Delta\chi^2/df = 2.905$ , SRMR = 0.065, RMSEA = 0.071, GFI = 0.948, CFI = 0.959, TLI = 0.943, NFI = 0.939) indicate that the model is consistent with the data and within acceptable limits. In addition, the path from resilience to life satisfaction ( $\beta = 0.39$ ,  $p < 0.001$ ) is positive and statistically significant. This result indicates support for H1.

In the second step of the research, the variable of entrepreneurial success was included in the model as a potential mediator to determine whether it mediates the effect of resilience on life satisfaction. For the analyses, the Bootstrap technique with 5000 resamples was preferred, and deviation-corrected confidence intervals were established at a 95% significance level (Bootstrap 95% CI).

**Figure 2**  
**Structural Equation Model of Entrepreneurial Success Mediation**



Source: Own elaboration.

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The fit indices obtained from the testing of the path analysis model in Figure 2 ( $\Delta\chi^2/df = 2.965$ , SRMR = 0.066, RMSEA = 0.072, GFI = 0.919, CFI = 0.931, TLI = 0.913, NFI = 0.900) indicate that the model is congruent with the data and falls within acceptable bounds. Furthermore, it was concluded that the paths from resilience to entrepreneurial success ( $\beta = 0.52$ ,  $p < 0.001$ ) and from entrepreneurial success to life satisfaction ( $\beta = 0.44$ ,  $p < 0.001$ ) were both positive and statistically significant.

These findings support hypotheses H2 and H3. However, the significant path from resilience to life satisfaction in the initial step ( $\beta = 0.17$ ,  $p < 0.01$ ) did not become insignificant; rather, it decreased in effect with the inclusion of entrepreneurial success in the analysis. On the other hand, the Bootstrap analysis indicated that the 95% confidence interval for the indirect effect ranged from 0.145 to 0.447, confirming that it did not include zero. Therefore, the indirect effect of resilience on life satisfaction through entrepreneurial success is significant, amounting to 26.7% (partial mediation). These results indicate that hypothesis H4 is also supported. Table 3 presents the path coefficients and indirect effects of the structural model.

**Table 3**  
**Summary of Results**

Exogenous Variables	Endogenous Variables							
	Entrepreneurial Success				Life Satisfaction			
	$\beta$	S.E	C.R	Sig.	$\beta$	S.E	C.R	Sig.
Resilience (c path)					0.389	0.072	6.627	***
<b>R<sup>2</sup></b>	<b>0.163</b>							
Resilience (a path)	0.516	0.059	7.800	***				
<b>R<sup>2</sup></b>	<b>0.267</b>							
Resilience (c' path)					0.167	0.079	2.476	0.013*
Entrepreneurial Success (b path)					0.442	0.101	5.734	***
<b>R<sup>2</sup></b>	<b>0.300</b>							
<b>Indirect Effects</b>	<b>Resilience → Entrepreneurial Success → Life Satisfaction</b>							
	0.267, %95CI [0.145 — 0.447]							

\*  $p < 0.05$ , \*\*\*  $p < 0.001$

Source: Own elaboration.

## CONCLUSIONS

This study represents one of the pioneering efforts to investigate the direct impact of resilience on life satisfaction and its indirect effect through entrepreneurial success among Syrian refugee entrepreneurs in Gaziantep, Türkiye. Consistent with the proposed theoretical model, the research findings reveal that resilience positively influences life satisfaction, resilience positively affects entrepreneurial success, and entrepreneurial success partially mediates the relationship between resilience and life satisfaction. The findings regarding the positive relationships between resilience, entrepreneurial success, and life satisfaction are generally consistent with previous studies (Akbar et al., 2014; Yalcin et al., 2022; Fisher et

al., 2016; Walsh & McCollum, 2020; Przepiorka, 2017; Cetin et al., 2022). Additionally, the confirmation of the specific mediating role of entrepreneurial success in the relationship between resilience and life satisfaction represents an original contribution of this study.

#### *Implications For Theory*

The findings from this research carry significant theoretical implications. Firstly, the study demonstrates that resilience can serve as a precursor to life satisfaction, thereby advancing current theoretical evaluations of resilience. This result confirms previous research findings that resilience positively predicts life satisfaction (Akbar et al., 2014; Yalcin et al., 2022). It is emphasised that, for individuals to sustain their lives and not become lost in negative emotional states amid difficulties, they need to engage in processes of resilience (Erhan, 2022). Therefore, resilience is a crucial factor in quality of life, contributing to greater life satisfaction by enabling individuals to cope with challenges that threaten their functioning and development. This may be because individuals with elevated levels of resilience are more capable of overcoming life's challenges and are more likely to achieve future success, maintain good health, and experience greater happiness (Achour & Nor, 2014).

Secondly, this study enhances current theoretical evaluations related to entrepreneurship by providing statistical support for the suggestion that entrepreneurs need to be psychologically resilient. This finding further supports previous research suggesting that resilience precedes entrepreneurial success (e.g., Fisher et al., 2016; Walsh & McCollum, 2020). Entrepreneurs need to effectively manage and overcome adversities in their lives to successfully identify and establish new ventures when an opportunity arises. Resilience facilitates favourable outcomes amid challenges. Entrepreneurs with heightened resilience can serve as valuable resources, offering knowledge, learning, and insights to capitalise on business opportunities (Sun et al., 2011).

Thirdly, it demonstrates that entrepreneurial success is associated with high life satisfaction among both potential and actual entrepreneurs, contributing to a growing body of research on refugee entrepreneurship. This finding also corroborates research results indicating the relationship between entrepreneurial success and life satisfaction (e.g., Przepiorka, 2017; Cetin et al., 2022).

Although entrepreneurship is commonly associated with the business domain in contemporary times, it is evaluated as a factor that emerges during developmental stages in developmental psychology, and, when supported, positively influences an individual's future life (Uckun et al., 2019). Entrepreneurs, typically driven by a desire to prove themselves in their ventures, must overcome various challenges to establish and run their businesses. While they can derive satisfaction from their daily tasks, individuals may find greater fulfilment in

their lives if they have the autonomy and freedom to pursue personal goals through entrepreneurial endeavours.

Ultimately, the study confirms that entrepreneurial success mediates the relationship between resilience and life satisfaction. However, it is important to highlight that there is also a significant direct relationship between resilience and life satisfaction. This partial mediation indicates that while entrepreneurial success helps explain the relationship, there may be additional mediators not addressed in this study. For instance, Liu et al. (2012) conducted research with college students in China, examining the effects of neuroticism and resilience on life satisfaction, as well as the mediating roles of positive and negative emotions in this relationship.

The study revealed that positive effects mediated the relationship between resilience and life satisfaction. Similarly, Durak (2021) found that, among university students, general self-efficacy mediated this relationship. In research with Malaysian university students, Khalid (2021) demonstrated that social support also acted as a mediator between resilience and life satisfaction. Our findings contribute to the ongoing academic discussion regarding how an entrepreneur's resilience affects their life satisfaction.

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### 130 *Implications For Practice*

This study reinforces the direct relationship between resilience and life satisfaction, demonstrating that entrepreneurial success is a key mechanism underlying this connection. The findings indicate that resilience is a positive predictor of both entrepreneurial success and life satisfaction. As a protective factor for quality of life, resilience can also help individuals improve their overall life satisfaction (Liu et al., 2012).

Syrian refugees, motivated by the need for income and the desire for a better future, often turn to entrepreneurship as a means to overcome trauma. These individuals typically exhibit high resilience and are determined to achieve success. In this context, the life satisfaction of Syrian refugees is closely tied to both their resilience and entrepreneurial success. Resilience reflects an individual's capacity to respond positively to stressful circumstances. Entrepreneurs with high levels of resilience are adept at navigating challenges and transforming adverse situations to their advantage (Tagay et al., 2016).

Consequently, resilience can play a crucial role in enhancing individuals' life satisfaction. When devising strategies to improve the life satisfaction of Syrian refugees, it is vital to consider both resilience and entrepreneurial success. These refugees are likely to rebuild their resources, which can help them navigate the uncertainty and anxiety associated with entrepreneurial endeavours (Cetin et al., 2022).

Sachdev (2023) argues that individuals who can laugh at their misfortunes and maintain a positive outlook on life are more likely to overcome negative situations than others. Research suggests that, since resilience is not an innate trait but rather an individual skill that can be developed through education to some extent, practitioners can take action to enhance entrepreneurs' resilience. Practitioners can develop activities specifically aimed at increasing resilience for Syrian refugee entrepreneurs, such as seminars, short-term workshops, executive training courses, and business development training. Knowing that such programs provide alternative psychological resources that Syrian refugees can utilise to cope with the challenges of entrepreneurial activities can reassure them in their professional endeavours, thereby potentially increasing their life satisfaction (Sun et al., 2011; Walsh & McCollum, 2020).

Thus, in terms of debates on resilience and integration, refugees' efforts to engage in entrepreneurial activities in their host locations are likely to increase further as one of the most effective solutions. The success of Syrian refugee entrepreneurs in establishing businesses or participating in partnerships during their integration into the economy will make a substantial contribution to employment and the development of the local economy—particularly by creating new job opportunities—while also enhancing the local economy's competitive advantage.

Such studies provide important implications for policy instruments that shape the entrepreneurial ecosystem. In particular, factors such as refugee entrepreneurs' access to finance, regulatory frameworks, entrepreneurship training, participation in business networks, and integration into supply chains directly affect both the success of their ventures and their impact on local economies. Therefore, it is important to link micro-level findings to macro-level policy and market outcomes.

#### *Limitations And Future Research Directions*

This study addresses a pertinent topic in management literature. It is important to acknowledge some limitations of this study and to address them in future research. The primary constraint of the research is its single-source, cross-sectional design. Conducting the study within a single timeframe limits its scope, suggesting that the current findings represent a specific situation at a particular point in time. To accurately evaluate the direction and strength of causal relationships among variables, the proposed theoretical model should be examined using a longitudinal research design that collects data from diverse sources. Secondly, measuring all variables using self-report measures may increase the risk of CMB. Although this issue was controlled in the analyses, it is recommended that different data sources be used in future research. It should be noted that participants tend to conceal the truth or present it in a positive light.

## Resilience, Entrepreneurial Success, and Life Satisfaction among Syrian Refugee Entrepreneurs in Türkiye

The data collection process, which was based on voluntary participation and used the snowball method, may have resulted in the study including only entrepreneurs who are active on digital networks or belong to specific social circles. This situation may limit the reflection of the diverse experiences of unreached segments in the results.

Furthermore, the collection of data via Google Forms may have excluded entrepreneurs with limited internet access or technology usage. Since the research was conducted at the Gaziantep scale and based on a specific chamber of commerce registry, the results cannot be directly generalised to all refugee entrepreneurs across Türkiye or to informal entrepreneurs in different sectors. However, the findings provide a critical foundation for understanding refugee entrepreneurship ecosystems with similar socio-economic structures. Therefore, future studies are recommended to employ probability-based sampling methods to enhance the generalizability of results. Additionally, it is suggested that the model be retested in future research using different samples.

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## FINANCIAL AND ECONOMIC INDICATORS

*Objectives and purposes of financial analysis: an approach based on user heterogeneity and decision-making*

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There is a general consensus in the financial literature that the main objectives and purposes of financial analysis are to interpret, evaluate and transform accounting information into useful data for economic and financial decision-making (AICPA, 1973; IASB, 2018). However, within this utilitarian approach, a fundamental problem persists: the heterogeneity of users of financial information and their potentially conflicting interests. From a theoretical perspective, financial analysis cannot be understood as a neutral process, but rather as an instrument conditioned by the specific objectives of financial users, such as investors, creditors, administrators, and regulators (Penman, 2013; Palepu et al., 2020). In this sense, the central problem lies in the fact that there is no single, universal objective or interest, but multiple objectives and interests derived from the diversity of users.

The explicit recognition of interests allows us to recognise that the objectives of users of financial analysis are contingent, depending on the type of user, the economic environment, and the nature of the decision to be made. Thus, the purpose of this study is to offer a comprehensive view of the objectives and purposes of financial analysis, emphasising that these emerge from the interaction between available information and the needs of heterogeneous users. In normative terms, the basic objective of financial statements and financial analysis is to provide useful information for economic and financial decision-making, particularly for the efficient allocation of scarce resources (FASB, 2010; AICPA, 1973). However, this general objective is insufficient to capture the complexity of real decisions, in which factors such as risk, uncertainty, and expectations intervene.

### *Methodological diversity of financial analysis*

One of the main characteristics of financial analysis is the existence of multiple methodologies, each designed to address specific dimensions of business performance. This methodological diversity implies that the choice of analysis type is not neutral but must align with the user's objectives and purposes (Koller et al., 2020).



## Objectives and purposes of financial analysis: an approach based on user heterogeneity and decision-making

**Table 1**  
**Types of Financial Analysis**

Type of Analysis	Description	Key Components/Metrics
Vertical Analysis	Examines components of the income statement as percentages of revenue, allowing for comparison between companies of different sizes	<ul style="list-style-type: none"> <li>• Common-sized income statement analysis</li> <li>• Percentage of revenue calculations</li> <li>• Industry benchmarking</li> </ul>
Horizontal Analysis	Compares financial data across multiple years to identify growth rates and trends	<ul style="list-style-type: none"> <li>• Year-over-year comparisons</li> <li>• Historical trend analysis</li> <li>• Growth rate calculations</li> </ul>
Leverage Analysis	Evaluates a company's capital structure and debt obligations	<ul style="list-style-type: none"> <li>• Debt/equity ratio</li> <li>• Debt/EBITDA ratio</li> <li>• Interest coverage ratio (EBIT/interest)</li> <li>• DuPont analysis</li> </ul>
Growth Analysis	Assesses historical growth patterns and projects future growth	<ul style="list-style-type: none"> <li>• Year-over-year (YoY) growth</li> <li>• Regression analysis</li> <li>• Bottom-up analysis</li> <li>• Top-down analysis</li> <li>• Market size and share analysis</li> </ul>
Profitability Analysis	Evaluates how effectively a company generates profit	<ul style="list-style-type: none"> <li>• Gross margin</li> <li>• EBITDA margin</li> <li>• EBIT margin</li> <li>• Net profit margin</li> </ul>
Liquidity Analysis	Focuses on the company's ability to meet short-term obligations	<ul style="list-style-type: none"> <li>• Current ratio</li> <li>• Acid test ratio</li> <li>• Cash ratio</li> <li>• Net working capital</li> </ul>
Efficiency Analysis	Examines how well a company manages its assets and generates revenue	<ul style="list-style-type: none"> <li>• Asset turnover ratio</li> <li>• Fixed asset turnover ratio</li> <li>• Cash conversion ratio</li> <li>• Inventory turnover ratio</li> </ul>
Cash Flow Analysis	Evaluates a company's ability to generate and manage cash	<ul style="list-style-type: none"> <li>• Operating Cash Flow (OCF)</li> <li>• Free Cash Flow (FCF)</li> <li>• Free Cash Flow to Firm (FCFF)</li> <li>• Free Cash Flow to Equity (FCFE)</li> </ul>
Rates of Return Analysis	Measures the returns generated on various forms of investment	<ul style="list-style-type: none"> <li>• Return on Equity (ROE)</li> <li>• Return on Assets (ROA)</li> <li>• Return on Invested Capital (ROIC)</li> <li>• Dividend Yield</li> <li>• Internal Rate of Return (IRR)</li> </ul>
Valuation Analysis	Estimates the worth of a business using various methods	<ul style="list-style-type: none"> <li>• Cost approach</li> <li>• Relative value analysis</li> <li>• Comparable company analysis</li> <li>• Precedent transactions</li> <li>• Discounted cash flow analysis</li> </ul>
Scenario & Sensitivity Analysis	Tests how changes in variables affect outcomes	<ul style="list-style-type: none"> <li>• Best-case scenarios</li> <li>• Worst-case scenarios</li> <li>• Break-even analysis</li> <li>• Goal Seek analysis</li> <li>• Data table sensitivity tests</li> </ul>
Variance Analysis	Compares actual results to budgeted or forecasted figures	<ul style="list-style-type: none"> <li>• Favorable/unfavorable variance calculation</li> <li>• Root cause analysis</li> <li>• Volume and price variance analysis</li> </ul>

Source: Adapted from Penman (2013); Koller et al. (2020); Palepu et al. (2020).

*The problem of decision-making under uncertainty*

The financial analysis process takes place in an environment characterised by uncertainty, in which the decision-maker evaluates probability distributions over future states of the economy (Damodaran, 2012). In this context, financial analysis works as a tool to reduce uncertainty, although it does not eliminate it.

However, the coexistence of multiple methodologies and perspectives generates an additional problem: the impossibility of simultaneously satisfying all interests. What is optimal for an investor may not be optimal for a creditor or for management. This conflict aligns with agency theory, which highlights tensions between different interest groups (Jensen & Meckling, 1976).

*Objectives of financial analysis from an internal and external perspective*

The objectives of financial analysis can be grouped into two main approaches:

## 1. Internal focus

Oriented to business management, it seeks:

- Optimise resource allocation
- Evaluate operational performance
- Support strategic planning
- Maximize profitability

## 2. External Focus

Market-related, it includes:

- Evaluate investment opportunities
- Determine the market value
- Analyse financial risk
- Facilitate financing decisions

In both cases, the ultimate objective is usually associated with maximising the value of the company, although this concept is also debated in contemporary literature due to its relationship with sustainability and social value criteria (Damodaran, 2012; Koller et al., 2020).

*Users of financial analysis and their objectives*

The statement and purpose of the objectives also require knowing and specifying the nature of the interests and commitments of the stakeholders in the financial analysis, which is why Table No.2 presents a summary of the users and the different objectives and commitments that the stakeholders seek as a result when using the various methodologies of financial analysis.

## Objectives and purposes of financial analysis: an approach based on user heterogeneity and decision-making

**Table 2**  
**Users of financial analysis**

User Group	Focus	Key Analysis Types	Main Goals
Academic Researchers	Market and industry trend	• Statistical analysis	• Study market behavior
		• Historical trends	• Identify industry trends
		• Cross-sectional analysis	• Test financial theories
		• Economic impact studies	• Develop new methodologies
Auditors	Accuracy and compliance	• Variance analysis	• Verify financial statements
		• Trend analysis	• Detect irregularities
		• Ratio analysis	• Ensure reporting compliance
		• Substantive testing	• Assess internal controls
Company Management	Operational performance	• Efficiency analysis	• Improve operational efficiency
		• Variance analysis	• Strategic planning
		• Cash flow analysis	• Resource allocation
		• Budget analysis	• Performance monitoring
Competitors	Competitive benchmarking	• Market share analysis	• Benchmark performance
		• Efficiency metrics	• Identify competitive advantages
		• Profitability analysis	• Guide strategic planning
		• Growth analysis	• Set performance targets
Creditors & Lenders	Credit worthiness	• Leverage analysis	• Assess default risk
		• Liquidity analysis	• Evaluate collateral
		• Cash flow analysis	• Determine lending terms
		• Coverage ratios	• Monitor loan compliance
Customers and Suppliers	Business stability	• Liquidity analysis	• Evaluate long-term viability
		• Going concern assessment	• Assess payment capability
		• Credit analysis	• Determine credit terms
		• Operating efficiency	• Guide business relationships
Investors / Investment Analysts	Investment potential	• Profitability analysis	• Evaluate investment opportunities
		• Valuation analysis	• Assess risk-return
		• Growth analysis	• Make buy/sell decisions
		• Risk assessment	• Manage portfolios
Labor Unions	Financial capacity	• Profitability analysis	• Negotiate wages and benefits
		• Cash flow analysis	• Assess company's ability to pay
		• Productivity metrics	• Monitor job security
		• Compensation analysis	• Evaluate workplace conditions
Tax Authorities	Tax compliance	• Income analysis	• Ensure tax compliance
		• Transfer pricing	• Detect tax evasion
		• Capital structure	• Verify reported income
		• Revenue recognition	• Assess tax obligations

Source: Adapted from Palepu et al. (2020); Penman (2013); Damodaran (2012).

Economic and financial indicators are useful tools that benefit organizations by facilitating timely and appropriate decision-making about their corporate and financial strategies. Next, the evolution of key economic and financial indicators in the Mexican environment is described to facilitate decision-making for personal and business strategies in an integrated manner.

1. National Consumer Price Index (INPC, Spanish)
2. The Price and Quotation Index of the Mexican Stock Exchange (IPC, Spanish)
3. Exchange rate
4. Equilibrium interbank interest rate (TIIE, Spanish)
5. CETES rate of return

6. Investment units (UDIS, Spanish)

**1. NATIONAL CONSUMER PRICE INDEX (INPC)**

Born in 1995, it reflects changes in consumer prices and measures the country's general price increase. It is calculated fortnightly by the Bank of Mexico and INEGI (2021). INPC is published in the Official Gazette of the Federation on the 10th and 25th of each month. The reference period is the second half of July 2018.

**Table 3**  
**Accumulated inflation in the year (Base: 2nd half of July 2018=100 with data provided by Banco de México)**

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	-0.09	0.38	1.70	0.53	0.09	0.48	0.86	0.59	0.76	0.89	0.29	0.38
February	0.09	0.82	2.29	0.91	0.06	0.90	1.50	1.43	1.24	0.99	0.56	0.88
March	0.51	0.97	2.92	1.24	0.44	0.85	2.34	2.43	1.51	1.28	0.88	1.75
April	0.25	0.65	3.04	0.90	0.50	-0.17	2.67	2.98	1.49	1.48	1.21	
May	-0.26	0.20	2.92	0.73	0.21	0.22	2.88	3.17	1.27	1.29	1.50	
June	-0.09	0.31	3.18	1.12	0.27	0.76	3.43	4.04	1.37	1.68	1.78	
July	0.06	0.57	3.57	1.66	0.65	1.43	4.04	4.81	1.86	2.74	2.05	
August	0.27	0.86	4.08	2.26	0.63	1.82	4.24	5.54	2.42	2.75	2.12	
September	0.27	1.47	4.41	2.69	0.89	2.06	4.88	6.19	2.88	2.80	2.35	
October	1.16	2.09	5.06	3.22	1.44	2.68	5.76	6.79	3.27	3.37	2.72	
November	1.71	2.89	6.15	4.10	2.26	2.76	6.97	7.41	3.93	3.06	3.40	
December	2.13	3.36	6.77	4.83	2.83	3.15	7.35	7.82	4.66	4.21		

Source: Own elaboration (INEGI, 2026). Route: Indicadores económicos de coyuntura > Índices de precios > Índice nacional de precios al consumidor. Base segunda quincena de julio de 2018=100 > Mensual > Índice > Índice general

**Graph 1**  
**Inflation in Mexico (2015-2025 accumulated at the end of the year)**



Source: Own elaboration (INEGI, 2026). Route: Indicadores económicos de coyuntura > Índices de precios > Índice nacional de precios al consumidor. Base segunda quincena de julio de 2018=100 > Mensual > Índice > Índice general

**Graph 2**  
**Inflation in Mexico (accumulated January-March 2026)**



Source: Own elaboration (INEGI, 2026). Route: Indicadores económicos de coyuntura > Índices de precios > Índice nacional de precios al consumidor. Base segunda quincena de julio de 2018=100 > Mensual > Índice > Índice general

**2. THE PRICE AND QUOTATION INDEX OF THE MEXICAN STOCK EXCHANGE (IPC)**

Represents the change in the values traded on the Mexican Stock Exchange concerning the previous day to determine the percentage rise or fall of the most representative shares of the companies listed therein.

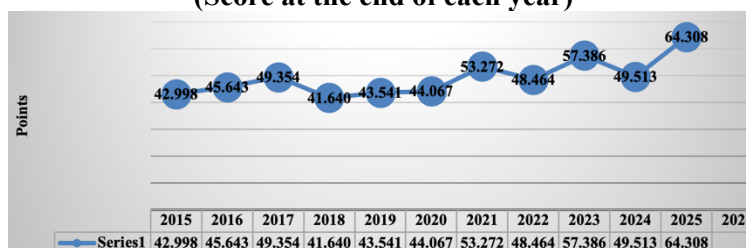
**Table 4**  
**The Price and Quotation Index of the Mexican Stock Exchange**  
**(Base: October 1978, 0.78=100)**

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	40,951	43,631	47,001	50,456	43,988	44,862	42,986	51,331	54,564	57,373	51,210	67,599
February	44,190	43,715	46,857	47,438	42,824	41,324	44,593	53,401	52,758	55,414	52,326	71,406
March	43,725	45,881	48,542	46,125	43,281	34,554	47,246	56,537	53,904	57,369	52,484	68,611
April	44,582	45,785	49,261	48,354	44,597	36,470	48,010	51,418	55,121	56,728	56,259	67,858
May	44,704	45,459	48,788	44,663	42,749	36,122	50,886	51,753	52,736	55,179	57,842	
June	45,054	45,966	49,857	47,663	43,161	37,716	50,290	47,524	53,526	52,440	57,451	
July	44,753	46,661	51,012	49,698	40,863	37,020	50,868	48,144	54,819	53,094	57,398	
August	43,722	47,541	51,210	49,548	42,623	36,841	53,305	44,919	53,021	51,986	58,709	
September	42,633	47,246	50,346	49,504	43,011	37,459	51,386	44,627	50,875	52,477	62,916	
October	44,543	48,009	48,626	43,943	43,337	36,988	51,310	49,922	49,062	50,661	62,769	
November	43,419	45,286	47,092	41,733	42,820	41,779	49,699	51,685	54,060	49,813	63,597	
December	42,998	45,643	49,354	41,640	43,541	44,067	53,272	48,464	57,386	49,513	64,308	

Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=7&accion=consultarCuadro&idCuadro=CF57&locale=es>

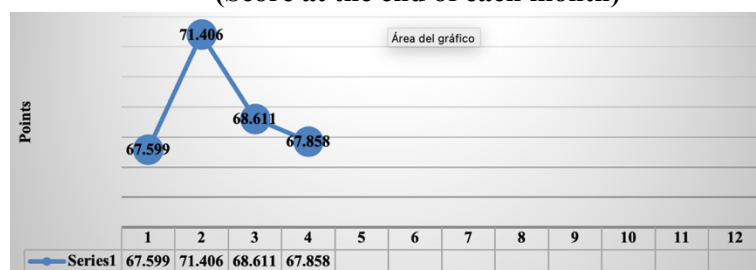
**Graph 3**  
**The Price and Quotation Index of the Mexican Stock Exchange, 2015 - 2025**  
**(Score at the end of each year)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=7&accion=consultarCuadro&idCuadro=CF57&locale=es>

**Graph 4**  
**The Price and Quotation Index of the Mexican Stock Exchange, January-April 2026**  
**(Score at the end of each month)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=7&accion=consultarCuadro&idCuadro=CF57&locale=es>

### 3. EXCHANGE RATE

It is the value of the Mexican peso against the dollar calculated from the daily average of the five most important banks in the country, which reflects the spot price (cash) negotiated between banks. It is closely related to Inflation, interest rates, and the Mexican Stock Exchange.

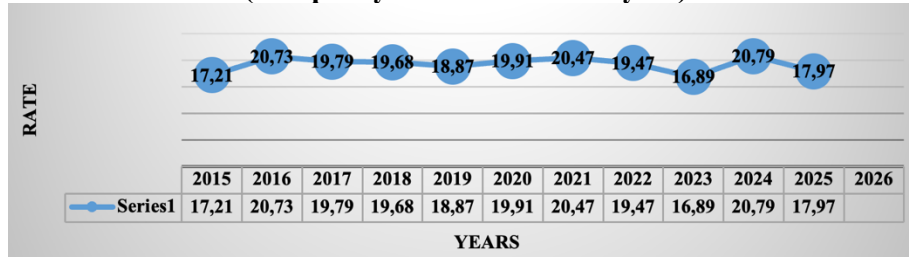
**Table 5**  
**Exchange rate (National currency per US dollar, parity at the end of each period)**

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	14.69	18.45	21.02	18.62	19.04	18.91	20.22	20.74	18.79	17.16	20.61	17.25
February	14.92	18.17	19.83	18.65	19.26	19.78	20.94	20.65	18.40	17.06	20.51	17.26
March	15.15	17.40	18.81	18.33	19.38	23.48	20.44	19.99	18.11	16.53	20.44	18.07
April	15.22	19.40	19.11	18.86	19.01	23.93	20.18	20.57	18.07	17.09	19.61	17.40
May	15.36	18.45	18.51	19.75	19.64	22.18	19.92	19.69	17.56	17.01	19.33	
June	15.57	18.91	17.90	20.06	19.21	23.09	19.91	20.13	17.07	18.24	18.89	
July	16.21	18.86	17.69	18.55	19.99	22.20	19.85	20.34	16.73	18.59	18.76	
August	16.89	18.58	17.88	19.07	20.07	21.89	20.06	20.09	16.84	19.60	18.65	
September	17.01	19.50	18.13	18.90	19.68	22.14	20.56	20.09	17.62	19.64	18.33	
October	16.45	18.84	19.15	19.80	19.16	21.25	20.53	19.82	18.08	20.04	18.57	
November	16.55	20.55	18.58	20.41	19.61	20.14	21.45	19.40	17.14	20.32	18.31	
December	17.21	20.73	19.79	19.68	18.87	19.91	20.47	19.47	16.89	20.79	17.97	

NOTE: Exchange rate FIX by The Banco de México, used for settling obligations denominated in foreign currency. Quote at the end Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=6&accion=consultarCuadro&idCuadro=CF102&locale=es>

**Graph 5**  
Exchange rate (National currency per US dollar, 2015-2025, (FIX parity at the end of each year)

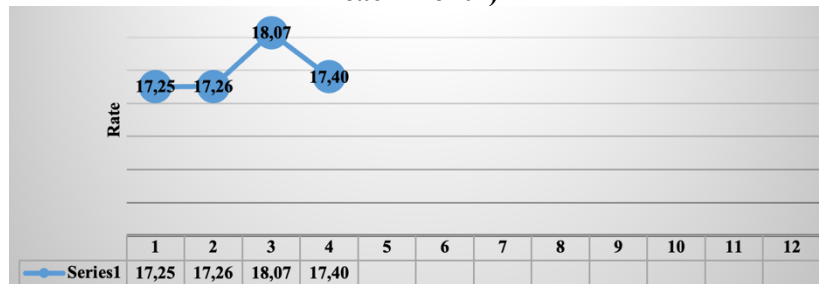


Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=6&accion=consultarCuadro&idCuadro=CF102&locale=es>

**Graph 6**

Exchange rate (National currency per US dollar, January-April 2026, FIX parity at the end of each month)



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=6&accion=consultarCuadro&idCuadro=CF102&locale=es>

#### 4. EQUILIBRIUM INTERBANK INTEREST RATE (TIE)

On March 23, 1995, the Bank of Mexico, to establish an interbank interest rate that better reflects market conditions, released the Interbank Equilibrium Interest Rate through the Official Gazette of the Federation.

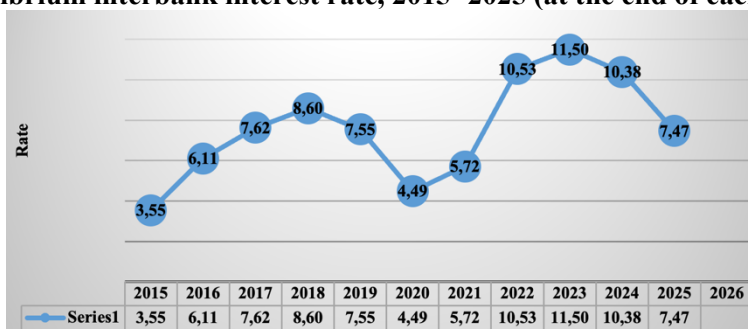
**Table 6**  
Equilibrium interbank interest rate (28-day quote)

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	3.29	3.56	6.15	7.66	8.59	7.50	4.47	5.72	10.82	11.50	10.28	7.30
February	3.29	4.05	6.61	7.83	8.54	7.29	4.36	6.02	11.27	11.50	9.88	7.29
March	3.30	4.07	6.68	7.85	8.51	6.74	4.28	6.33	11.43	11.44	9.74	7.24
April	3.30	4.07	6.89	7.85	8.50	6.25	4.28	6.73	11.54	11.25	9.28	7.02
May	3.30	4.10	7.15	7.86	8.51	5.74	4.29	7.01	11.51	11.24	9.05	
June	3.30	4.11	7.36	8.10	8.49	5.28	4.32	7.42	11.49	11.24	8.74	
July	3.31	4.59	7.38	8.11	8.47	5.19	4.52	8.04	11.51	11.25	8.26	
August	3.33	4.60	7.38	8.10	8.26	4.76	4.65	8.50	11.51	11.08	8.09	
September	3.33	4.67	7.38	8.12	8.04	4.55	4.75	8.89	11.50	11.08	8.02	
October	3.30	5.11	7.38	8.15	7.97	4.51	4.98	9.56	11.50	10.95	7.81	
November	3.32	5.57	7.39	8.34	7.78	4.48	5.13	10.00	11.50	10.74	7.61	
December	3.55	6.11	7.62	8.60	7.55	4.49	5.72	10.53	11.50	10.38	7.47	

Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=18&accion=consultarCuadro&idCuadro=CF101&locale=es>

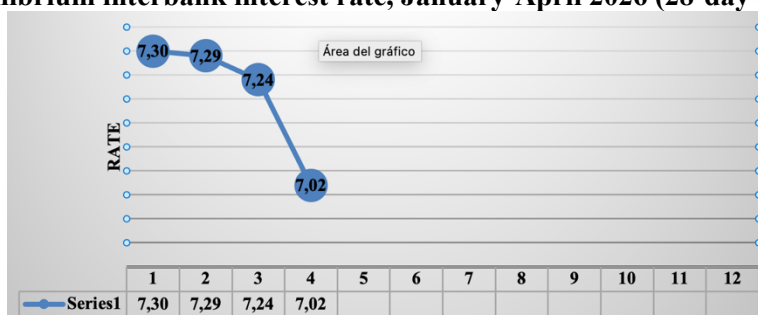
**Graph 7**  
**Equilibrium interbank interest rate, 2015- 2025 (at the end of each year)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=18&accion=consultarCuadro&idCuadro=CF101&locale=es>

**Graph 8**  
**Equilibrium interbank interest rate, January-April 2026 (28-day quote)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=18&accion=consultarCuadro&idCuadro=CF101&locale=es>

## 5. CETES RATE OF RETURN

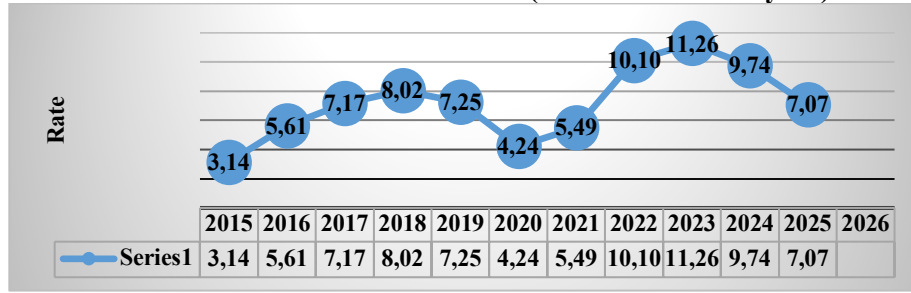
**Table 7**  
**CETES rate of return (28-day)**

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	2.67	3.08	5.83	7.25	7.95	7.04	4.22	5.50	10.80	11.28	9.87	6.95
February	2.81	3.36	6.06	7.40	7.93	6.91	4.02	5.94	11.04	11.00	9.44	6.83
March	3.04	3.80	6.32	7.47	8.02	6.59	4.08	6.52	11.34	10.90	9.02	6.81
April	2.97	3.74	6.50	7.46	7.78	5.84	4.06	6.68	11.27	11.04	8.65	6.50
May	2.98	3.81	6.56	7.51	8.07	5.38	4.07	6.90	11.25	11.03	8.12	
June	2.96	3.81	6.82	7.64	8.18	4.85	4.03	7.56	11.02	10.88	8.00	
July	2.99	4.21	6.99	7.73	8.15	4.63	4.35	8.05	11.09	10.87	7.48	
August	3.04	4.24	6.94	7.73	7.87	4.50	4.49	8.35	11.07	10.65	7.27	
September	3.10	4.28	6.99	7.69	7.61	4.25	4.69	9.25	11.05	10.35	7.20	
October	3.02	4.69	7.03	7.69	7.62	4.22	4.93	9.00	11.26	10.20	7.10	
November	3.02	5.15	7.02	7.83	7.46	4.28	5.05	9.70	11.78	9.95	7.15	
December	3.14	5.61	7.17	8.02	7.25	4.24	5.49	10.10	11.26	9.74	7.07	

Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=22&accion=consultarCuadro&idCuadro=CF107&locale=es>

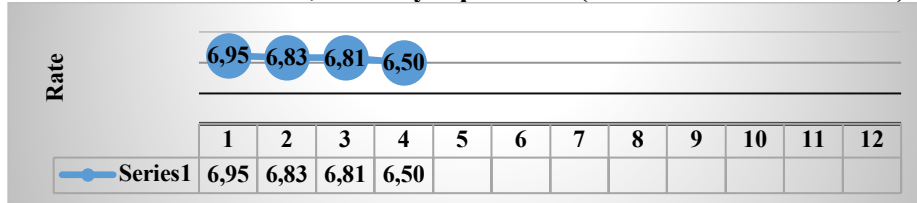
**Graph 9**  
**CETES rate of return 2015- 2025 (at the end of each year)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=22&accion=consultarCuadro&idCuadro=CF107&locale=es>

**Graph 10**  
**CETES rate of return, January-April 2026 (at the end of each month)**



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=22&accion=consultarCuadro&idCuadro=CF107&locale=es>

## 6. INVESTMENT UNITS (UDIS)

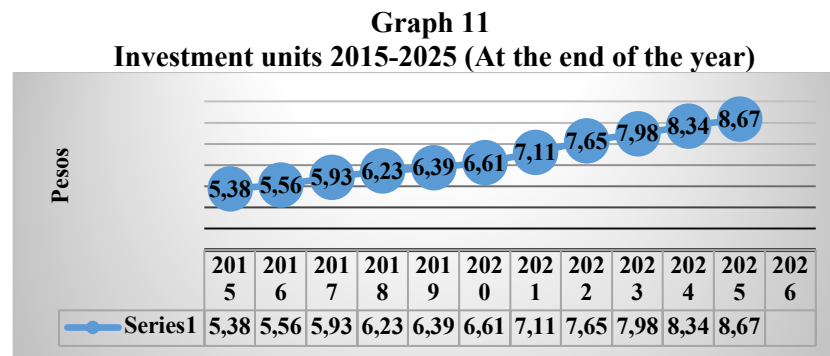
The UDI is a unit of account of constant real value to denominate credit titles. It does not apply to checks, commercial contracts, or other acts of commerce.

**Table 8**  
**Investment units (value concerning pesos)**

Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
January	5.29	5.41	5.62	5.97	6.25	6.44	6.64	7.12	7.69	8.06	8.37	8.08
February	5.29	5.43	5.69	6.00	6.25	6.46	6.70	7.18	7.74	8.11	8.40	8.72
March	5.30	5.44	5.71	6.02	6.26	6.49	6.75	7.24	7.77	8.11	8.42	8.79
April	5.32	5.45	5.75	6.03	6.28	6.43	6.79	7.31	7.78	8.13	8.45	8.83
May	5.29	5.42	5.75	6.01	6.27	6.42	6.81	7.33	7.78	8.15	8.48	
June	5.28	5.42	5.75	6.01	6.26	6.44	6.83	7.36	7.77	8.13	8.50	
July	5.28	5.42	5.76	6.04	6.27	6.49	6.87	7.43	7.79	8.20	8.53	
August	5.29	5.44	5.79	6.07	6.29	6.52	6.90	7.47	7.83	8.25	8.54	
Sep.	5.31	5.45	5.82	6.11	6.29	6.55	6.92	7.53	7.87	8.25	8.55	
Oct.	5.33	5.49	5.84	6.13	6.31	6.57	6.97	7.57	7.90	8.26	8.57	
Nov.	5.36	5.53	5.89	6.17	6.35	6.60	7.04	7.62	7.94	8.32	8.61	
Dec.	5.38	5.56	5.93	6.23	6.39	6.61	7.11	7.65	7.98	8.34	8.67	

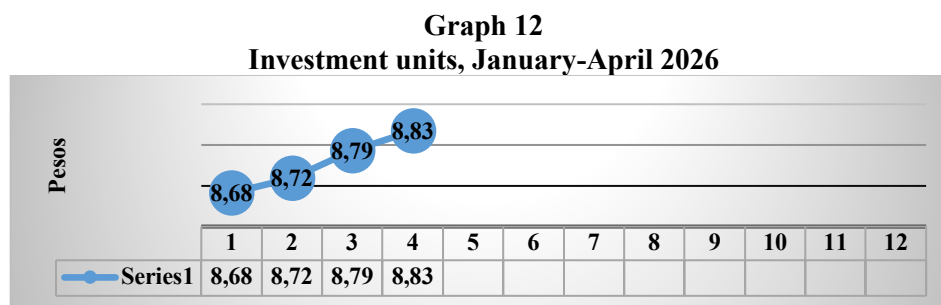
Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?accion=consultarCuadro&idCuadro=CP150&locale=es>



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?accion=consultarCuadro&idCuadro=CP150&locale=es>



Source: Own elaboration (BANXICO, 2026).

<https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?accion=consultarCuadro&idCuadro=CP150&locale=es>

## DISCUSSION AND FINAL THOUGHTS

Financial analysis should not be conceived only as a set of techniques, but as an interpretative process oriented by specific objectives. The simple identification of methodologies is insufficient if it is not accompanied by a clear definition of the purposes pursued. In this sense, the main contribution of financial analysis lies in its ability to:

- Anticipate risks
- Detect structural weaknesses
- Evaluate strategic alternatives
- Supporting rational decisions

However, heterogeneous user populations introduce structural limitations, as objectives may be incompatible. Therefore, the definition of the objectives of financial analysis requires an explicit approach that considers:

1. The nature of the user
2. The economic context
3. The type of decision

In conclusion, the objectives and purposes of financial analysis are not universal or static, but constitute a dynamic construction derived from the interaction between information,

## Objectives and purposes of financial analysis: an approach based on user heterogeneity and decision-making

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context and interests, which represents both its greatest strength and its main theoretical and practical challenge.

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