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SINTA 2

Adapting Travel Business Strategies For Gen Z: The Role of Cross-Border Partnership and Technology Integration

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ABSTRACT

This study explores the role of cross-border cooperation in attracting Generation Z travelers, particularly in Indonesia. With the rise of online travel agencies (OTAs) and direct service distribution by airlines and hotels, the travel industry has been reshaped by digital platforms. However, there is a gap in understanding how these collaborations meet the specific preferences of Gen Z as the potential market. The study investigates how selection factors, technology integration, and customer trust influence Gen Z's booking intentions. A mixed-methods approach was used, combining a stratified random sampling survey and semi-structured interviews with industry professionals involved in cross-border travel partnerships. The quantitative data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that personalized experiences, trust in brands, and seamless technology integration significantly impact Gen Z's booking decisions. This research offers insights for travel companies looking to enhance engagement with this key demographic.

Keywords: gen z, travel companies, business strategies, cross-border partnership, technology integration

INTRODUCTION

Partnerships that span international borders are becoming increasingly important for the travel industry, which is distinguished by its global nature and competitive landscape (Kvasnová et al., 2019). The opportunities and difficulties that come with international collaborations that span international borders come with a number of advantages, but they also bring about a number of issues that need to be carefully managed. Collaborations make it possible for firms to enter new markets and reach a larger audience by capitalizing on the market knowledge of local partners (Castañer & Oliveira, 2020).

Ferreira et al. (2020) added that partnerships are the driving force behind innovation because they allow for the combination of resources and knowledge, which ultimately results in the creation of new products and services. Collaborations make it possible for firms to enter new markets and reach a larger audience by capitalizing on the market knowledge of local partners (Castañer & Oliveira, 2020). Kormakova et al. (2023) stated that partnerships are the driving force behind innovation because they allow for the

combination of resources and knowledge, which ultimately results in the creation of new products and services. Ekins & Zenghelis, (2021) also mentioned that sharing resources and expenses can lead to significant cost savings for both parties, a concept known as cost efficiency.

Enhanced competitive advantage of this business collaboration is that it enables companies to differentiate themselves from their rivals by producing distinctive products and services that are the result of collaborations (Supina & Singh, 2024; Jerab & Mabrouk, 2023). Furthermore, cross-border collaboration not only enables travelers to visit many destinations, but also facilitating companies to utilize global resources and extend their operating scope (Chan et al., 2020), cross-border labor sourcing and procurement (Oriade & Cameron, 2017). Studies regarding supply chain collaboration is substantial; however, certain scholars have observed an insufficient emphasis on the cultural dimensions of these initiatives (Osei & Asante-Darko, 2024, 2023). Obstacles to Overcome Cultural and Operational Differences may shape different business practices and cultural norms can be a source of difficulty when it comes to attracting potential markets (Putra et al., 2024).

Figure 1 below outlines the diverse intentions of Generation Z regarding international vacations across various nations, and Figure 2 is about the diversity regarding domestic vacations. Analyzing these global trends underscores the impact of cultural and generational characteristics on the travel activities of this age, offering significant insights into their preferences and expectations. This data can guide initiatives for brands and travel companies aiming to engage Gen Z. Targeting Generation Z is a strategic decision due to their considerable importance as a consumer generation at this period (Chen et al., 2023). This generation exerts significant impact on shopping decisions and overarching cultural trends. Gen Z are those who were born between 1995-2012 (Lopez & Abadiano, 2023).

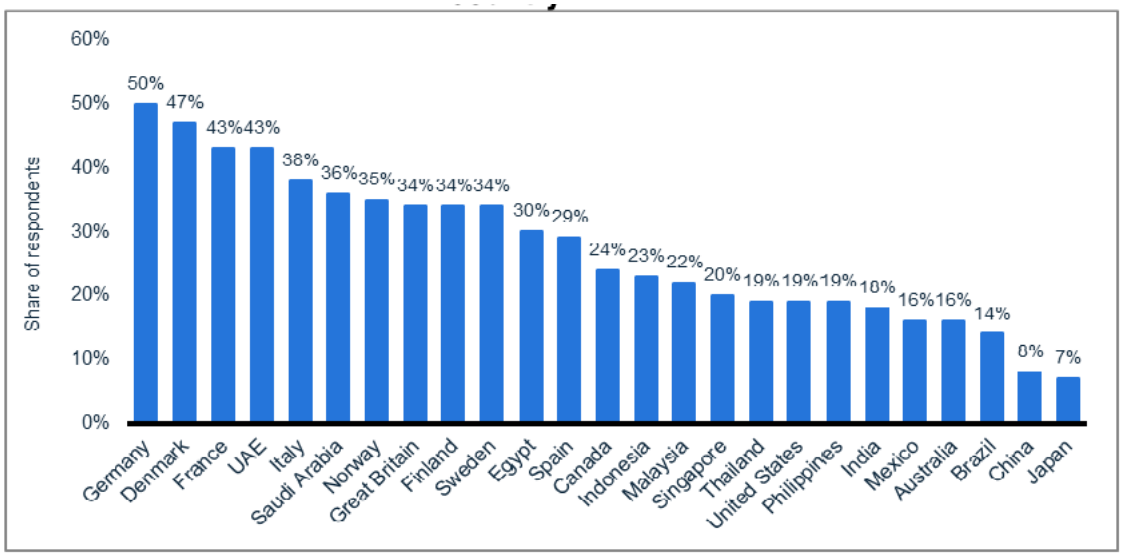

Figure 1. Intention of Gen Z to Take an International Vacation Worldwide by Country

Source: Travel & Tourism Report (2022)

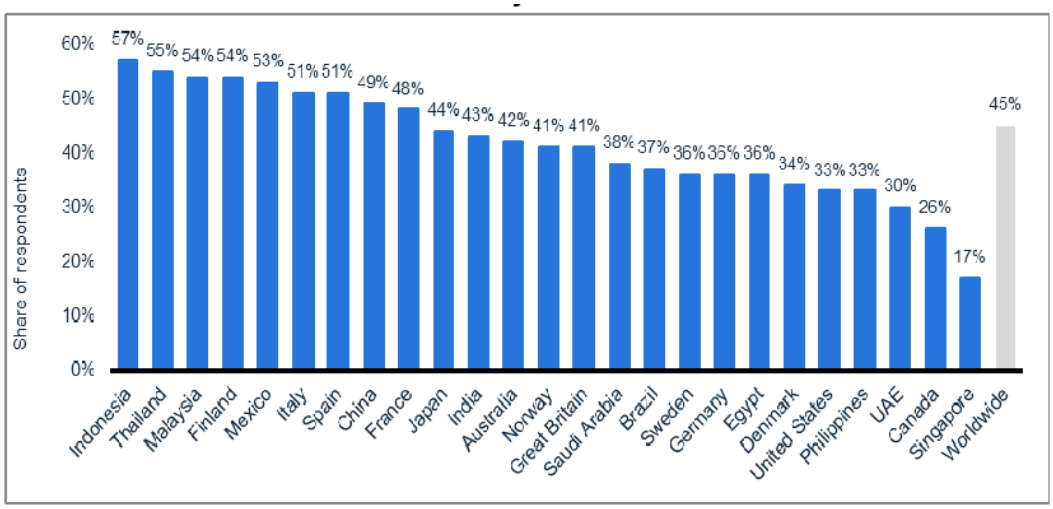

Figure 2. Intention of Gen Z to Take a Domestic Vacation Worldwide by Country
Source: Travel & Tourism Report (2022)

Figure 2 reveals that Gen Z from Asian countries, specifically Indonesia (57%), Thailand (55%), and Malaysia (54%), show a greater inclination towards domestic holidays compared to young travelers from European countries such as Germany, Denmark, and France, who display a higher preference for international vacations. These figures illustrate the diverse intentions of Gen Z regarding domestic travel globally, with Indonesia emerging as the nation where Gen Z exhibits the greatest propensity for both domestic and international travel—23% for international travel and the highest percentage for domestic travel as well. Once travel companies understand the intention of Gen-Z to travel, they must also understand the necessary updates to cater to this age group. This information helps us learn more about how people of different ages, including Gen Z, see the value of technology in making their trip experiences better. The growing importance of these technological tools closely links to changing business strategies of travel companies. These companies are adapting their services to meet the demand for smooth, stress-free journey experiences. Companies can make their services more appealing to today's tech-savvy tourists if they know what these travelers want.

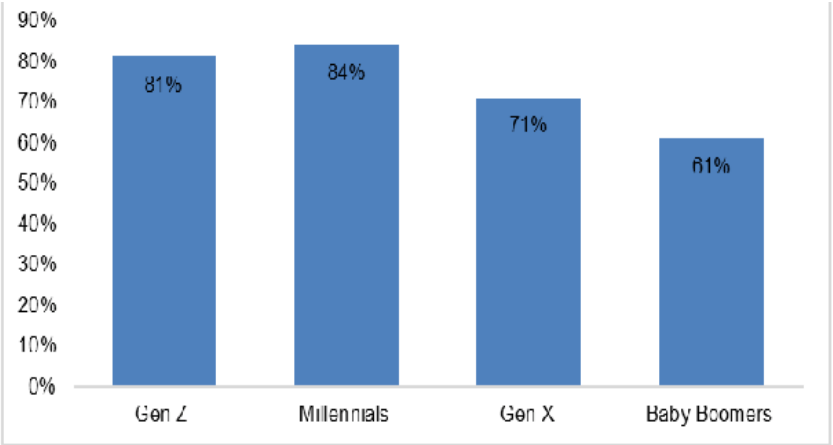

Figure 3. Share of Travellers Who Appreciate Travel Apps That Reduce the Stress of a Trip, by Generation
Source: Hilton, Trends Report 2024 – The Year of the Great Recharge (Popşa, 2024)

The necessity of examining cross-border cooperation in the travel sector, particularly with Generation Z as the predominant developing consumer demographic, is critical. Despite a growing amount of research on global business practices and cross-border partnerships, there is a dearth of studies specifically examining how these collaborations meet the distinct preferences of Gen Z, both internationally and in places like Indonesia. This disparity is particularly alarming considering the huge business potential that Generation Z embodies. As the inaugural generation raised wholly in the digital era, Gen Z has unique habits and beliefs, including a preference for customized, technology-oriented experiences, social awareness, and a requirement for authenticity in brand engagements (Singh et al., 2022; Marta et al., 2022). Despite their considerable purchasing power, there is insufficient research on how cross-border cooperation may strategically engage and cater to this group (Wilson, 2019). In Indonesia, a swiftly expanding market characterized by rising internet penetration and a burgeoning adolescent demographic, this disparity is particularly evident.

In the absence of a comprehensive strategy to penetrate this crucial sector, travel companies jeopardize a significant growth opportunity. Business evaluation approaches and initiatives that neglect the distinct attributes of Generation Z, especially for cross-border relationships, are likely to be unproductive or irrelevant. Consequently, there is an imperative requirement for research that investigates the impact of cross-border cooperation in attracting Generation Z, both internationally and within Indonesia, to guide future corporate strategies and enhance market penetration. This study aims to bridge this gap by examining how these collaborations can align with Generation Z's expectations, thereby creating a more effective and targeted strategy to engage one of the most profitable and dynamic consumer demographics today.

The travel industry has experienced substantial changes in recent years, necessitating that companies within this sector adjust their strategies to remain competitive and address the changing demands of consumers. A significant trend is the emergence of the sharing economy, which has transformed conventional travel company structures. Platforms such as Airbnb have disrupted the strategy of conventional hotel companies by providing more flexible and economical alternatives for travelers. Ruggieri et al. (2018) mentioned that the emergence of these online platforms has granted consumers greater autonomy, eliminating their exclusive dependency on traditional travel agents for expertise and services (Noor et al., 2020).

The emergence of the sharing economy, along with the expansion of online travel agencies and the direct distribution of services via airline and hotel websites, has transformed the travel business. These modifications have transformed the manner in which consumers organize and reserve their travels, with digital platforms now assuming a predominant position. In reaction to these changes, travel enterprises have had to adopt a more customer-centric approach and be more responsive to client demands. Travel and hospitality companies have had to modify their business strategies to provide more personalized, differentiated, and unique experiences for their guests to maintain market share and profit margins (Giannoukou, 2024).

Different kinds of international partnerships established in the tourism sector. Partnerships that span international borders in the travel sector can take several forms, each of which contributes in its own unique way to the expansion of businesses. Such as:

corporate partnerships which is the formation of a new corporation with worldwide partners for the purpose of accomplishing particular business goals is what is known as a joint venture. Through these partnerships, travel companies are able to expand their operations into new markets and share their resources and experience (Castañer & Oliveira, 2020). Another one is strategic alliances where the term "strategic alliance" refers to partnerships in which organizations work together to achieve common goals while still retaining their autonomy. Some examples include the formation of alliances amongst airlines in order to provide integrated travel services (Kormakova et al., 2023). There are also licenses and franchising opportunities, it is possible for travel companies to expand internationally through the use of franchising and licensing agreements, which allow them to leverage local knowledge and infrastructure. According to El-Ebiary et al. (2022), this strategy assists brands in expanding their presence in new locations in an efficient manner. The last one is partnerships for cross-promotional activities to co-marketing activities between travel organizations, such as joint promotions or bundled deals, are examples of cross-promotional partnerships. These collaborations are designed to recruit and keep clients with respective businesses. According to Hudson (2020), technology partnerships in travel businesses are collaborations that consist of the development or integration of technological solutions. These solutions may include booking systems or customer relationship management tools, and their purpose is to improve both operational efficiency and the customer experience.

Popșa (2024) also observed that the political, economic, and health events during their formative years influence the travel patterns of Generation Z. This cohort recognizes the importance of experiences, authenticity, and ecological initiatives (Gray et al. 2019). The primary motivations for Generation Z to travel include immersing themselves in diverse cultures and trying new culinary experiences, connecting with unfamiliar individuals, strengthening existing relationships, exploring new territories, and engaging in sports events (Marta et al., 2022), due to the fear of being excluded (Supina & Lautama, 2024). As of 2019, Generation Z has overtaken both Millennials and Baby Boomers to become the largest generation, comprising 32% of the global population (Slivar et al., 2019).

Agustina & Astari conducted the most recent study in 2022 on the evolving travel microtrends of Gen Z, highlighting the significant impact of the ongoing COVID-19 pandemic, which began in early 2020, on the transformation of tourism patterns, particularly within the travel industry. Trends can be defined as the act of observing and analyzing the present seasonal behavior and patterns (Irfan & Sukirno, 2019; Kumar et al., 2023) Researchers have discovered that individuals between the ages of 18 and 34 have been responsible for driving new trends in tourism in the year 2022 (Arlou, 2022). According to Vancia & Băltescu (2022), there are two travel microtrends emerging as a result of the pandemic. Firstly, visitors will increasingly travel with the intention of supporting local businesses. Secondly, tourists will opt for boutique hotels when going on vacation. The pandemic will cause travellers to prioritize their health and return to the prevailing trend of natural tourism.

Three factors influence an individual's preferences: The characteristics of individuals encompass age, gender, educational attainment, income level, and nutritional understanding. Furthermore, the product consists of various components, including both tangible items and intangible services. Finally, the characterization of the environment includes factors such as the number of families, social aspects, mobility, and seasons (Hunter et al., 2019).The younger generation's preference for traditional travel agents (38%

of Millennials and Gen Z) is unexpected considering their well-documented inclination towards digital behaviors rather than analogue ones. In sharp contrast to Generation X and Baby Boomers, barely 12% and 2%, respectively, utilize the services of a conventional travel agent. On the other hand, Generation X greatly prefers to utilize online travel agencies (OTAs) for making their holiday travel arrangements, accounting for 35% of their bookings. The resurgence of travel agents among the younger generation has resulted in only 22% of respondents directly ordering hotel stays and airline tickets through the vendors' websites (Talwar et al., 2020).

Based on Octaviani et al. (2023), it is evident that Gen Z travellers show a minor inclination towards Online Travel Agents (OTA). Out of this group, 64% have utilized an OTA, while 59% have sought the assistance of a travel adviser, 50% have engaged a travel concierge, and 45% have utilized a destination management company (DMC). This indicates the ease and familiarity that Gen Z travellers have with online services (Suwitho et al., 2023). Specifically, Generation Z is the first generation to have grown up with the internet at their fingertips, which naturally equips them with digital technology skills. However, it is important to note that Gen Z/Millennial travellers are more likely to choose an online service for booking their vacation. Additionally, compared to travellers aged 43 and above, Gen Z travellers are twice as inclined to utilize travel services in order to make their vacation reservations. Furthermore, they continue to rely on travel brokers even after scheduling a trip.

METHODS

For the quantitative survey, a random sampling method was utilized to ensure that the sample accurately reflects the diverse demographic characteristics of Generation Z travelers. The target population consisted of individuals aged 18 to 43 who have traveled internationally within the past three year. When determining sample size for an unknown population, a systematic approach is essential for ensuring the reliability and validity of research findings. Due to the large and unknown number of Gen Z travellers who have travelled overseas in the last three years, a Z-score sample size determination method is utilized. First, it is crucial to define the target population based on relevant characteristics, such as age, demographics, or interests (Creswell., 2019). Then a 5% margin of error was set for this study, where 1.96 is for a 95% confidence level, resulting sample size as follow:

$$n = (\mathrm{Z-score})2 \times \mathrm{StdDev} \times (1 - \mathrm{StdDev}) \,/\, (\mathrm{margin\ of\ error})2$$

$$n = (1.96^2 \times .5(.5))/(.05)^2$$

$$n = (3.8416 \times 0.25) \,/\, .0025$$

$$n = .9604 \,/\, .0025$$

$$n = 284.16$$

This systematic method allows this study to acquire significant and generalisable data, even without specific demographic factors. The quantitative data in this study was analyzed using SmartPLS version 4, a specialized tool for partial least squares structural equation modelling (PLS-SEM) (Hair et al., 2021).

To strengthen the quantitative survey results, qualitative data were collected via semi-structured interviews with a varied array of industry professionals engaged in cross-

border cooperation in the travel and tourism business. The study included participants from numerous international travel agencies, including tour planners, ticket managers, and general managers. Each interview employed a semi-structured style, facilitating comprehensive exchanges while permitting the exploration of developing themes. We documented, transcribed, and thematically analyzed the qualitative data to identify repeating patterns and significant discoveries. This mixed-methods approach enhances quantitative findings and offers thorough knowledge of the effects of cross-border cooperation on travel enterprises targeting Generation Z, providing significant insights for both academia and industry practice. This approach aimed to capture a wide array of perspectives on how cross-border collaborations are implemented and their effectiveness in addressing the needs of Gen Z travelers. The criteria for participant selection included relevant experience in cross-border initiatives and a demonstrated understanding of Generation Z travel preferences.

Table 1. Informant Profile

Initials	Gender	Age	Profession
SN	Male	52	General Manager AY
SG	Male	49	General Manager BA
IM	Male	37	Ticketing Manager AY
MS	Male	39	Ticketing Manager BA
IR	Female	36	Tour Manager AY
SB	Male	42	Tour Manager BA

Source: Data processed, 2024

RESULT AND DISCUSSION

The respondents in this study are Gen Z travelers who have employed services from both online travel agencies (OTAs) and conventional travel agents, and the studied data met the preliminary requirements.

Table 2. Respondents Socio-Demographic

Category	Range	Freq.	%
Gender	Male	234	49
	Female	247	51
Instagram users	Yes	389	81
	No	92	19
Facebook Users	Yes	453	94
	No	28	6
TikTok Users	Yes	328	68
	No	153	32
Having OTA app	Yes	410	85
	No	71	15
Doing travel transaction online with or without app	Yes	439	91
	No	42	9

Source: Data processed, 2024

Based on the table above, the measurement model meets all the necessary standards for validity and reliability. This study utilized the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT) to enhance the validity and reliability of the survey instrument. To check the discriminant validity, the Fornell-Larcker criterion was used. This was done by comparing the square root of the average variance extracted (AVE) for each construct with the correlations between the constructs. Also, the findings validate that each construct is unique, as the square roots of the AVEs surpass the corresponding correlations. This study also computed the HTMT ratio to evaluate the discriminant validity. All HTMT values were below the advised threshold of 0.85, signifying that the constructs are adequately different from each other.

Table 3. Reflective Measurement Model

Construct	Items	Type	Loading/Weights	CR	rho_A	AVE
Selection Factors for Travel Companies		Reflective		0.925	0.918	0.754
	FS1		0.832			
	FS2		0.820			
	FS3		0.893			
	FS4		0.925			
Technology and Travel Experiences		Reflective		0.736	0.713	0.522
	TCE1		0.754			
	TCE2		0.764			
	TCE3		0.827			
Customer Trust and Reputation		Reflective		0.783	0.742	0.548
	CTR1		0.722			
	CTR2		0.795			
	CTR3		0.769			
Booking Intention		Reflective		0.803	0.736	0.545
	BI1		0.744			
	BI2		0.770			
	BI3		0.835			
	BI4		0.738			
	BI5		0.876			

Source: Data processed, 2024

The results indicate strong validity and reliability, thereby reinforcing the robustness of the methodology and the credibility of the analysis employed for complete data analysis by using assessment structural model.

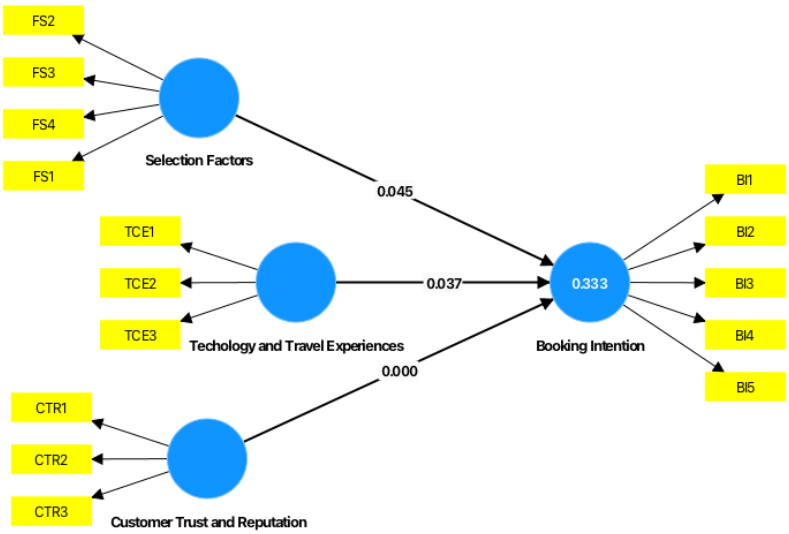

Figure 4. Structural Assessment Model
Source: Authors, 2024

Table 4. Result of Hypothesis Testing

	Direct Effect	*P-value*	Result
Selection Factors → Booking Intention	0.084	0.045	Accepted
Technology and Travel Experiences → Booking Intention	0.112	0.037	Accepted
Customer Trust and Reputation → Booking Intention	0.491	0.000	Accepted

Source: Data processed, 2024

Based on the table above, it was discovered that there is a statistically significant link between selection variables and booking intention (β = 0.084, p = 0.045). These findings suggests that the selection criteria examined in this research ranging from travel companies chain to personalized travel options play a key role in shaping customers' intentions to book travel services. These findings were aligned with previous research that emphasizes the significance of selection criteria in the decision-making process for customers (Ahmad & Nesamani, 2020; Hiezl & Gyurácz-Németh, 2020). These findings also highlight the ways in which an assortment of service characteristics, such as the availability of trusted travel brands and the capacity to customize services, influence booking behavior.

The insights that were collected from interviews with the general manager of a conventional travel agency shed further light on this trend, particularly with regard to the manner in which travel companies are responding to the changing requirements of Gen Z tourists. Both traditional and online travel companies are being challenged to innovate and improve their service offerings in order to cater to the interests of Generation Z, which has distinct preferences for individualized experiences and the seamless integration of technology. The general manager made the observation that in order to maintain a competitive edge in a market that is becoming increasingly digital and experience-driven, it is vital to comprehend and include selection factors, such as bespoke itineraries and

booking platforms that are easy to use. The insights from the general manager of the conventional travel agency reveal significant trends in the adaptation to changing consumer needs among Gen Z.

"Whether conventional or online, Indonesian travel agents operate with the same worldwide wholesalers. Despite having subsidiaries or sister firms in some countries, we don't focus much on that. If another foreign chain offers us a better deal, we'll take it. This is why pricing competition is so tough. However, the younger generation of travelers poses a challenge. While they are aware of the terms and conditions and are primarily concerned with the price, they frequently neglect the smaller nuances. During their trips, they realize it may not be as comfortable as expected." **(IR/SB)**

"The younger generation accounts for the vast bulk of our online travel agency's sales. They commonly reserve their tickets six months or one year in advance. Most of them merely book flights, hotels, and occasional local transportation. Customers rarely purchase whole packages. Currently, the top three most popular destinations are China, Europe, and Turkey." **(IR/SB)**

"In this industry, it makes little difference whether we sell only tickets or entire packages. We have developed a wide range of strategies to improve our companies' futures. Technology does not undermine our progress; rather, it facilitates it. **(IR/SB)**

This study highlights the critical role that selection criteria play in determining booking intentions, hence highlighting the necessity for travel companies to customize their services to the increasing expectations of consumers who are members of the Gen Z. By concentrating on these essential factors, travel companies may increase their appeal to this generation, which will ultimately have an effect on the decisions that they make regarding bookings. The interviews provide insights into the complex and dynamic nature of Indonesia's travel sector, especially on the preferences and habits of Gen Z. Although functioning via global wholesalers, both traditional and online travel agents encounter fierce pricing rivalry, frequently propelled by opportunistic choices rather than enduring brand loyalty. This dynamic illustrates the commodification of travel services, when price emerges as the primary factor influencing client selection. Generational transitions are transforming the market. The Gen Z travelers, while cost-conscious and proficient with technology, frequently overlook the experiential compromises associated with budget-oriented planning. Their inclination to reserve essential travel components, such as flights and hotels, well ahead of time—while eschewing whole package deals—indicates a preference for flexibility and autonomous travel. Travel agents view technology advancement not as a threat but as a fuel for innovation and strategic diversification. Collectively, these viewpoints emphasize the necessity for travel companies to reconcile price competitiveness with value-added services while utilizing technology to personalize and elevate the client experience. By doing so, they may more effectively fit with the expectations of Gen Z travelers and maintain relevance in a rapidly evolving global travel market.

The direct impact of technology and travel experiences on booking intention was also shown to be statistically significant ($\beta = 0.112$, $p = 0.037$). This implies that the utilization of technology and previous travel experiences has a beneficial impact on Gen Z's intention to book their traveling activities. This finding supports Pinto & Castro, (2019), Wijaya & Eppang, (2021), Garcia et al., (2022), and Liu et al, (2020) which similarly highlight the role of technology and customer experience in shaping consumer behavior. These results

emphasize the growing influence of technology and experiential factors in the travel booking process, particularly within the Gen Z demographic. However, the interview results below shows that for Indonesia's travel companies to not having so much worry and blindly swift to online travel services. Since, the conventional and online travel companies have their own pros and cons.

"Our travel firm is well-established in Indonesia, with a strong customer base that includes both individual and corporate clients. However, in order to keep up with the quickly changing technological landscape and appeal to the younger generation of travelers, we have established a smaller online travel agent with a different name and branding. We specifically created this website for the Free Independent Traveler (FIT) industry, with a focus on ticket and accommodation bookings." **(SN&SG)**

"Our online travel agency has had excellent volume sales, but the profit margins are significantly lower than our traditional sales channels. Nonetheless, there has been a huge increase in travel to China recently. The Chinese government and local travel operators are offering extremely low-cost packages to promote new tourist destinations. This has piqued the interest of the Indonesian market, particularly those under 35, who are acquiring these bundles in big quantities. As a result, we have started selling these China-bound packages at a substantially higher volume recently." **(IM/MS)**

The establishment of an online travel agent under the same company umbrella demonstrates a strategic response to the demand for an engaging and user-friendly website that appeals to these younger generations. However, the current offerings are limited, primarily consisting of basic ticket and hotel sales, which generate low profit margins. Furthermore, the focus on selling travel packages for a minimum of six months to a year in advance indicates a cautious approach to maintaining profitability while safeguarding the brand identity of the main travel agency. As the travel landscape continues to evolve, it will be crucial for the agency to enhance its offerings and innovate its online presence to better align with the preferences of Gen Z travelers, thereby ensuring long-term sustainability and competitiveness in a dynamic market.

Customer trust and reputation which encompass factors such as online reviews and the reputation of well-established global travel brands exhibited the most significant impact on booking intention ($\beta = 0.491$, $p = 0.000$), underscoring the essential role of trust in travel service providers in influencing Gen Z's intention to book their traveling activities. These findings are consistent with previous studies that emphasizes the significance of selection criteria in the decision-making process for customers (Kim & Kim, 2022; Jin et al., 2021; Singh & Kathuria, 2019; Lattu et al., 2023). These findings also highlight the ways in which an assortment of service characteristics, such as the availability of trusted travel brands and the capacity to customize services, influence booking behavior.

Online evaluations and ratings are vital markers of a brand's legitimacy, particularly for members of Gen Z who are firmly ingrained in digital areas. This is especially true for Gen Z. Therefore, travel firms that have good reputations, which are reinforced by positive evaluations and recommendations from word-of-mouth, are more likely to inspire confidence and promote booking intentions among this group.

"Unquestionably, both offline and online evaluations and ratings have an impact—especially for Gen Z. Whether it's ratings or customer reviews, people believe a great deal of what they observe online to be accurate compared to offline reviews. However, for my travel company, our confidence is much raised if it has a strong reputation supported by

good comments and word-of-mouth referrals. Conversely, Gen Z will swiftly go on to a rival if the reviews are negative or if there is no internet presence." **(IR&SB)**

"Furthermore, the expansion of tourism trends has proven to be highly beneficial. Currently, our approach requires the reservation of full flights. Thus, I am always willing to collaborate if my company reserves two or three planes for a trip and another travel agent requests my help. The same situation arises if they reserve the planes before I do. We believe that this is a collaboration rather than a type of competition. Collaboration is more important than competition in ensuring our shared future." **(SN&SG)**

The importance of trust in this study sheds light on a trend in which members of Gen Z place a high value on travel companies when it comes to transparency, authenticity, and consistency. When it comes to travel businesses, this indicates that it is essential to keep an ideal reputation by utilizing consumer feedback, social proof, and effective online interaction in order to influence the booking choices of this generation. Based on the findings of this survey, it is clear that establishing trust should be a top focus for travel companies that want to attract the attention and loyalty of Gen Z passengers.

The overall interviews underscore the growing influence of online evaluations and digital presence on travel decision-making, particularly among Generation Z. As one respondent stated, "people believe a great deal of what they observe online," and "Gen Z will swiftly go on to a rival if... there is no internet presence" (IR&SB). This behavior reflects a broader generational reliance on electronic word-of-mouth (eWOM), with studies showing that over 50% of Gen Z travelers consult online reviews before booking, and nearly 84% are influenced by social media for travel planning (Tham et al., 2020). Nekmahmud et al. (2022) similarly found that Gen Z travelers' perfectionist and sustainability-oriented decision-making styles are strongly associated with their dependence on digital reviews in selecting accommodations. While online feedback is essential for capturing Gen Z's attention, businesses also derive long-term credibility from positive word-of-mouth and brand reputation, reinforcing the signaling function described in consumer trust literature. In parallel, the travel sector is demonstrating a shift toward collaboration rather than competition, particularly in large-scale group bookings such as full-flight reservations. As another participant noted, "We believe that such activity is a collaboration rather than a type of competition" (SN&SG). This perspective aligns with the concept of coopetition, where firms cooperate and compete simultaneously to secure shared value and industry resilience. Together, these dynamics point to the need for travel firms to actively manage their digital reputation while fostering strategic partnerships to remain competitive in a trust-driven and interconnected marketplace.

CONCLUSIONS

The findings of this investigation robustly corroborate the three hypotheses, all of which were affirmed. From selection criteria to technology and travel experiences, together with customer trust and reputation, were identified as having substantial direct impacts on booking intention, underscoring the essential variables that shape Gen Z's travel choices. These factors aligned closely with the related theories in this study which highlights the importance of attitude, perceived behavioural control, and subjective norms in decision-making processes. Specifically, the influence of trust and reputation reflects the role of social capital theory, emphasizing how relational trust and credibility guide consumer choices in digital environments.

Based on these findings, some essential methods arise for travel companies seeking to address the changing needs of consumers. The integration of technology is essential since the demand for smooth booking experiences via digital platforms necessitates investment in user-friendly websites and AI-driven services. Individualization is crucial, as individualized itineraries and data-driven marketing techniques are vital for providing customized experiences. The brand's trust and reputation are fundamental, highlighting the necessity for businesses to prioritize trust-building via transparent communication, favorable evaluations, and outstanding customer service. In the context of global vs. local strategy, enterprises must reconcile the dependability of multinational corporations with the distinctive services provided by local agencies, as each addresses varying consumer preferences. Moreover, loyalty and incentive programs are becoming increasingly significant, indicating that the enhancement of reward systems may bolster client retention. Ultimately, it is essential for companies to prepare for future trends, like memorable travel experiences and increased desire for personalization, in order to sustain a competitive edge. Collectively, these methods offer an extensive framework for travel enterprises to adjust and prosper in a swiftly evolving market.

Although this study addresses a gap in the sparse research on Gen Z's travel preferences, it has drawbacks, such as concentrating on a singular demography and country application. Subsequent research ought to broaden the sample to encompass additional age demographics and investigate actual booking practices for more comprehensive insights. Furthermore, examining the influence of upcoming technologies like artificial intelligence and virtual reality may improve comprehension of forthcoming consumer trends. To bolster potential consumer trust, travel companies must also look into the verification of online reviews and the mitigation of misinformation even though they are already an established brand and have loyal customers. Travel companies ought to be incentivized to invest in digital platforms and technologies that align with Gen Z's expectations, thereby ensuring competitive service delivery and sustained customer engagement.

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How E-Wallet Usage Triggers Impulsive Buying in Online Live Shopping Platform: Evidence from Indonesia

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ABSTRACT

The study examines factors influencing impulsive buying in live shopping, focusing on e-wallet usage, hedonic motives, perceived risk, and celebrity endorsers. Using a quantitative, explanatory research, data were collected in 2024 from 349 respondents who had used live shopping features on Shopee, TikTok Shop, or Lazada with e-wallets in the last six months. Data analysis employed Structural Equation Modeling (SEM-PLS). Six hypotheses were tested, and results indicate that e-wallet usage positively influences impulsive buying, while hedonic motives mediate this effect. Celebrity endorsers strengthen the relationship between hedonic motives and impulsive buying, but perceived risk does not moderate the link between e-wallet usage and impulsive buying. However, perceived risk does not impact the relationship. The findings suggest that e-commerce platforms should leverage live shopping and celebrity endorsements to boost sales. Future research should explore additional moderators (e.g., cultural factors, interfaces) and longitudinal impacts of impulsive buying behavior in live commerce contexts.

Keywords: celebrity endorser, e-wallet usage, hedonic motives, impulsive buying, perceived risk

INTRODUCTION

Indonesia ranks among the top 10 countries for e-commerce growth, with a 78% growth rate, leading globally and expected to continue expanding (Kominfo, 2023). By 2024, the sector is forecasted to have 33.5 million users (+51.03%) and reach 99.1 million by 2029 (Statista, 2023). This growth contributes $62 billion to Indonesia's digital economy by 2023 (Databoks, 2023), reflecting a large market and high purchasing power. Additionally, consumer behavior is shifting from conventional to online shopping. According to CNN Indonesia, (2023), the top five e-commerce platforms by visits are Shopee (2.3 billion), Tokopedia (1.2 billion), Lazada (762.4 million), BliBli (337.4 million), and Bukalapak (168.2 million). Highlighting the competitive landscape and the need for continuous innovation among platforms. E-commerce must innovate to enhance services and create better shopping experiences than conventional shopping, as innovation is key to gaining competitive advantages (Farida & Setiawan, 2022; Skordoulis et al., 2020; Wen et al., 2022). Companies such advantages can differentiate themselves, maintaining their market position and expanding share (Azeem et al., 2021). Innovation, in the Live Shopping feature, enables

e-commerce companies to showcase products in real-time (Y. Wang et al., 2022), offer discounts (Ji et al., 2024), or provide direct gifts, simulating physical store experience (Xin et al., 2023). Live Shopping can drive consumer interest, create urgency with limited-time offers, and encourage impulsive purchases (P. Wang, 2023).

Encouraging consumers to make impulsive purchases is one way to increase the total sales of their products. Based on a JakPat survey in 2022, live shopping on Shopee had the highest number of users in Indonesia, reaching 83.4% of users. TikTok had 42.2% of users, and Instagram had 34.1% of users (Databoks, 2024). Gulfraz et al., (2022) explained that when e-commerce can create situations that prompt consumers to make impulsive purchases, the higher the profit the e-commerce gains. However, to create situations that stimulate impulsive behavior, e-commerce must be prepared to face significant costs, such as offering large discounts, subsidizing shipping costs, and other efforts (Li et al., 2022). On one hand, impulsive buying behavior is very beneficial for companies, but on the other hand, the costs to induce such behavior are also quite substantial. Therefore, this study attempts to analyze in-depth the impulsive buying behavior in live shopping along with the influencing factors.

The increase in purchases during live shopping is partly due to integrated payment methods, which make transactions easier (Liu et al., 2022; Moghavvemi et al., 2021). Digital payment alternatives are linked to perceptions of transaction security, personal data protection, and refund ease (Chawla & Joshi, 2021). Consumers trusting e-wallets' security and convenience may lose control over spending, leading to impulsive buying behavior, as confirmed by studies (Esawe, 2022; Lee et al., 2023; Sari, 2021). These studies show that e-wallet usage often leads to unplanned or repeated purchases. However, other research (Ali et al., 2023; Khan & Abideen, 2023) found that e-wallet usage does not influence impulsive buying, with factors like perceived risk, trust, usefulness, ease of use, personal financial management, and shopping habits being more significant.

The contradictory findings on e-wallet usage and impulsive buying highlight a research gap. To address this, hedonic motives are proposed as a mediating variable. Hedonic motives reflect consumers' drive to seek pleasure, satisfaction, and positive sensations in shopping (Goel et al., 2022). Faster, unobstructed e-wallet transactions enhance pleasure and satisfaction, increasing impulsive buying tendencies (Agrawal & Gupta, 2023; Ranjith, 2021), as shown by previous studies (Coelho et al., 2023; Pacheco et al., 2022; Tarka & Harnish, 2023). Impulsive buying is further reinforced by celebrity endorsers in live shopping, who legitimize products and create emotional drives, encouraging consumers to emulate their lifestyle (Zafar et al., 2021). To comprehensively understand the phenomenon and relationships among variables, this study uses the Stimulus-Organism-Response (SOR) theory, which explains how information provided to individuals must meet their needs, both materially and non-materially (Lee et al., 2022). Furthermore, this study will focus on three e-commerce platforms that have live shopping features, namely Shopee, TikTok Shop (Powered by Tokopedia), and Lazada.The novelty of this research lies in the use of hedonic motives as a mediating variable in the relationship between e-wallet usage and impulsive buying, which has not been used in previous studies. Additionally, the novelty also includes the use of celebrity endorser as a moderating variable in the relationship between hedonic motives and impulsive buying, as well as the use of perceived risk as a mediating variable in the relationship between e-wallet usage and impulsive buying, which is still rarely used in previous studies.

The SOR theory consists of stimulus, organism, and response. Stimulus refers to external factors that influence consumer perception and act as the initial trigger of the purchasing process (Zhang et al., 2022). In the case of live shopping, stimuli can come from various sources such as product promotions, special discounts, bundling offers, or the presence of celebrity endorsers. These factors are designed to attract consumers' attention and spark their interest in participating in live shopping sessions. Organism, or consumers in this context, play a crucial role in processing the received stimulus. They will filter information, evaluate the relevance and usefulness of the products, and respond emotionally to the presented offers. Individual perceptions, motivations, and emotions will influence the extent to which the stimulus impacts purchasing decisions. Response, or the actions taken by consumers, includes purchasing the products offered during the live shopping session. This response can be impulsive, driven by emotional urges or time pressure, or it can be well-considered before finally deciding to buy.

A digital wallet is a technology that stores transaction details and other information for various user payment methods (Parameswaran, 2022). The speed and ease of transactions using e-wallets can influence consumer behavior, including the tendency to make impulsive purchases. Previous studies have shown that technological factors, such as the ease and speed of payment with e-wallets, can increase the likelihood of impulsive purchases (Lee et al., 2023). From the perspective of the Stimulus-Response Theory, certain stimuli can trigger specific responses from individuals (Gawior et al., 2022). In this context, the use of e-wallets can be considered a stimulus that influences purchasing behavior responses. E-wallets allow consumers to make instant payments without using cash. Features such as discount offers, cashback, or special promotions often associated with e-wallet usage can increase purchasing impulsiveness. Studies by Esawe, (2022); Lee et al., (2022); Sari, (2021) found that the ease of payment with e-wallets can increase the likelihood of impulsive purchases among consumers. Therefore, it is assumed that the more frequently someone uses an e-wallet, the greater the likelihood of them making impulsive purchases.

H1: E-Wallet Usage has a significant effect on Impulsive Buying.

Hedonic motives encompass feelings of pleasure, satisfaction, and other positive experiences derived from the use of a particular product or service (Goel et al., 2022). In the context of live shopping, hedonic motives are closely related to the use of e-wallets, which have seen significant growth in recent years. Previous research has shown that new technologies, such as e-wallets, can enhance user satisfaction through various attractive features and enjoyable user experiences (Chopdar et al., 2022; Gawior et al., 2022). Research by (Liu et al., 2022) found that users who experience hedonic satisfaction tend to have higher intentions to continue using the service. Therefore, it is assumed that the more frequently someone uses an e-wallet, the greater the positive impact on their hedonic motives.

H2: E-wallet Usage has a significant effect on Hedonic Motives.

Impulsive buying is the act of making unplanned purchases and doing so spontaneously (Chen & Yao, 2018; Li et al., 2022). Impulsive purchases are often triggered by positive emotions felt during the shopping process. Previous research indicates that hedonic motives play an important role in impulsive buying (Coelho et al., 2023; Tarka & Harnish, 2023). Individuals who shop with the intention of seeking pleasure and satisfaction are more susceptible to impulsive purchases. Hedonic motives include emotional aspects such as feelings of happiness, excitement, and enjoyment experienced during the shopping process (Y. Wang et al., 2020), encouraging individuals to seek more enjoyable and

satisfying shopping experiences. Prior by (Pacheco et al., 2022) shows that hedonic motives can enhance positive feelings during shopping, which ultimately leads consumers to make spontaneous purchasing decisions without thorough consideration. Therefore, the stronger an individual's hedonic motives, the more likely they are to make impulsive purchases. The use of e-wallets has become an increasingly popular trend in online transactions. Literature has shown that the use of e-wallets can facilitate faster and more impulsive purchases (Ranjith, 2021). Moreover, hedonic motives have been proven to be a significant factor in influencing impulsive buying behavior (Lavuri, 2023). The use of e-wallets can provide enjoyable and satisfying experiences for users, which can enhance their hedonic motives and trigger impulsive buying behavior (Gulfraz et al., 2022). Users tend to make quick purchasing decisions without thorough consideration. Therefore, it can be concluded that hedonic motives serve as a mediator in the relationship between e-wallet usage and impulsive buying,

H3: Hedonic Motives have a significant effect on Impulsive Buying.

H4: Hedonic Motives mediate the relationship between E-Wallet Usage & Impulsive Buying.

E-wallets have become one of the most popular payment methods, especially in the current digital era. However, along with the advantages offered by e-wallets, there are also associated risks, such as transaction security and data privacy (Rizvi et al., 2020). In the context of impulsive buying, where purchasing decisions are made without careful consideration, perceived risk becomes an important factor influencing the relationship between e-wallet usage and impulsive buying. Perceived risk refers to the extent to which consumers feel financial, security, or privacy risks associated with using digital wallets for impulsive purchases (Chopdar & Sivakumar, 2019). Previous research has shown that the use of e-wallets can facilitate impulsive buying by providing easy and quick access to products or services (Lee et al., 2023). On the other hand, perceived risk in the context of online transactions has been associated with concerns about transaction security and reliability. When perceived risk is low, consumers tend to be more confident and more likely to engage in impulsive buying behavior when using e-wallets. Conversely, when perceived risk is high, consumers tend to carefully evaluate the security and reliability of transactions, which can reduce the likelihood of impulsive purchases. Therefore, it is assumed that perceived risk moderates the relationship between e-wallet usage and impulsive buying.

H5: Perceived Risk moderates the relationship between E-Wallet Usage & Impulsive Buying.

Celebrity endorser refers to the use of a celebrity or well-known figure in a promotional campaign or advertisement to influence consumers' perceptions, attitudes, and behaviors towards a product or brand (Gong & Li, 2017). The use of celebrities as endorsers in advertisements can also affect consumer behavior. Previous research has shown that hedonic motives are positively related to impulsive buying behavior (Gulfraz et al., 2022) Moreover, the use of celebrity endorsers can enhance the influence of advertisements on consumers, as they tend to emulate or be influenced by the behavior of celebrities they admire. The use of celebrity endorsers in advertisements can increase the appeal of the product and influence consumers' perceptions of the product (Amatulli et al., 2020). When consumers see a celebrity, they admire endorsing a product, they are likely to be influenced and more inclined to make impulsive purchases, especially if the product is associated with emotional satisfaction or pleasure, referred to as hedonic motives (Zafar et al., 2021). Therefore, it is assumed that a celebrity endorser can moderate the relationship between hedonic motives

and impulsive buying, by enhancing the influence of hedonic motives on impulsive buying behavior.

H6: Celebrity Endorser positively moderates the relationship between Hedonic Motives and Impulsive Buying.

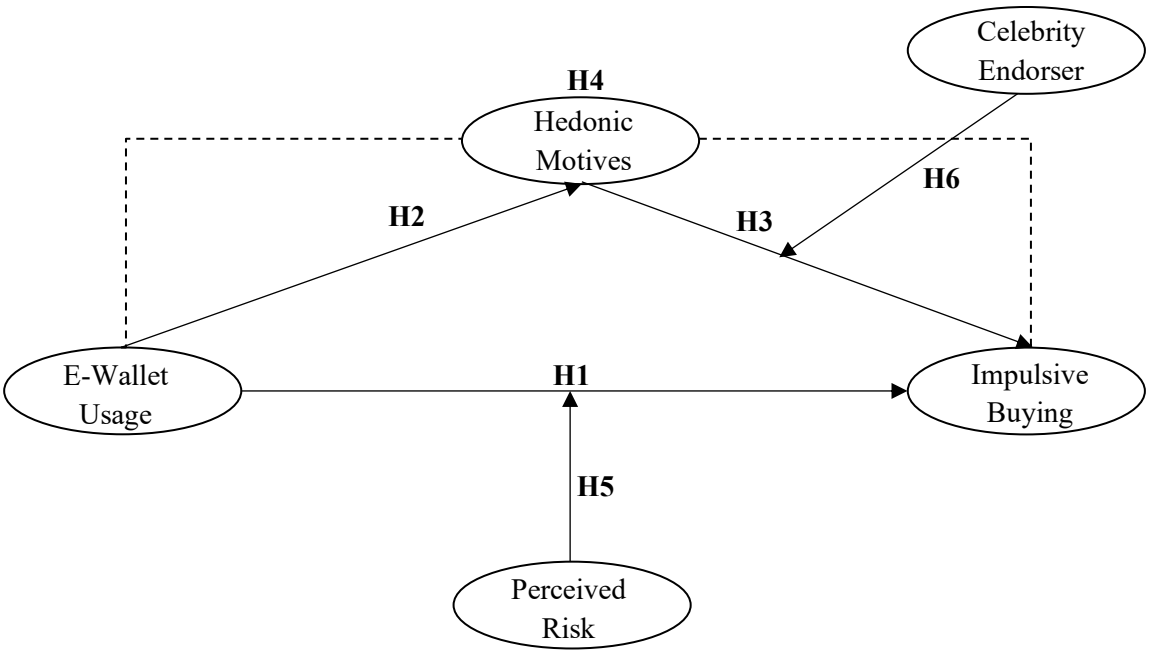

Figure 1. Conceptual Framework
Source: Adopted and modified from Research Conceptual Model, 2023

METHODS

This study is explanatory research aiming to understand the relationships between variables used in the research, namely E-wallet Usage, Impulsive Buying, Hedonic Motives, Celebrity Endorser, and Perceived Risk. This research employs a quantitative approach. The focus of this study is on consumers who have shopped using the live shopping feature on Shopee, TikTok Shop, or Lazada with payment via e-wallets. Since the population in this study is indefinite, the most relevant sampling technique to use is purposive sampling by establishing specific criteria (Sekaran & Bougie, 2016) with the following criteria: 1. At least 17 years old, 2. Have shopped using the live shopping feature on one of the platforms (Shopee, TikTok Shop, or Lazada) with e-wallet payment methods within the last six months. The determination of the minimum sample size in this study refers to the calculation set by (Hair et al., 2019) the minimum sample size in this study is 315 respondents. Data collection for this study uses online questionnaires distributed through Google Forms, using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The data analysis methods used in this study include descriptive statistical analysis and Structural Equation Modeling based on Partial Least Squares (SEM-PLS), assisted by SmartPLS 4 software. Data Analysis This study uses Partial Least Squares Structural Equation Modeling (PLS SEM) as the analysis method. PLS SEM is used to assess the

interrelationships between complex variables in the structural model (Hair et al., 2019). The main purpose of using PLS SEM in this study is to investigate the impact of identified variables on the constructs being studied and to evaluate the model's fit with the data (Hair et al., 2019). The analysis involves various techniques such as path analysis and mediation analysis to provide comprehensive insights into the relationships between variables within the scope of this study.

Table 1. List of Indicators Measurement

Variable	Question Indicators
E-Wallet Usage (EW)	I spend more money when using a digital wallet (EW1) I use a digital wallet to purchase most of my items (EW2) I frequently make payments with my digital wallet (EW3) I am more impulsive when shopping using a digital wallet (EW4)
Hedonic Motives (HM)	Shopping online gives me pleasure (HM1) Online shopping feels like buying a gift for myself (HM2) I find online shopping very interesting (HM3) Shopping online excites me (HM4)
Impulsive Buying (IB)	I am a bit careless when buying items while watching live shopping platforms (IB1) I often buy items spontaneously while watching live shopping (IB2) I frequently buy items without considering the long-term benefits while watching live shopping (IB3) I immediately buy items when there is a discount during live shopping (IB4)
Perceived Risk (PR)	I am concerned about the security of exchanging personal information in e-wallets (PR1) I worry that my personal information might be disclosed without my consent as a result of using e-wallets for purchases or bill payments (PR2) I am concerned that the information I provide to mobile vendors could be misused (PR3) I am worried about the security of financial transactions conducted through e-wallets (PR4) I fear that using e-wallets might lead to potential fraud against my bank account (PR5)
Celebrity Endorser (CE)	Celebrity endorsers in live shopping make me feel comfortable, as if I am with a friend (CE1) Celebrity endorsers in live shopping make me feel like I am with a friend (CE2) I will watch live shopping where my favorite celebrity is live shopping (CE3) I often interact with the celebrity during live shopping (CE4)

Source: Chen & Yao, 2018; Chopdar & Sivakumar, 2019; Goel et al., 2022; Gong & Li, 2017; Li et al., 2022; Parameswaran, 2022

RESULT AND DISCUSSION

The distribution of the questionnaire was carried out in to two procedural stages. The first stage involved distributing the questionnaire to 40 respondents (12.7% of the minimum sample size) for a preliminary test. The data obtained from this test were analyzed to assess the validity and reliability of the instrument using SmartPLS3. The final stage involved distributing the questionnaire to respondents in accordance with the targeted minimum sample size. In this stage, the questionnaire reached 387 respondents. Of this number, 349

respondents (90.1%) met the eligibility criteria and were included in the data analysis. This sample size exceeds the minimum required sample of 315 respondents. A detailed breakdown of the demographic data of the actual respondents can be seen in the table below.

Table 2. Demographic Respondents

Profile	Criteria	Total	%
Sex	Male	90	26
	Female	259	74
Ages	17 – 21 years	82	23
	22 – 26 years	170	49
	27 – 31 years	76	22
	32 – 36 years	10	3
	>37 years	11	3
Education	High School	176	50
	Diploma	58	17
	Undergraduate/ Bachelor	109	31
	Graduate	6	2
Occupation	Student	159	46
	Entrepreneur	70	20
	Employee	85	24
	Civil Servant	35	10
Monthly Income	<IDR 1,500,000	156	45
	IDR 1,500,000 – IDR 3,000,000	94	27
	IDR 3,000,000 – IDR4,500,000	30	9
	IDR 4,500,000 – IDR 6,000,000	54	15
	>IDR 6,000,000	15	4
Favorite E-Commerce Platform	Shopee	147	42
	Tiktok Shop	130	37
	Lazada	72	21

Source: Data processed, 2024

The majority of respondents are female in a group range of 22-26 years, which are more open to new technologies like e-wallets and online shop more frequently. Respondents generally have high school or equivalent education. Additionally, entrepreneurs are also a significant part of the sample, indicating a diversification of user professions. The majority of respondents have a monthly income of less than IDR. 1,500,000, indicating that e-wallet and live shopping users come from lower income segments. Lastly, Shopee is the preferred platform, showing Shopee's dominance in Indonesia's live shopping market. Furthermore, the data collected is evaluated through its outer and inner model.

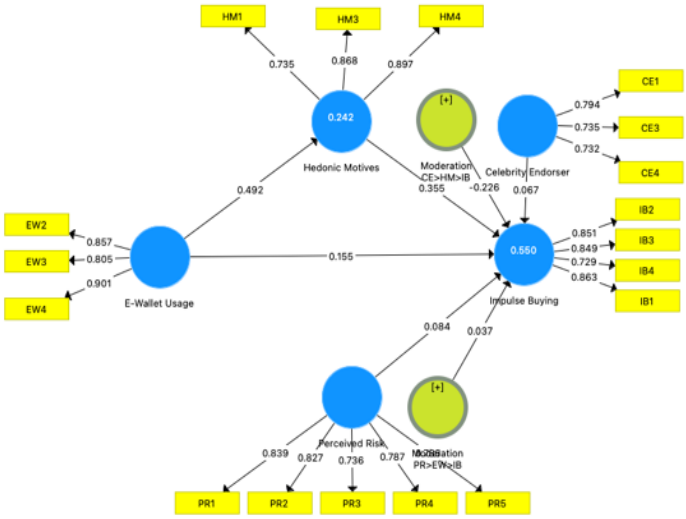

Figure 2. Outer Loading Value
Source: Authors, 2024

The first step in the PLS analysis is evaluating its validity. Method used to assess construct validity is through convergent validity. Convergent validity is measured using measurement tools (indicators) to accurately measure the concept. A loading factor greater than or equal to 0.708 (≥ 0.708) is considered valid (Hair et al., 2021). The complete test results can be seen in Table 3, where each indicator shows an exceed value of the standard.

Table 3 indicates that the indicators provide more than the minimum required percentage, which is 70%, to measure the latent variables. The loading factor values were obtained from 349 respondents who completed the questionnaire. The results for each variable—Celebrity Endorser, E-Wallet Usage, Hedonic Motives, Impulsive Buying, and Perceived Risk—have exceeded the validity threshold of 0.7, indicating that these results are valid. The indicator with the most significant contribution to the Celebrity Endorser variable is CE1, with a value of 0.794. This represents that having a celebrity endorser in live shopping makes respondents feel comfortable as if they are with a friend. The most contributing indicator for the E-Wallet Usage variable is EW4, with a value of 0.901, which relates to impulsive behavior when shopping using digital wallets. For the Hedonic Motives variable, the most influential indicator is HM4, with a value of 0.897, indicating that online shopping excites respondents. The indicator with the most significant contribution to the Impulsive Buying variable is IB1, with a value of 0.863, which addresses the recklessness in purchasing items while watching live shopping platforms. Lastly, for the Perceived Risk variable, the most contributing indicator is PR1, with a value of 0.839, which discusses the security of exchanging personal information in electronic wallets. Furthermore, to assess the validity, this study also evaluating the convergent validity.

Table 4 shows that all variables have achieved an Average Variance Extracted (AVE) value greater than 0.5 (Hair et al., 2019). This indicates that the average variance of all indicators exceeds 50%, meeting the minimum requirement to be explained by their respective latent variables (Hair et al., 2019). Therefore, the results of the convergent validity test through AVE indicate that the indicators measuring all the variables in this study are considered valid.

Table 3. Convergent Validity Through Loading Factor Value

Variable	Indicator	Loading Factor	Result
Celebrity Endorser	CE1	0.794	Valid
	CE3	0.735	Valid
	CE4	0.732	Valid
E-Wallet Usage	EW2	0.857	Valid
	EW3	0.805	Valid
	EW4	0.901	Valid
Hedonic Motives	HM1	0.735	Valid
	HM3	0.868	Valid
	HM4	0.897	Valid
Impulsive Buying	IB1	0.863	Valid
	IB2	0.851	Valid
	IB3	0.849	Valid
	IB4	0.729	Valid
Perceived Risk	PR1	0.839	Valid
	PR2	0.827	Valid
	PR3	0.736	Valid
	PR4	0.787	Valid
	PR5	0.785	Valid

Source: Data processed, 2024

Table 4. Convergent Validity Through AVE

Variable	AVE	Result
Celebrity Endorser	0.569	Valid
E-Wallet Usage	0.731	Valid
Hedonic Motives	0.699	Valid
Impulsive Buying	0.681	Valid
Perceived Risk	0.633	Valid
Celebrity Endorser	0.569	Valid

Source: Data processed, 2024

To assess construct validity in this study, an alternative approach can be used as a reference. The Heterotrait-Monotrait (HTMT) ratio, with values below 0.85 (Hair et al., 2019), is typically considered adequate to ensure construct validity, although this threshold may vary depending on the complexity of the model and the characteristics of the data used (Hair et al., 2019). Table 5 presents the HTMT values obtained in this study.

Table 5. Discriminant Validity Through HTMT

	Celebrity Endorser	E-Wallet Usage	Hedonic Motives	Impulsive Buying_	MOD CE -> HM*IB	MOD PR - > EW*IB	Perceived Risk
Celebrity Endorser							
E-Wallet Usage	0.401						
Hedonic Motives	0.720	0.623					
Impulsive Buying_	0.536	0.591	0.655				
MOD CE → HM*IB	0.250	0.481	0.593	0.618			
MOD PR → EW*IB	0.245	0.509	0.339	0.362	0.635		
Perceived Risk	0.313	0.384	0.469	0.367	0.194	0.308	

Source: Data Processed, 2024

Based on the results in Table 5, Based on the results presented in Table 5, the HTMT values for the variables used in this study are below 0.85. This indicates that the construct validity in this study meets the criteria established by (Hair et al., 2019). Therefore, it can be concluded that the instruments used in this study have adequate construct validity to measure the variables being studied, which are Celebrity Endorser, E-Wallet Usage, Hedonic Motives, Impulsive Buying, and Perceived Risk.

Furthermore, as to analyze the reliability of a variable in this study, two methods can be used. The Composite Reliability value must be above 0.7, However, The Cronbach's Alpha Value must exceed 0,6 (Hair et al., 2019).

Table 6. Construct Reliability

	Composite Reliability	Cronbach's Alpha	Result
Celebrity Endorser	0.784	0.755	Reliable
E-Wallet Usage	0.822	0.815	Reliable
Hedonic Motives	0.798	0.782	Reliable
Impulsive Buying	0.852	0.842	Reliable
Perceived Risk	0.884	0.858	Reliable

Source: Data Processed, 2024

Table 6 present the Composite Reliability and Cronbach's Alpha values for all variables. All variables have a Cronbach's Alpha value exceeding 0.6 and a Composite Reliability value exceeding 0.7. Therefore, it can be stated that the constructs are reliable. In other words, all variables, including Celebrity Endorser, E-Wallet Usage, Hedonic Motives, Impulsive Buying, and Perceived Risk, can be considered reliable as they all show values exceeding the minimum specified standards.

To test the significance of the construct model in this study, the R-Square value analysis was used. The quality of a model can be determined based on the R-Square value, in which a value of 0.67 indicates a substantial, 0.33 indicates a moderate model, and 0.19 indicates a weak model (Chin et al., 1998).

Table 7. R-Square

	R Square	R Square Adjusted
Hedonic Motives	0,242	0,240
Impulsive Buying	0,550	0,542

Source: Data processed, 2024

Referring to Table 7, the R-Square value for Hedonic Motives is 0.242, which is above the threshold of 0.19, categorizing it as a weak model. This means that the Hedonic Motives variable can only explain 24.2% of the variation in Impulsive Buying. On the other hand, Impulsive Buying has an R-Square value of 0.550, which exceeds the threshold of 0.33. This indicates that Impulsive Buying can be explained by Celebrity Endorser, E-Wallet Usage, Hedonic Motives, and Perceived Risk by 55%. To determine the significance of the model in predicting model fit, an analysis of the Q-Square value is necessary. The significance of the Q-Square value should be above 0 and close to 1.

Table 8. Q-Square

$$Q^2 = 1 – (1- R^2 1)(1- R^2 2)$$
$$Q^2 = 1 – (1 – 0,242)(1- 0,550)$$
$$Q^2 = 0,658$$

Source: Data processed, 2024

Referring to Table 8, a Q-square value of 0.658 indicates that the applied model can explain approximately 65.8% of the variation in endogenous variables, such as Celebrity Endorser, E-Wallet Usage, Hedonic Motives, Impulsive Buying, and Perceived Risk. This demonstrates that the developed model has an adequate level of accuracy in prediction and provides sufficient confidence in the relationships between variables proposed in this study.

Table 9. Hypotheses Testing Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Result
H1: EW -> IB	0.155	0.163	0.055	2.838	0.005	Accepted
H2: EW -> HM	0.492	0.496	0.062	7.943	0.000	Accepted
H3: HM -> IB	0.355	0.346	0.057	6.213	0.000	Accepted
H4: EW -> HM -> IB	0.174	0.172	0.036	4.910	0.000	Accepted
H5: Mod CE>HM>IB -> IB	0.226	0.226	0.043	5.197	0.000	Accepted
H6: Mod PR>EW>IB -> IB	0.037	0.036	0.045	0.818	0.414	Accepted

Source: Data processed, 2024

In this study, there are three direct relationship hypotheses, one hypothesis about indirect relationships (mediation), and two hypotheses about moderation effects being analyzed. H1 tests the positive relationship between E-Wallet Use (EW) and Impulsive Buying (IB). The analysis results show that EW has a direct effect on IB of 0.155, with a significance P-Value of 0.005 and a T-Statistic value of 2.838, thus H1 is accepted. Next, H2 tests the relationship between EW and Hedonic Motivation (HM). The analysis results show that EW can influence HM, as evidenced by a P-Value of 0.000 and a T-Statistic value of 7.943, thus H2 is accepted. H3 tests the relationship between HM and IB. Based on the statistical analysis results, HM can directly influence IB by 0.355, with a significance level P-Value of 0.000 and a T-Statistic value of 6.213, thus H3 is accepted. Next, H4 tests the mediating effect of HM on the relationship between EW and IB. The analysis results show that HM can mediate the relationship between EW and IB with a significance level of 0.000 and a T-Statistic value of 4.910, thus H4 is accepted. H5 tests the moderating effect of Celebrity Endorsement (CE) on the relationship between HM and IB. It is proven that CE can positively moderate the relationship between HM and IB with a P-Value of 0.000 and a T-Statistic value of 5.197, thus H5 is accepted. Finally, this study tests the positively moderating effect of Perceived Risk (PR) on the relationship between EW and IB. The analysis results show that PR cannot moderate the relationship between EW and IB, with significance P-Value and T-Statistic values that do not meet the standard, which are 0.414 and 0.818, thus H6 is rejected.

The use of E-Wallet (EW) has a positive and significant influence on Impulsive Buying (IB). This result indicates that the more frequently consumers use e-wallets, the higher their tendency to make impulsive purchases. The justification for this result can be seen from the convenience and speed of transactions offered by e-wallets, which reduce barriers in the purchasing process and encourage impulsive behavior. This finding is consistent with studies conducted by (Esawe, 2022; Lee et al., 2022, 2023; Sari, 2021), which state that the ease and speed of transactions offered by digital wallets can increase the tendency of consumers to make unplanned purchases. The influence of e-wallet usage on impulsive buying is evident through the highest indicator for this variable, EW4, which relates to impulsive behavior when shopping using a digital wallet referring to the significant influence of transaction convenience and speed on consumer behavior. In the context of this study, the indicator shows that consumers are more likely to make unplanned purchases when using digital wallets, due to the quick and low-barrier payment process. This reinforces the finding that the ease of access and convenience offered by digital wallets play an important role in increasing impulsive buying behavior among users. In the context of SOR theory, e-wallet usage acts as a stimulus that triggers impulsive responses from consumers. Stimulus in the form of ease and speed of payment via e-wallet affects the organism (consumer), who responds by making impulsive purchases. Furthermore, digital wallets often offer various attractive promos and cashback, allowing users to shop more economically. These incentives not only increase the appeal of using digital wallets but also encourage transaction frequency.

Based on the statistical analysis results, it was found that e-wallet usage (EW) significantly and positively influences hedonic motives (HM). This relationship indicates that the more frequently e-wallets are used, the higher the consumer's hedonic motives. This finding aligns with studies conducted by (Chopdar et al., 2022; Gawior et al., 2022), which state that the ease of access and speed of transactions offered by digital wallets not only increase impulsive buying but also encourage consumptive behavior oriented towards

personal pleasure and satisfaction. E-wallet usage increases consumers' hedonic motives when shopping, where they experience greater pleasure and satisfaction when making transactions with e-wallets. This finding is also supported by the highest indicator for this variable, EW4 which discusses the level of impulsiveness felt by consumers when using e-wallets. The justification for this result can be seen from the convenience and ease offered by e-wallets, which enhance the shopping experience for consumers. In the context of this study, the use of digital wallets facilitates a smoother and more enjoyable shopping experience, making consumers more likely to pursue instant gratification through purchasing desired goods and services. In the framework of SOR theory, e-wallet usage can be a stimulus to increase the hedonic motivation of the organism (consumer). Hedonic motives reflect the positive emotional response consumers obtain when using e-wallets for Theshopping.

Based on hypothesis testing, this study found that Hedonic Motives (HM) significantly and positively influence Impulsive Buying (IB). This finding indicates that the higher the consumer's hedonic motives, the more intense the impulsive buying behavior. This study's results are consistent with Coelho et al. (2023) and Tarka & Harnish (2023), which show that individuals with hedonistic orientations are more likely to frequently buy unplanned items as a way to achieve instant satisfaction and happiness. Supporting this study's results, the highest-loading indicator for HM4 is the statement "Shopping online excites me," referring to the tendency of consumers to feel excitement and enthusiasm when shopping online. This indicator shows that the online shopping experience can provide a strong emotional boost, which ultimately increases impulsive behavior. SOR theory explains that pleasurable Thstimuli (such as positive shopping experiences) affect the organism (consumer), who responds with impulsive actions.

The hypothesis testing results in this study found that Hedonic Motives (HM) can mediate the relationship between E-Wallet Usage (EW) and Impulsive Buying (IB). Referring to the H1 hypothesis test results, which found that E-Wallet Usage can directly influence Impulsive Buying (IB), it can be concluded that Hedonic Motives (HM) play a partial mediation role. Directly, consumers using E-Wallets for transactions while shopping during live shopping may lose control over their impulsives, leading to impulsive purchases. However, in some situations, consumers using e-wallets do not immediately make impulsive purchases due to factors such as good financial management, self-control over expenses, and others. Therefore, e-commerce companies need to direct e-wallet usage to create the perception that shopping is easier and more enjoyable, ultimately leading consumers to engage in more impulsive behavior (Gulfraz et al., 2022). The euphoria and enthusiasm experienced while shopping online are further enhanced by the transaction convenience provided by digital wallets (Nanda et al., 2023). In other words, the ease and convenience offered by digital wallets increase the consumer's tendency to seek pleasure through shopping, which in turn increases the frequency and intensity of impulsive purchases. From the perspective of SOR Theory, E-Wallet Usage (EW) can be interpreted as stimuli that trigger specific reactions in consumers. These stimuli create internal conditions in consumers, namely Hedonic Motives (HM), which act as organisms. These organisms influence consumers' psychological and emotional states, such as feelings of euphoria and enthusiasm when shopping online. The reactions within these organisms then result in responses in the form of Impulsive Buying (IB). In other words, the ease and convenience offered by e-wallets as stimuli increase the hedonic motivation within consumers, which in turn encourages them to make impulsive purchases.

Referring to the statistical analysis results of this study, it was found that the use of celebrities in promotions can positively moderate the relationship between hedonic behavior and impulsive buying behavior. Celebrities have a strong appeal and are often considered role models by many consumers. When celebrities act as hosts on a livestreaming platform for online shopping, they can create a greater emotional appeal and strengthen consumers' desire to emulate the lifestyle and choices demonstrated by these celebrities, thereby increasing consumers' hedonic drive to purchase items impulsively. This study's results are consistent with Zafar et al., (2021), which revealed that celebrities not only function as effective marketing tools but also as emotional triggers that can strengthen consumers' hedonic behavior. This study's findings are also validated through the indicator with the most significant contribution to the Celebrity Endorser variable, CE1 which representing that a celebrity endorser in live shopping makes respondents feel comfortable and as if they are with a friend. When consumers see a celebrity, they admire promoting a product, they are more likely to feel excessive excitement and enthusiasm, which can ultimately drive them to make impulsive purchases (Zafar et al., 2021). Furthermore, promotions involving celebrities are often associated with exclusivity and prestige, which can be even more attractive to hedonic consumers (Amatulli et al., 2020). Consumers motivated by the desire for instant gratification and short-term happiness are more likely to be influenced by promotional campaigns involving celebrities, increasing their tendency to buy products impulsively. Referring to the Stimulus-Organism-Response (SOR) theory, celebrities as stimuli create a strong emotional appeal, especially when they are hosts on a livestreaming platform for online shopping. This influences the internal state of the consumer organism, including hedonic drive and the desire to emulate the celebrity lifestyle, resulting in consumer responses in the form of increased impulsive buying behavior. This shows that celebrities are effective not only as marketing tools but also as emotional triggers.

Based on this study's results, it was found that the understanding of risk cannot moderate the relationship between digital wallet usage and impulsive buying behavior. This result is supported by research conducted by Yang et al. (2021), which states that even though there is awareness of security risks, consumers are still more influenced by the convenience and ease offered by digital wallets. Even when consumers are aware of the potential risks, such as the possibility of sensitive information like credit card numbers, addresses, and other personal data being hacked by irresponsible parties, the assessment of these risks is not strong enough to reduce their tendency to make impulsive purchases when using digital wallets. This condition shows that although education and awareness about risks are important, they are not always effective in changing consumer behavior accustomed to the convenience and ease of financial technology. Support for this study is reflected in the lowest outer loading value, PR3 which discusses the concern that confidential information provided to mobile vendors can be misused. This means that security and privacy risks are not a significant concern for consumers.

CONCLUSIONS

This study investigates the factors influencing impulsive buying in the context of live shopping, focusing on e-wallet usage, hedonic motives, perceived risk, and the role of celebrity endorsers. The findings show that e-wallet usage has a significant positive influence on impulsive buying, with hedonic motives acting as a mediator between e-wallet usage and impulsive buying behavior. The presence of celebrity endorsers further strengthens this

relationship, enhancing the emotional drive behind impulsive purchases. Conversely, perceived risk does not moderate this relationship, suggesting that although consumers may be aware of potential risks like data theft, these concerns do not significantly deter impulsive behavior.

The study also explores innovations in e-commerce marketing, particularly leveraging live shopping features and celebrity endorsements to drive sales. E-commerce platforms must continue innovating to offer satisfying and secure shopping experiences to consumers while managing perceived risks to maintain trust. Future research should address the critique of this study by investigating the dynamics of impulsive buying on individual e-commerce platforms. While this research analyzes data from combined platforms (Shopee, TikTok Shop, and Lazada), platform-specific analyses could yield more granular insights, as consumer behavior may differ across these platforms due to variations in user interface, product offerings, celebrity involvement, and marketing strategies. Exploring each platform independently will provide a clearer understanding of the unique factors influencing impulsive buying on each platform. For instance, Shopee's dominant market share in Indonesia may drive different consumer responses compared to TikTok Shop's heavy reliance on influencer marketing.

Additionally, other variables such as app security, product quality, and user experience could be examined in more detail for each platform. Future studies could utilize qualitative methods, such as interviews or case studies, to capture the intricate and platform-specific factors driving impulsive buying. This approach could also help uncover hidden motivators and barriers to impulsive purchasing, providing a more nuanced understanding of consumer behavior across different e-commerce platforms. Furthermore, additional factors such as the role of social media influencers, gamification, and platform-specific promotional tactics (e.g., exclusive deals or live streaming features) could be explored to expand the scope of research in this domain.

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SINTA 2

Improving Financial Literacy and Perception to Increase Public Involvement in Capital Markets: Evidence in West Java

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ABSTRACT

The insufficient financial literacy of the Indonesian people causes low public involvement in the capital market; thus, this study seeks to build a capital market education model that can be a solution to this problem. The SEM-PLS technique was used to test hypotheses on 155 people from West Java. The findings of this study show that the financial literacy level of the Indonesian people is still very poor, their knowledge of investment and managing emergency funds is very restricted, and their lifestyle tends to be consumptive. Also, there is still a negative view of capital market perception, which makes people hesitant to join the market. In contrast to earlier research, this study proposes a novel capital market education model based on the findings of variable tests and indicators, with the expectation that it would be used to increase literacy and improve public perceptions of the capital market.

Keywords: capital market, financial literacy, financial inclusion, public perception

INTRODUCTION

The development of Indonesian people's participation in the capital market is still comparatively slow. According to Kustodian Sentral Efek Indonesia (2022) data, 69.02% of investors are still concentrated on the island of Java. Sumatera accounting for only 16.80%, Kalimantan accounting for 5.48%, Sulawesi accounting for 4.34%, Bali accounting for NTT and NTB 3.36%, and Maluku and Papua accounting for 1.01%. Figure 1 depicts the number of Single Investor Identification (SID) in Indonesia, which increased dramatically between 2019 and 2022, demonstrating that Indonesians are increasingly interested in participating in the capital market. The increase of capital market investors is clearly linked to the involvement of the IDX and other capital market stakeholders in socialisation and education, although it should be noted that, despite continued growth, their proportion of Indonesia's overall population remains modest.

In 2022, there will be 8,103,795 capital market investors, or about 2.9% of Indonesia's total population. This figure remains higher than in prior years. Capital market investors were just 0.92% in 2019, increasing to 1.4% in 2020 and 2.7% in 2021. The rapid growth in the

number of investors happened during the 2020 pandemic, at precisely 0.5% and 1.3% in 2021. Even though many educational programmes have been implemented by various parties, this increase will drop to 0.2% in 2022. This demonstrates the importance of determining the true cause of the problem to devise an effective solution to stimulate community participation in the Indonesian capital market.

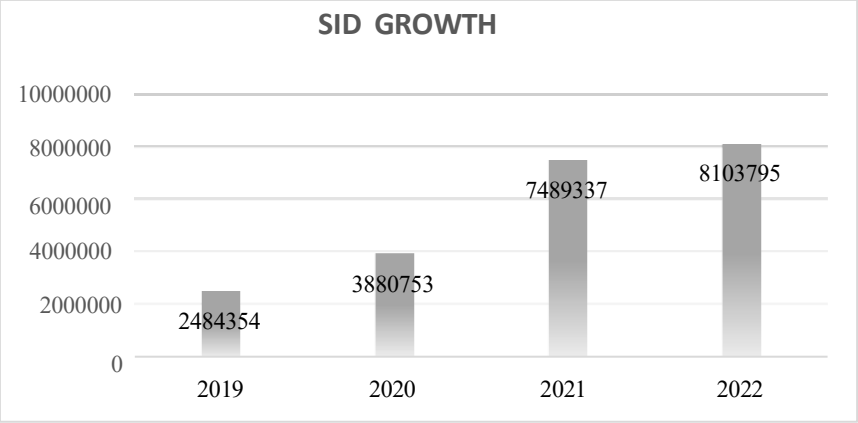

Figure 1. Single Investor Identification (SID) Growth
Source: Kustodian Sentral Efek Indonesia, 2022

A low level of literacy will certainly result in bad perceptions, prompting people to invest in alternative assets, such as gold, or just save. According to Zait & Bertea (2014), financial literacy is defined as "the ability to read, analyse, manage, and communicate personal finances that have an impact on material well-being" (Chen, H., & Volpe, 1998; Cude et al., 2006; Huston, 2010). People who lack financial literacy avoid riskier investments, such as the stock market. Understanding financial principles is critical for assisting someone in playing a role through investing (Faulcon Bowen, 2002). Understanding financial principles will assist a person in managing finances and making financial decisions in any economic situation (Remund, 2010). As a result, it is possible to conclude that a thorough comprehension of financial knowledge assists someone in making financial decisions and makes them more willing to accept risks when investing in capital market instruments.

Low financial literacy leads to negative public perceptions of risky investment instruments such as stocks. Cupák et al. (2022) revealed that a lack of risk knowledge discourages people from investing in hazardous assets, notably the stock market. Aren & Zengin (2016), found that investment quality is influenced by literacy level and risk perception. Furthermore, investor perceptions are more relevant than real economic uncertainty in motivating investment (Fang et al., 2020). According to Marfatia (2020), among other concerns, investors' perceptions of risk in stock investments have a substantial impact on stock performance. Loss risk is a risk that investors seriously consider (Huber et al., 2019), and it generates negative sentiment among investors, which can influence stock prices (Liu et al., 2022). Albu et al. (2015) demonstrate that consumer perceptions of capital market risk influence capital market investment performance. Marfatia (2020) stated that risk perceptions influence stock market transactions. Individual stock market participation is determined by the risk/reward trade-off desired (Merkoulova & Veld, 2022).

To address this issue, the involvement of BEI and other parties in educating the public is critical to increase capital market literacy and assist people in successfully investing in the capital market, thereby improving the public's negative perception of the capital market. Results of research (Li et al., 2020) Effective investment requires good literacy. Because they have better investment habits and are more risk-tolerant, investors with superior financial education are more likely to succeed in boosting their stock market returns. Financial education, according to Yong et al. (2023), can help less experienced investors and those from areas with lower levels of investor protection earn favourable returns on investments. If more investors maximise their gains from their investments, it will undoubtedly boost trust and reduce negative perceptions of stock investment, encouraging wider public engagement in the capital market (Merkoulova & Veld, 2022). The Financial Education Programme can enhance people's financial behaviour and boost their understanding (Kaiser et al., 2022). Apart from that, financial education, according to Boyd & Díez-Amigo (2023) helps disadvantaged individuals improve their lives, and financial education must begin at a young age (Wahyuni et al., 2023). Several other studies have emphasised the significance of financial literacy in motivating investors.(Aren & Zengin, 2016; Fernandes et al., 2014; Grohmann et al., 2018; Hung et al., 2011; Jalilvand et al., 2018; Karakurum-Ozdemir et al., 2019; Klapper & Lusardi, 2020; Lazarus, 2020). Furthermore, Ghafoori et al. (2021) indicated that financial education can improve positive financial behaviour.

Previous research has shown that financial literacy, perception, and capital market literacy are major factors influencing public engagement in the capital market. Financial literacy is divided into two categories: elementary and advanced. Capital markets are a critical component of advanced financial literacy. Based on this, this study would evaluate variables such as financial planning, capital market literacy, public perception, and capital market participation to identify the root causes of Indonesians' lack of engagement in the capital market. After assessing these variables, a capital market education model may be built and applied as a structured teaching model in Indonesian educational institutions; this model is the study's novelty.

METHODS

In this study, four latent variables will be evaluated: financial literacy (X), capital market literacy (Y_1), public perception of the capital market (Y_2), and level of community participation in the capital market (Z) are the variables used in this study. The research model is depicted in as follows:

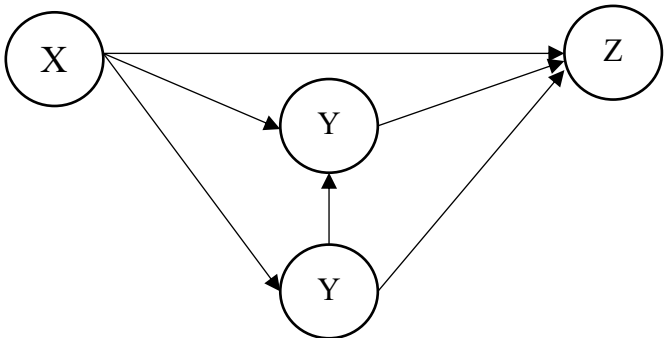

Figure 2. Research Model
Source: Authors, 2023

According to Hair et al. (2019), the sample size may be calculated using 5-10 times the highest number of indicators in a variable. Because this study contains a maximum of five indicators, the minimum sample size is 25-50 participants. However, the number of respondents for the research was set at 155. West Javanese people aged 17 to 55 years old were chosen as samples, based on the legal working age in Indonesia and the minimum age to create a capital market account. According to statistics from the Kustodian Sentral Efek Indonesia (KSEI), the West Java province was chosen as a sample because it has better infrastructure to support capital market transaction activity and the most investors in Indonesia.

Table 1. Criteria for Sampling

Respondent's Age	Percent
17-25	36.1
25-30	11
30-40	22.6
40-55	23.2
>55	7.1
Respondent's Field of Work	
Not yet working	21.9
Financial sector	22.6
non-financial sector	55.5
Respondent's Income Level	
0 (no income)	21.9
< Rp 1.000.000	5.4
Rp 1.000.000 – Rp 3.000.000	10.3
Rp 3.000.000 - Rp 5.000.000	11
Rp 5.000.000 - Rp 10.000.000	21.7
Rp 10.000.000 – Rp 20.000.000	14.2
> Rp 20.000.000	15.5

Source: Data processed, 2023

The SEM-PLS approach is used to evaluate hypotheses based on the research model. This approach was used since the investigation comprises latent variables, each with a broad collection of indicators (Memon et.al. 2021). Aside from that, SEM-PLS can be used to evaluate path models, deal with causal paths that connect predictors with paths, and deal with predictors that connect predictors with response variables.

RESULT AND DISCUSSION

According to the survey results, the degree of public awareness of financial planning, the level of capital market knowledge, and the public's perception of the capital market are all very poor, resulting in limited participation in the capital market. The average value for each level of financial planning indicator is less than 3, indicating poor performance. Investment understanding has a score of 2.277 (bad). Understanding of emergency funds received a score of 2.216 (bad). Poor financial planning comprehension is becoming increasingly caused by consumerist lifestyles.

Poor financial literacy leads to poor capital market literacy and capital market investment perspectives. This is evident from the scores of each indicator, which are all in the 2 (bad) range; even the score for comprehending capital market transactions was 1.8 (very bad). Low literacy and perception levels are also associated with low levels of public

engagement in the capital market. Each mark on the engagement variable has a score of around 1 (extremely bad).

Table 2. Average Value of Each Indicator

Variable	Indicators	Value	Conclusion
Level of Financial Literacy	level of investment understanding	2.277	Bad
	understanding of emergency fund management	2.216	Bad
	level of lifestyle management understanding	2.607	Bad
Capital Market Literacy	Knowledge of capital market products	2.374	Bad
	Knowledge of analytical techniques	2.032	Bad
	Knowledge of transaction techniques	1.8	Very Bad
Public Perception of the Capital Market	confidence in the halal level of capital market investment	2.511	Bad
	Perception of profits from investment	2.501	Bad
	Perception of capital requirements	2.478	Bad
	Perception of product existence	2.647	Bad
	Perception of investment risk	2.632	Bad
Level of Community Participation in the Capital Market	Transaction Frequency	1.632	Very Bad
	Level of funds distributed to the capital market	1.677	Very Bad

Assessment scale for each indicator 1-4: 1 = Very Bad; 2 = Bad; 3 = Good; 4 = Very Good
Source: Data processed, 2023

According to survey results, only 5.8% of respondents consistently set aside and understand emergency money; 32.92% set aside but not consistently; 49.67% have only ever set aside but are no longer setting aside; and 11.61% claimed to have never set aside an emergency fund and had never studied it. Only 7% completely comprehend investment, specifically those who learn it seriously and are committed to setting aside funds for investment on a regular basis, whereas 19.35% stated that they set aside investment funds but not on a regular basis, and 26.45% do not understand investment at all and have never set aside funds for investment. As many as 46.45% of respondents said they had previously saved money for investing but no longer do so.

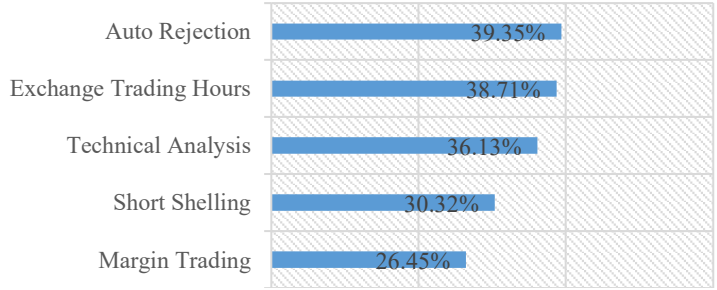

Figure 3. Concept on Capital Market Literacy Material Was the Least Understood by Respondents
Source**:** Data processed, 2023

Their lack of awareness of financial planning reduces their interest in learning about investing, particularly in the capital market. This is seen by the average capital market literacy score of only 2.338. The survey findings also revealed that 16.19% of respondents had a very low awareness of capital market transaction practices, while 59.36% had a very low comprehension of margin trading. Only 26.45% properly answered margin trading questions, and only 30.32% grasped the notion of short shelling; in all, only 38.71% were familiar with standard stock trading hours. Meanwhile, respondents' understanding of analytical methodologies was relatively limited; only 36.13% correctly answered very basic questions about technical analysis, and only 54.2% correctly answered basic questions about fundamental analysis. This reveals their lack of knowledge of the capital market, since many individuals are unfamiliar with the general and fundamental principles of the capital market, and their literacy level will decline if more advanced questions are asked.

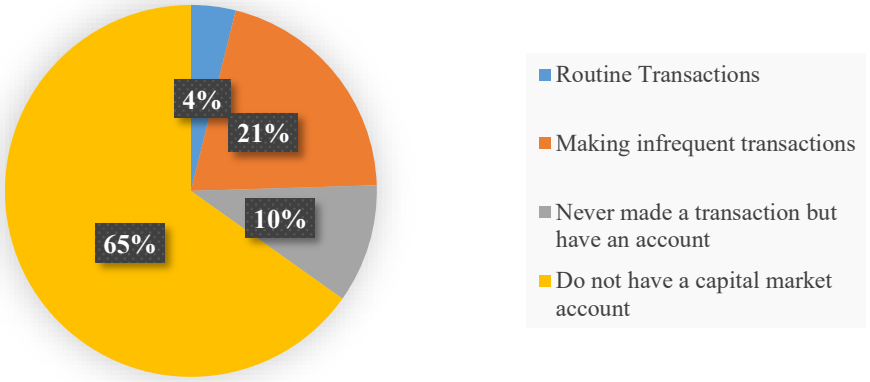

Figure 4. Frequency of Respondents' Transactions in the Capital Market
Source: Authors, 2023

Low community involvement in the capital market is caused by a lack of awareness of financial planning, which leads to a lack of knowledge about investing in the capital market. According to research, 65% of respondents do not have a capital market account, which means they never make any transactions; 10% have an account but never use it for transactions; and only 4% conduct regular capital market transactions. This statistic is consistent with IDX figures, which reveal that capital market investors account for just about 3% of Indonesia's total population. Thus, it is clear that the basis of the problem is Indonesian society's limited participation in the capital market, specifically a lack of understanding of investment and good financial planning. According to the study's findings, if income rises, 65.8% of respondents would like to save, 32.9% would prefer to invest, and 66.5% would avoid the capital market as an investment platform.This reinforces the public's negative perception of capital market investing.

According to the study's findings, 18.71% of respondents believe that investing in the capital market is extremely difficult to profit from, 47.74% believe that investing in the capital market requires a thorough understanding of various financial concepts as well as hard work to conduct analysis and monitoring, and only 10.32% believe that investing in the capital market is simple and can be done with small funds. According to Aren & Zengin (2016), Educational programs are necessary to influence investors' perceptions. Risk

perception affects stock market transactions (Marfatia, 2020). Individual stock market participation is determined by the risk/reward trade-off desired (Merkoulova & Veld, 2022).

Investing in the stock market is not as tough as many people think; even those without a financial education may do it. There are several items that may be utilised as investment vehicles; however, investors must first determine their investment objectives and risk tolerance. Following the determination of the risk profile, investors can select assets that are appropriate for their risk profiles. According to Gui et.al (2021), someone who does not understand finance is more likely to buy financial products that are not suitable for their risk profile. If someone buys an investment instrument that is not appropriate for their risk profile, they will make poor decisions.

To determine a relationship between variables, the model must be tested. Validity and reliability tests must be performed before examining variable correlations. According Ghozali (2017), convergent validity (outer model) with a loading factor value ranging from 0.50 to 0.60 can be used to prove validity. According to the test results, there is one sign of financial planning comprehension (X1) with a value less than 0.5, which is investment understanding (X1.1). Meanwhile, there are three variables in the capital market public perception variable (Y2) with factor loading values less than 0.5, namely perception of capital needs (Y2.3), perception of product existence (Y2.4), and perception of risk (Y2.5); thus, these indicators must be disregarded.

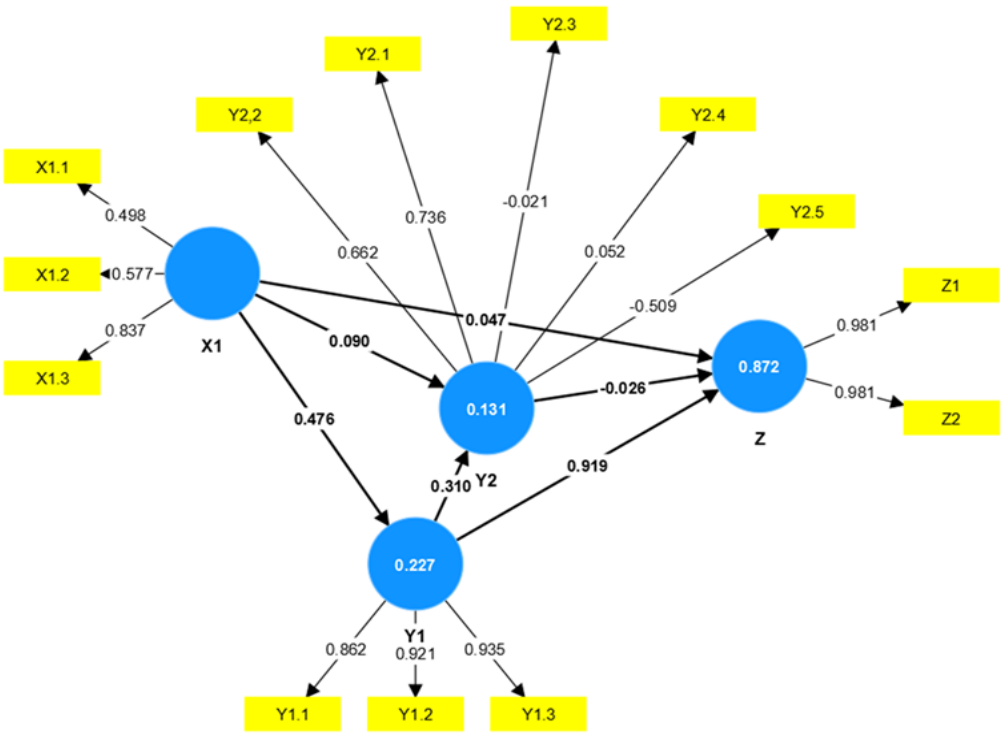

Figure 5. Validity and Reliability Test Result
Source: Data processed, 2023

The next step is to calculate the influence of each variable by excluding indicators with loading factor values less than 0.5. The results show that the outer model's P-value has a substantial impact, suggesting that all indicators can assess the variables. The study's findings

demonstrate that the degree of financial planning (X) has a positive and significant relationship with capital market literacy (Y1), with a p value of 0.000, which is less than 0.05. Y1 has a significant beneficial influence on the amount of public participation in financial markets. The degree of financial planning has not been able to considerably improve the public impression of the capital market (Y2). However, a high level of capital market literacy will result in a favourable impression of the capital market.

Table 3. Partial Test Results

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
X1 -> Y1	0.451	0.459	0.068	6.593	0.000
X1 -> Y2	0.060	0.074	0.109	0.551	0.582
X1 -> Z	0.045	0.036	0.041	1.084	0.279
Y1 -> Y2	0.311	0.311	0.091	3.425	0.001
Y1 -> Z	0.924	0.926	0.027	34.628	0.000
Y2 -> Z	-0.034	0.028	0.040	0.849	0.396

Source: Data processed, 2023

A Sobel test was performed to determine if boosting public financial awareness can drive the public to learn about capital market investing, hence increasing capital market inclusion. The findings indicate that financial literacy has a favourable influence on capital market literacy, which encourages the expansion of capital market participation, as indicated by a Zsobel value of 6.521, which is more than 1.96. Meanwhile, while financial education might improve attitudes, a positive view does not necessarily lead to stock market investment. A positive outlook must be accompanied by good financial and capital market expertise, which are required for capital market inclusion.

Table 4. Indirect Test Results

	Variable correlation	Z Sobel Score	Conclusion
Hypothesis 1	X1►Y1►Z	6.521	There is an influence of financial literacy on capital market inclusion through the capital market literacy variable
Hypothesis 2	X1►Y2►Z	-0.462	There is no influence of financial literacy on capital market inclusion through the variable public perception

Source: Data processed, 2023

Comprehension of financial literacy remains poor; the average score on the investment comprehension level indicator is 2.27, suggesting that understanding of investment is deemed inadequate. The emergency fund indicator has a bad score of 2.16, as does the consumptive lifestyle management indicator with a score of 2.60. Many individuals still do not save for an emergency, do not distribute their income clearly and consistently, and are unsure of the percentages that should be allocated to investment, emergency money, and prudent spending. Most people believe they should spend first, then save or invest. To stimulate public engagement in the capital market, individuals must first be taught in personal finance so that they may comprehend investing and better their consumerist lifestyles. According to Yamori & Ueyama (2022), the level of financial literacy influences the level of capital market

involvement. According to Zhao et al. (2023), increasing financial literacy among housewives encourages them to choose riskier liquid assets.

The study's findings indicate that financial education concentrated on capital market investment material is required to promote capital market literacy and perception, hence stimulating public involvement in the capital market. Agasisti *et.al* (2023) observed that financial education may stimulate the attention of someone who had previously been uninterested in financial products. Furthermore, persons with good financial literacy are more likely to build a more sophisticated investment portfolio.(Giofré, 2017).

To address this issue, related parties must strengthen capital market education programs in a structured and continuous way, according to the study's findings, which show that higher levels of financial literacy encourage people to learn about investment, including capital market investment. Previously, the team discovered a capital market education model that had a significant impact on encouraging increased community involvement, particularly among university students (Rinaldo & Puspita, 2023); In this study, the model was created to be applicable to all communities, including pupils with and without economic roots. The earlier two-level educational periods have been split into three levels under this model.

According to the study's findings, those with inadequate financial literacy lead a consumptive lifestyle and question the halalness of capital market assets, particularly equities. According to the findings of this study, only 29.03% of respondents feel that capital market investing is halal, 67.74% are unsure, and 1.2% believe it is haram. As a result, the first curriculum for the capital market education model focusses on lifestyle management, financial planning, and halal capital market investing.

Because most respondents are unfamiliar with capital market goods, how to create a capital market account, how to conduct transactions, and other essential capital market information, Stage 2 instructional material will focus on fundamental capital market investing principles. Furthermore, many individuals assume that in order to invest in the capital market, you must have a large quantity of money and a complete comprehension of advanced financial theory. As a regulator, the Indonesia Stock Exchange has historically required a minimum investment of IDR 100,000 ($6.4) to trade stocks in the capital market, as well as a minimum purchase of one lot of 100 shares to ensure that people from all socioeconomic levels may participate.

Next, the teaching materials in stage 2 will provide an analysis methodology that is easy for the general public to understand. Novice investors should initially focus on the company's high-demand goods in the market, typically owned by public companies, before introducing them to a straightforward transaction process. At this level, a basic financial analysis approach is also provided, which is based on simp.

We also discovered that respondents lack knowledge of technical and fundamental analysis techniques, as well as awareness of capital market investing strategies and terminologies used in capital market transactions; thus, at this level, the material studied will be more advanced, allowing them to survive in any situation. These resources concentrate on financial behaviour, which is critical for new investors to grasp because stock price fluctuations are impacted by both fundamental and non-fundamental factors. Liu et al. (2022) discovered that investor sentiment can be used to forecast stock prices. According toFang et al. (2020), investor behaviour is vital to watch in the realm of investment. The final item in the model is stock transaction practices, which are the respondents' inadequacies in this study.

Level 3 also contains technical analysis with many indicators, advanced fundamental analysis, investment strategies for both normal and crisis conditions, and stock transaction simulations based on advanced level analysis results. It is expected that this instructional methodology will improve the efficacy of the Indonesian stock exchange's teaching programs. Several previous study findings have shown the importance of education programs in fostering investor excitement. Kimiyaghalam & Yap (2017) argue that financial education for Malaysian youth is critical to grow income and have effective financial management. People are hedonistic, which causes them to adopt shopping patterns that do not suit their requirements or income, trapping many of them in consumerism. According to data from the Financial Services Authority (OJK), the national value of online loans bad credit reached IDR 1.73 trillion in the June 2023 quarter. When we break it down by age group, we see that the 19–34-year age range contributes the most to online loans negative credit with the accumulated default amount. reached IDR 763.65 billion, accounting for 44.14% of total national bad debts (Financial Services Authority, 2023). Figure 6 depicts the most recent model of capital market education, which developed from the prior model of capital market education.

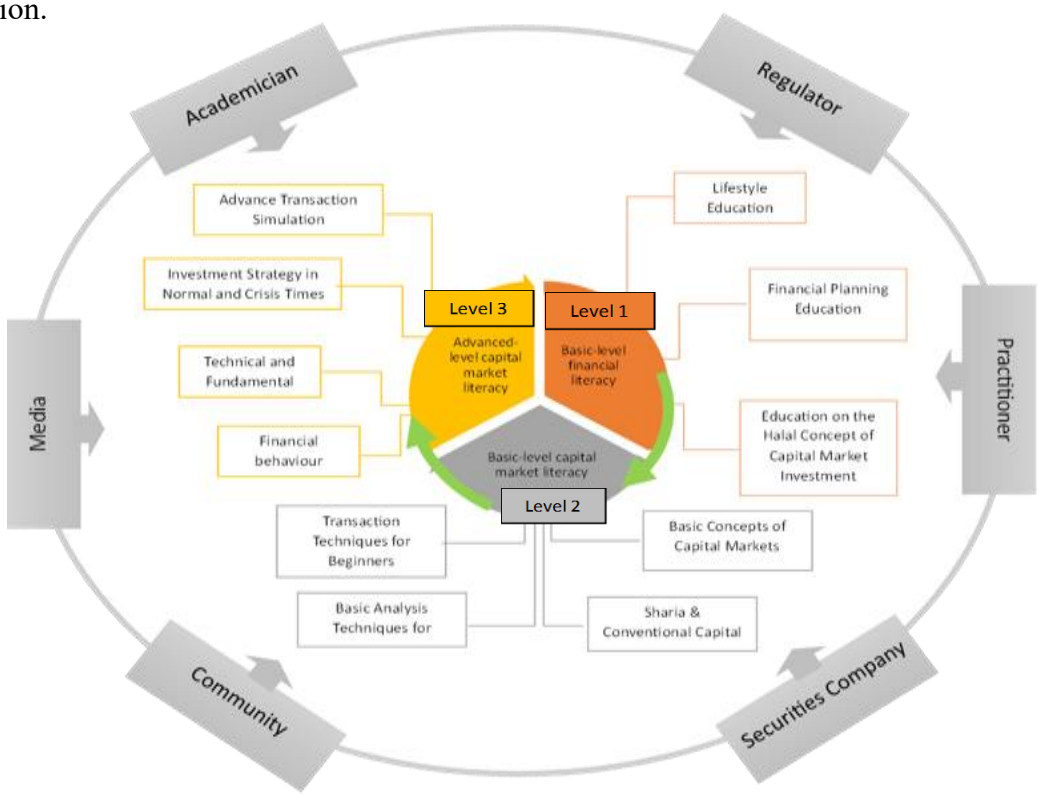

Figure 6. The Capital Market Education Model Has Been Developed Based On Research Findings

Source: Authors, 2023

This is seen to be crucial, particularly for investment learning materials during a crisis, because the study's findings indicate that many consumers still prioritise consumption above investment. This attitude encourages people to spend a lot of their income on consumption, with the remainder saved or invested, leaving no money for investment or emergency finances. This obviously has a negative impact when an unforeseen occurrence happens, such

as COVID-19. Mohd Daud et al. (2023) discovered that healthy financial behaviour can help reduce financial vulnerabilities. And strong financial understanding shapes behaviour as well (Nga, 2020).

It is also conceivable for regulators to partner with various universities in the implementation of structured education programmes. Pan et al. (2020) stated the necessity of education for everyone, from financial advisors to housewives, in order to stimulate their participation in the capital market. According to research by Chen et al. (2023), individuals with high financial literacy are more likely to be interested in investing in stocks. Individuals with good financial understanding are more willing to accept risks, which opens up more options for them to participate in capital markets with a relatively high level of risk (Molina-García et al., 2023). The technical application of the capital-intensive education model in higher education is depicted in Figure 7. that explains the process and the impact on the parties engaged in putting this educational model in place.

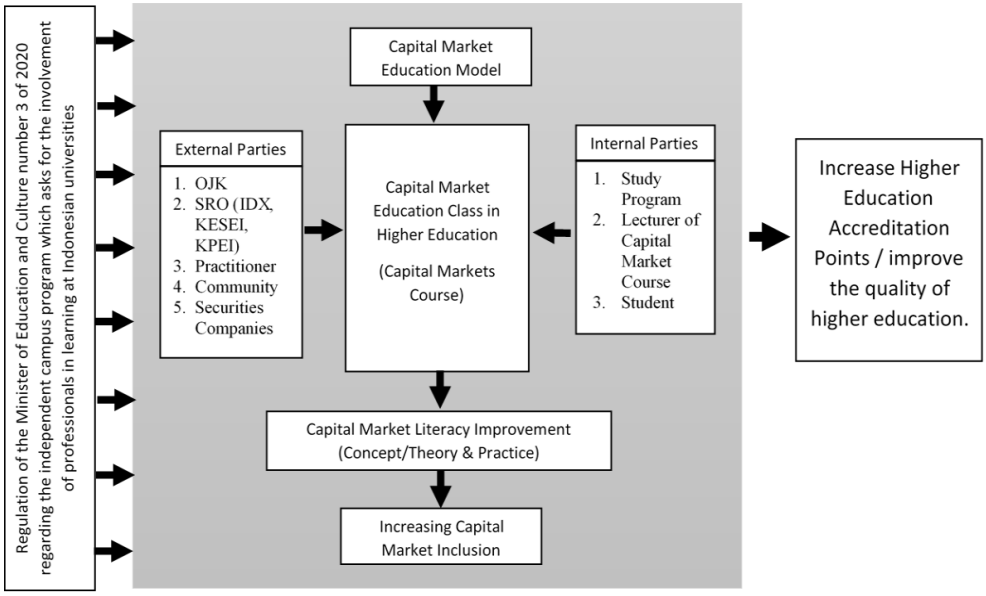

Figure 7. Technical Implementation of the Capital Market Education Model in Higher Education

Source : Authors, 2023

Universities may organise pursuit team classes. The course will be taught by two people: the lecturer and a capital market practitioner. This program will provide students with a more interesting and practical classroom learning experience. Teachers who are well-versed in finance will have a positive influence on financial education initiatives. (Compen et al., 2019; Urban et al., 2020). A good educational programme will undoubtedly aid them in future money management. Cupák et al. (2022) discovered that investors with a high degree of financial literacy will be more successful in capital market investing; (Zhang et al. 2021) discovered the value of education in making smart financial judgements during times of crisis. Hermansson et al. (2022) discovered that media and literacy levels play an essential role in increasing public engagement in the capital market. Yong et al. (2023) also said that more financially knowledgeable investors will make more money while investing in stocks. Financial literacy will assist investors in analysing financial assets and is particularly

successful in assisting young investors in making more lucrative investments (Li et al., 2020). Aside from that, it will be quite advantageous for universities to meet the accrediting indications, specifically teaching practitioners. Furthermore, increased public engagement in the capital market will help the Indonesian economy (Kim et al., 2018; Ozili, 2018). The government's participation is also critical in providing investors with investment security guarantees, ensuring that investor confidence in the capital market is high (Prihandono, 2014).

CONCLUSIONS

The results of the study show that a strong understanding of financial planning will motivate someone to study the capital market because the concept of financial planning includes allocating cash for investment purposes. As a result, everyone will research various types of investments, including the capital market. which leads to increased individual participation in the stock market. Positive individual perceptions of capital market investment can be created through good financial literacy, but it is not yet capable of encouraging the creation of capital market inclusion; in other words, creating a positive perception of society is insufficient to make society invest; positive perceptions must be balanced with good capital market literacy to create capital market inclusion. As a consequence, the capital market education model provided in this study might be used as a reference by all stakeholders to increase Indonesian capital market literacy.

Furthermore, coordination with other institutions is essential to ensure that the capital market education model, which is original to this research, is integrated into university learning processes. The educational program is organised into three stages: planning, implementation, and assessment, making it more structured. This study did not go into detail on the regulation or products of the Indonesian capital market; however, it is obvious that legislative changes and product innovation are necessary to make it more accessible and acceptable.

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A Study of Intention to Reduce Indonesia's Food Waste

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ABSTRACT

Indonesia has a food waste crisis. Indonesia was the third-largest producer of food waste in May 2023. According to the Ministry of Environment and Forestry in 2023, 40.98% of waste is food. This contradicts the fact that many of its citizens still lack food. Moral norms are important in Indonesia, which can be used to help reduce food waste. This study examines how moral norms and self-efficacy affect Indonesian food waste reduction intentions. SEM-PLS was used in this study, with 157 respondents participating. The results indicate that moral norms and self-efficacy for food waste reduction have a positive effect on food waste reduction intention. In conclusion, Indonesia's moral norms regarding food waste helped reduce food waste. Intention alone is insufficient; substantial incentives are needed to turn intentions into action.

Keywords: Indonesia, food waste, moral norms, self-efficacy

INTRODUCTION

Food waste represents a multifaceted global predicament with adverse ramifications encompassing environmental degradation and scarcity (Bech-Larsen et al., 2019; Dou et al., 2016). Around one-third of the world's consumable food supply, totaling 1.3 billion metric tons every year, is squandered, incurring an annual financial loss exceeding USD 750 billion. Consequently, an international discourse has arisen to curtail food waste and foster a more sustainable global milieu (Mu'azu et al., 2019). In developed countries, food waste ranges from 280 to 300 kilograms annually per person, whereas in developing countries, it ranges from 120 to 170 kilograms per capita yearly (Mumtaz et al., 2022). Presently, Indonesia confronts a crisis of waste accumulation, with food waste constituting the most substantial portion, accounting for 40.98% of the total waste composition, as the Ministry of Environment and Forestry reported in 2023 (The Ministry of Environment and Forestry, 2024). Furthermore, in May 2023, Indonesia assumed the disheartening rank of the third-largest food waste producer, trailing behind Saudi Arabia and the United States (Raharjo, 2023).

Mitigating food waste represents an imperative yet intricate strategy necessitating the active involvement of various stakeholders (Wang et al., 2017). Minimizing food waste within the restaurant sector is significant from both environmental and sustainable perspectives (Godfray et al., 2010). Consumers tend to think that food waste is an unavoidable facet of consumption, while the food industry and vendors employ discounts and special offers to entice impulsive purchases, influencing consumer buying choices and exacerbating waste generation (Grandhi & Appaiah, 2016). Past research in food service management has predominantly centered on operational facets of food waste mitigation and management rather than scrutinizing consumer behavior concerning food waste within dining establishments (Charlebois et al., 2016). Within the ambit of ethical consumption, it is crucial not to neglect consumers' ethical inclinations and tangible actions regarding food waste management in the food service sector, given that food waste poses substantial threats to the sustainability of the environment, social, and economic (Ding, 2022).

While prior studies have delved into the influence of consumers' self-efficacy on the way they treat and produce food waste within household settings (Aschemann-Witzel et al., 2020), there exists a dearth of comprehensive exploration concerning customers' attitudes, intentions, and actions regarding food waste management in restaurant contexts (Li et al., 2021). Specifically, further inquiry is warranted into the relationship between restaurant patrons' self-efficacy for reducing food waste and their inclination to engage in waste-reduction behaviors (Ding, 2022). Moreover, Ding (2022) contends that food sustainability and waste management are intrinsically interconnected with societal advantages and necessitate the active participation of all stakeholders. Generation Z consumers' perspectives and affirmative attitudes are driven by their perception of strong collective efficacy, which compels them to contribute to mitigating food waste (Ding & Jiang, 2023). Therefore, this research was conducted to understand the food waste phenomenon in Indonesia, specifically to probe the influence of moral norms and self-efficacy on an individual's intentions to reduce food waste. The research questions arising from this context are as follows: How do the moral norms for the reduction of food waste affect self-efficacy towards reducing food waste?; How does self-efficacy towards food waste reduction affect food waste reduction intention?; How do the moral norms for food waste reduction affect food waste reduction intention?.

Food waste, as stipulated, is the residual outcome arising from the initial production of consumable sustenance for human consumption, subsequently forsaken or left unconsumed by individuals. This encompasses provisions that deteriorated before disposal, as well as those that retained their edibility at the time of discarding (Thyberg & Tonjes, 2016). This phenomenon constitutes a multidimensional and intricate predicament characterized by many causal factors (Gao et al., 2021; Schanes et al., 2018). The continuous accumulation of food waste on a global scale has galvanized the recognition of its urgency among commercial entities, governmental bodies, vested organizations, and the general populace (Schanes et al., 2018). Substantive evidence substantiates a consumerist culture's influence on food waste propagation (Aschemann-Witzel, 2015). Such a culture encourages individuals to procure quantities of sustenance over their actual requirements, particularly in circumstances characterized by elevated income and reduced pricing structures. This practice fosters heightened consumption patterns without consideration for potential waste and its associated repercussions. Furthermore, the prevailing culture of consumption plays a pivotal role in shaping individuals' perceptions regarding which food items merit preservation and

which may be dispensed with (Thyberg & Tonjes, 2016). In contemporary societies, the predicament of food waste is intimately intertwined with overarching consumption paradigms, rendering it a formidable challenge that transcends resolution solely through the reclamation and recycling of food waste materials (Huang et al., 2020).

Moral norms refer to an individual's perception of whether a behavior is morally right or wrong (Ajzen, 1991; Sparks, 1994). Moral norms are "personal feelings of … responsibility to perform, or refuse to perform a certain behavior" (Ajzen, 1991). Moral norms are expectations for certain behaviors that have evolved through socialization (Manstead, 1999). Moral norms embody an individual's moral convictions (Talwar et al., 2022). The presence of moral norms should significantly impact the execution of acts that possess a moral or ethical aspect. Beck and Ajzen (1991) included a measure of moral norms in their analysis of dishonest actions and found that it significantly increased the amount of variance in intention accounted for (3 to 6%) and significantly contributed to the prediction of each intention. In this study, we used the definition of moral norms from Stancu et al. (2016), which are governing principles that aid individuals in making judgments in various situations, including food waste.

As expounded by Bandura et al. (1999), social cognitive theory elucidates the intricate interplay between an individual's self-efficacy and behavioral intentions. This theoretical framework places simultaneous emphasis on both the social and cognitive dimensions of human behavior. Within the social cognitive theory, the social component acknowledges the profound influence of social origins on human thought and actions, encapsulating what individuals acquire through their societal interactions. In contrast, the cognitive component recognizes the pivotal role of cognitive processes in shaping human motivation, attitudes, and conduct (Stajkovic & Luthans, 1998). In essence, Bandura (2012) posits that social cognitive theory perceives an individual's actions as a consequence of the dynamic interplay among intrapersonal factors, their activities, and the external forces exerted upon them. Individual behavior emerges as a product of the amalgamation of self-efficacy beliefs and other personal and contextual factors, given that self-efficacy encapsulates one's perceptions of one's capabilities.

The social cognitive theory provides a comprehensive account of the psychological phenomenon of self-efficacy. It delineates that individuals undertake a process of self-examination and integration of their perceived skills before making judgments and investing effort in a task. Self-efficacy significantly influences an individual's initial coping strategies, exerted efforts, and persistence (Stajkovic & Luthans, 1998). Furthermore, individuals tend to allocate greater effort and commitment to tasks in which they possess competence and confidence (Bandura et al., 1999). Consequently, self-efficacy emerges as a pivotal predictor of goal-setting behaviors and profoundly shapes individuals' perceptions of environmental challenges and opportunities (Pihie & Bagheri, 2013). Ethical self-efficacy shapes individuals' ethical intentions (Pan & Sparks, 2012). Wang et al. (2013) delved into the connection between customers' ethical self-efficacy and their intentions regarding online purchases, revealing that individuals with high ethical self-efficacy are inclined to exhibit disciplined behavior aligned with moral norms when confronted with ethics-related consumption situations, irrespective of the moral intensity of the context. In the context of dining consumption, reducing food waste can be construed as an ethical consumer behavior within restaurants. Ding (2022) precisely defined customers' restaurant food waste reduction intentions to minimize food waste from all food items ordered for consumption in restaurant

settings. If customers believe in their capacity to effectively reduce food waste, they are predisposed to behave ethically when dining out.

Based on the previous literature, we proposed a conceptual framework, as shown in Figure 1.

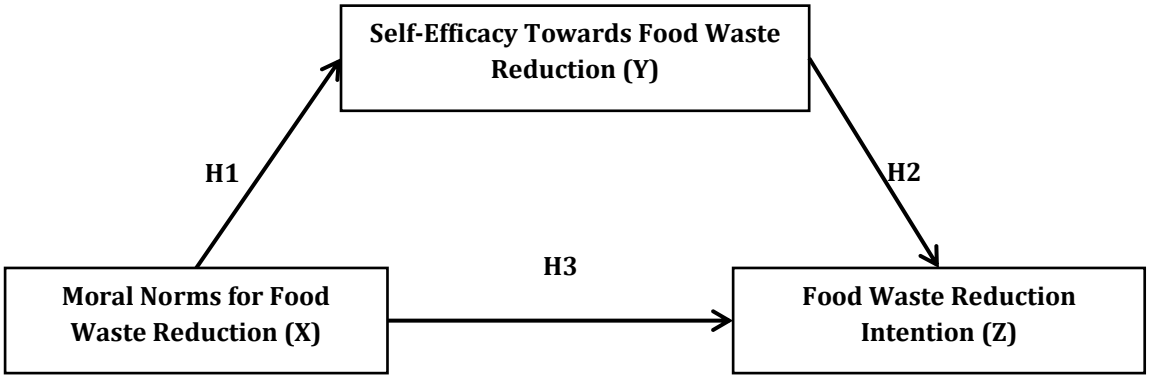

Figure 1. Conceptual Framework
Source: Authors' work, 2023

METHODS

The data from respondents is acquired by distributing online questionnaires on social media platforms such as Facebook and Instagram, as well as via email. The questionnaire consists of statements related to moral norms for food waste reduction, self-efficacy towards food waste reduction, and food waste reduction intention. The moral norms for food waste reduction were measured with four indicators (MN1, MN2, MN3, MN4) by Ding (2022). Self-efficacy towards food waste reduction is measured using six indicators (SE1, SE2, SE3, SE4, SE5, SE6) from Aschemann-Witzel et al. (2020), four indicators (SE7, SE8, SE9, SE10) from Kim et al. (2022), and lastly two indicators (SE11, SE12) from Ding and Jiang (2023). Meanwhile, food waste reduction intention was measured using four indicators (FR1, FR2, FR3, FR4) from Ding (2022). Each indicator used can be seen in Table 3.

All indicators used were measured using a 6-point Likert scale. Point 1 means strongly disagree, while point 6 means strongly agree. There are also several questions related to the demographics of the respondents, including sex, age, education, domicile, occupation, and income. The sample used in this study consisted of respondents aged 17 years or older who were able to make their own decisions and purchase their own food. This sample was collected from various regions in Indonesia with diverse backgrounds.

Furthermore, we used the structural equation model-partial least squares (SEM–PLS) to evaluate the model and test the research hypotheses. Moral norms for food waste reduction will be the independent variable for this study, self-efficacy toward food waste reduction will be the intervening variable, and food waste reduction intention will be the dependent variable. The conceptual framework used in this study is illustrated in Figure 1.

RESULT AND DISCUSSION

This study collected 157 respondents, consisting of 91 women (57.96%) and 66 men (42.04%). The majority of respondents came from groups aged 22 - 26 years (32.48%) and 27 - 31 years (28.66%) and other groups of age categories (38.68%). Meanwhile, respondents came from East Java (25.48%), DKI Jakarta (24.20%), West Java (17.20%), Central Java (11.46%), Banten (8.28%), and other provinces in Indonesia (13.38%). From 157 respondents, the majority of respondents have a monthly income within the range of IDR 2.5 million up to IDR 3.5 million (17.83%), more than IDR 4.5 million up to IDR 5.5 million (15.92%), less than IDR 2.5 million (13.38%), more than IDR 3.5 million up to IDR 4.5 million (12.74%), more than IDR 6.5 million up to IDR 7.5 million (12.10%), and the rest categories of monthly income (28.03%). For further information about respondents' profiles, see Table 1.

Table 1. Respondents' Profile

Categories	Subcategories	N	%
Gender	Female	91	57.96
	Male	66	42.04
	Total	**157**	**100.00**
Group of Age	17 - 21	10	6.37
	22 - 26	51	32.48
	27 - 31	45	28.66
	32 - 36	26	16.56
	37 - 41	12	7.64
	42 - 46	8	5.10
	47 - 51	3	1.91
	52 - 56	2	1.27
	Total	**157**	**100.00**
Monthly Income	< IDR 2,5 million	21	13.38
	> IDR 2,5 million up to IDR 3,5 million	28	17.83
	> IDR 3,5 million up to IDR 4,5 million	20	12.74
	> IDR 4,5 million up to IDR 5,5 million	25	15.92
	> IDR 5,5 million up to IDR 6,5 million	13	8.28
	> IDR 6,5 million up to IDR 7,5 million	19	12.10
	> IDR 7,5 million up to IDR 8,5 million	5	3.18
	> IDR 8,5 million up to IDR 9,5 million	4	2.55
	> IDR 9,5 million up to IDR 10,5 million	12	7.64
	> IDR 10,5 million	10	6.37
	Total	**157**	**100.00**

Source: Data processed, 2023

Table 2. Respondents' Profile (cont'd)

Categories	Subcategories	N	%
Highest Education Level	Primary School	3	1.91
	Junior High School	2	1.27
	Senior High School	73	46.50
	Diploma Degree	15	9.55
	Bachelor Degree	59	37.58
	Master Degree	5	3.18
	Total	**157**	**100.00**
Province of Residence	Central Kalimantan	1	0.64
	East Kalimantan	1	0.64
	North Kalimantan	1	0.64
	North Maluku	1	0.64
	West Nusa Tenggara	1	0.64
	East Nusa Tenggara	2	1.27
	Riau	2	1.27
	South Sulawesi	3	1.91
	Southeast Sulawesi	1	0.64
	Yogyakarta	1	0.64
	Total	**157**	**100.00**

Source: Data processed, 2023

Table 3 indicates each indicator's mean, standard deviation, and factor loading, as well as Cronbach's alpha, composite reliability, and average variance extracted (AVE) from each variable. As we can see from Table 3, the mean value from respondents is generally relatively high, as seen in moral norms for food waste reduction (5.526), self-efficacy towards food waste reduction (5.239), and also food waste reduction intention (5.518). From these results, it can be concluded that Indonesian respondents have high moral norms and self-efficacy for food waste reduction, and have a high intention to reduce food waste too. The highest mean is from MN3 (5.669), whereas the smallest is from indicator SE7 (5.064).

This study used partial least square structural equation modeling (PLS-SEM). The data was analyzed using SmartPLS version 4.1.0.2. For the first run, the outer loading result of SE4 (0.614) is lower than 0.70. According to Hair et al. (2021), if certain condition is met (it increases the internal consistency reliability or convergent validity), then it is possible to remove outer loading between 0.40 and 0.70. For the second run, after removing SE4, the internal consistency reliability or convergent validity have increased. The result from the second run shows that all outer loading from each indicator is above 0.70. For internal consistency reliability in exploratory research, Cronbach's alpha should be higher than 0.60 (Hair et al., 2021). In this study, all variables have Cronbach's alpha results above 0.60. Meanwhile, AVE was used for convergent validity, which must be higher than 0,50 (Hair et al., 2021). The AVE result from three variables is higher than 0.50. This study used heterotrait–monotrait ratio (HTMT) for discriminant validity. The HTMT must be lower than 0.90 (Hair et al., 2021); from Table 4, all HTMT values are lower than 0.90. It can be concluded that the model measurement of this study has been proven valid and reliable.

Table 3. List of Indicators, Variables Used

Variables and Indicators	Means	SD	OL
Moral Norms for Food Waste Reduction (CA= 0.817; CR= 0.821; AVE= 0.647)			
MN1. I regret leaving leftover food, considering the plight of poor people.	5.529	0.841	0.808
MN2. Having leftover food makes me feel guilty.	5.503	0.762	0.854
MN3. I have been taught to consume all the food I have taken.	5.669	0.612	0.813
MN4. Discarding food goes against my morals.	5.401	1.021	0.738
Self-Efficacy Towards Food Waste Reduction (CA= 0.945; CR= 0.946; AVE= 0.646)			
SE1. Regardless of the dish I intend to cook, I am typically efficient in its preparation, ensuring it is prepared well and in the appropriate amount.	5.344	0.819	0.741
SE2. I am confident in efficiently determining which food and ingredients to purchase and when to utilize it.	5.344	0.819	0.786
SE3. I am keenly aware of the foods or ingredients that I have or lack in my household.	5.299	0.863	0.798
SE4. I possess the ability to know whether a food is still edible or not.*	5.554	0.642	-
SE5. I am confident in generating ideas for cooking with my available ingredients.	5.127	1.033	0.833
SE6. I know how to store my purchased foods or ingredients appropriately.	5.140	0.993	0.770
SE7. There are straightforward measures I can take to mitigate the adverse effects of food waste.	5.064	1.051	0.814
SE8. I can modify my regular habits to mitigate the issue stemming from food waste.	5.178	0.927	0.823
SE9. My personal efforts will contribute to resolving the issue stemming from food waste.	5.076	0.921	0.845
SE10. Modifying my everyday habits will aid in mitigating the adverse effects of food waste.	5.401	0.764	0.762
SE11. I can proactively take measures to mitigate food waste in my daily routines.	5.17	0.897	0.838
SE12. I have solutions when I have to deal with food waste.	5.166	0.950	0.821
Food Waste Reduction Intention (CA= 0.821; CR= 0.829; AVE= 0.650)			
FR1. I will try to consume all the food I order at the restaurant.	5.548	0.681	0.779
FR2. I will try to consume all the food cooked or prepared at home.	5.439	0.743	0.833
FR3. I plan to refrain from wasting food at home or in restaurants.	5.535	0.753	0.812
FR4. I will endeavor to minimize the amount of food I leave uneaten.	5.548	0.672	0.801

Notes: *Item is removed during validation process CA: Cronbach's alpha; CR: composite reliability; AVE: average variance extracted; SD: standard deviation; OL: outer loading.

Source: Data processed, 2023

Table 4. Heterotrait–Monotrait Ratio (HTMT) Results

	Food Waste Reduction Intention	Moral Norm	Self-Efficacy Towards Food Waste Reduction
Food Waste Reduction Intention			
Moral Norm	0.744		
Self-Efficacy Towards Food Waste Reduction	0.709	0.827	

Source: Data processed, 2023

The results from the evaluation of the structural model are presented in Table 4; all the hypotheses (H1, H2, H3) are supported. Moral norms for food waste reduction positively and significantly affect self-efficacy towards food waste reduction (β = 0.730; t= 12.354; p= 0.022). Self-efficacy towards food waste reduction significantly and positively affects food waste reduction intention (β = 0.402; t= 3.132; p= 0.000). Moral norms for food waste reduction positively and significantly affect food waste reduction intention (β = 0.325, t= 2.287, p= 0.002).

Table 5. Results of The Structural Model Assessment

Hypothesis	β values	T statistics	p values	Result
H1. Moral Norms for Food Waste Reduction → Self-Efficacy Towards Food Waste Reduction	0.730	12.354	0.022	Supported
H2. Self-Efficacy Towards Food Waste Reduction → Food Waste Reduction Intention	0.402	3.132	0.000	Supported
H3. Moral Norms for Food Waste Reduction → Food Waste Reduction Intention	0.325	2.287	0.002	Supported

Source: Data processed, 2023

This study found that moral norms for food waste reduction have a positive and significant influence on self-efficacy towards food waste reduction (H1). This result aligns with the findings from studies by Ding (2022) and Ding and Jiang (2023), which articulate that self-efficacy acts as a mediator between ethical judgment and food waste reduction intentions, indicating that moral assessments enhance perceptions of individual capability in reducing food waste. This interaction suggests that when individuals recognize their moral duty towards sustainability, their self-efficacy increases, allowing them to feel more empowered to engage in effective food waste management.

Furthermore, this study found that self-efficacy towards food waste reduction has a positive and significant influence on food waste reduction intention (H2). This result aligns with Ding and Jiang (2023), who highlight the positive relationship between self-efficacy and food waste reduction intentions, asserting that enhancing customers' self-efficacy can lead to increased engagement in food waste reduction practices within the hospitality sector. Their findings suggest that consumers who believe in their abilities to reduce food waste are more likely to express intentions to do so, underscoring self-efficacy as a critical psychological factor in behavioral decision-making processes related to food waste. Further supporting this result, Blešić et al. (2021) demonstrate that intentions to reduce food waste directly correlate with self-efficacy, emphasizing that the perception of personal capability to change behaviors significantly impacts the actual food waste behaviors reported by individuals.

Lastly, moral norms for food waste reduction have a positive and significant influence on food waste reduction intention (H3). This result is supported by a previous study by Wang et al. (2022), which affirms that an enhanced sense of personal responsibility triggers moral norms that can lead to proactive food waste reduction actions. They reveal that awareness of the negative consequences of food waste cultivates a personal norm that motivates individuals to take action against wastage (Wang et al., 2022). This result is echoed in the study by Huang and Tseng (2020), which establishes a causal framework linking social norms, attitudes, and moral considerations to intentions and subsequent behaviors in food waste management.

CONCLUSIONS

The results of this study indicate that moral norms for food waste reduction have a positive and significant effect on self-efficacy toward food waste reduction. In addition, self-efficacy toward food waste reduction also has a positive and significant effect on food waste reduction intention. Finally, moral norms for food waste reduction also positively and significantly affect food waste reduction intention. The limitation of this study is the number of samples, which is only 157 respondents; future research can increase the number of respondents. In addition, it can also be a consideration for further research to consider gender and income as moderating variables that affect the intention to reduce food waste. Moreover, it is crucial to recognize that consumer behavior is also significantly shaped by contextual and structural factors in the food service industry, which may not have been fully explored in this study. An overarching consumerist culture can impact food waste behaviors considerably, and the complexity of these interactions necessitates a broader investigation beyond individual attitudes. To address these limitations, future research should employ a mixed-methods approach to gain both qualitative and quantitative insights into consumer behaviors. Incorporating in-depth interviews or focus groups could provide richer contextual data that complements the quantitative findings.

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SINTA 2

Incentive Mechanism for Quality Inspection: A Linear Programming Approach

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ABSTRACT

This study develops an incentive mechanism model for outsourced personnel in product quality inspection, based on a principal-agent relationship. The core challenge lies in misaligned incentives, where agents often prioritize output volume over quality. By integrating Mechanism Design Theory (MDT) and Linear Programming (LP), our model aligns the principal's objective of minimizing defective products with the agent's utility maximization, subject to Incentive Compatibility and Individual Rationality constraints. Our analysis reveals that the optimal incentive structure combines a basic wage with a performance-based bonus. The optimal effort level of outsourced personnel increases with both rising losses due to defective products and enhanced detection effort effectiveness. The model also shows that optimal inspection allocation should be assigned to personnel with higher capabilities, especially for high-risk products. This research provides a theoretical contribution by integrating MDT and LP for incentive design and offers practical implications for improving product quality through a measurable incentive framework.

Keywords: Incentive mechanism, outsourcing, quality checking, Mechanism design theory, Linear programming.

INTRODUCTION

In the fierce business competition, many companies adopt outsourcing strategies in an effort to improve operational efficiency and reduce production costs (Nyameboame & Haddud, 2017). Outsourcing has become a common practice in a variety of industries, from manufacturing to information technology (Vardhan et al., 2024). According to data from Grand View Research (2023), the growth of the outsourcing workforce in Indonesia shows a positive trend with a compound annual growth rate of around 10% during the 2021–2025 period ("Indonesia Business Process Outsourcing (BPO) Market Growth & Trends," 2023). However, behind the economic benefits offered, outsourcing brings challenges, especially in product quality control.

One of the main problems in outsourcing practices is how to ensure that outsourcing personnel have the right incentives to conduct careful and honest product quality checks.

This problem arises due to incentive misalignment between the company and outsourced personnel (Bhattacharya & Singh, 2019). On the one hand, companies want high-quality products to improve customer satisfaction and reduce warranty costs (Zhou et al., 2024). On the other hand, outsourced workers who are paid based on the number of products produced (piece-rate system) tend to prioritize quantity over quality, which can result in defective products passing through to customers (Friis et al., 2015).

The passing of defective products to customers has serious consequences for the company, namely decreased customer satisfaction, damage to brand reputation, increased warranty costs and handling of complaints, and potential loss of market share (Lucky & Takim, 2015). According to a study conducted by (Shipley et al., 2022), The cost of external failure due to defective products reaching customers is several times the cost of inspection and prevention. Therefore, designing an effective incentive mechanism to encourage outsourcing personnel to properly conduct quality checks is critical to business sustainability.

This problem can be analysed with Mechanism Design Theory (MDT), a branch of Economic Theory that focuses on designing interaction rules to achieve desired outcomes when agents have personal information and incentives that may not align with the goals of the mechanism designer (Börgers, 2015). In the context of outsourcing, the company acts as a principal who tries to encourage outsourcing agents to properly conduct quality checks, even though this action may conflict with their incentives to maximize output.

This study aims to develop an Incentive Mechanism Model for outsourcing personnel to be willing to perform product quality inspections correctly, to reduce the passing of defective products to customers. This model is developed based on the MDT concept and modeled with Linear Programming (LP). The LP model was chosen because it is structured and measurable, considers all relevant constraints, and can be mathematically proven to achieve the best solution. In this research, the relevant constraints are Incentive Compatibility (IC) and Individual Rationality (IR). The IC requirement ensures that outsourcing personnel have an incentive to act honestly in reporting quality inspection results, while IR ensures that outsourcing personnel are willing to participate in the mechanism (Ballen, 2023).

The main contribution of this research is the development of a comprehensive LP model to design optimal incentive mechanisms in the context of outsourcing, with a special focus on product quality inspection. This model considers the economic aspects of the principal-agent relationship and pays attention to the honesty factor of outsourcing as a key element in ensuring product quality. In addition, this research also provides practical insights for companies in designing outsourcing contracts to harmonize incentives between companies and outsourcing workers.

MDT focuses on designing interaction rules to achieve desired outcomes when agents have personal information and incentives that may not align with the goals of the mechanism designer. This theory was originally developed by several prominent economists, such as Leonid Hurwicz, Eric Maskin, and Roger Myerson, who were awarded the Nobel Prize in Economics in 2007 for their contributions to the development of this theory (Börgers, 2015). In contrast to classical game theory which analyzes how agents behave within pre-set rules, MDT focuses on designing optimal rules to achieve specific goals (Börgers, 2015). In this context, the principal designer seeks to design an incentive system that encourages agents to honestly disclose their personal information and act

according to the principal's objectives, even though such actions may conflict with their incentives (Liang et al., 2023).

The key concepts in MDT are IC and IR (Börgers, 2015). ICs ensure agents have an incentive to act honestly and disclose their personal information accurately. IR ensures agents are willing to participate in the mechanism, by ensuring the expected utility of their participation is at least equal to the utility of their reservation. In its development, MDT has been applied in various contexts, including in auction issues, public resource allocation, and contract design. (Jiang & Ma, 2025) applies this theory in the context of the data market, using a multitasking principal-agent model to develop incentive mechanisms to optimize data circulation and security.

The principal-agent model is a theoretical framework that analyses the relationship between two parties, namely the principal (assignee) and agent (executor of the task). This model becomes relevant when the principal delegates tasks to the agent, but cannot fully observe the agent's actions or has less information than the agent. This situation creates information asymmetry that can result in two main problems, namely adverse selection (before the contract) and moral hazard (after the contract) (Tan et al., 2023).

Adverse selection occurs when agents have personal information about their characteristics (e.g., ability or productivity) that the principal did not know before the contract was made. Moral hazard occurs when the principal is unable to fully observe the agent's actions after the contract is made, so the agent may not act in the principal's best interests (Liang et al., 2023).

In the context of outsourcing, information asymmetry is a significant problem. (Zhang et al., 2022) have analysed how information asymmetry influences production outsourcing and quality management decisions. They compared two outsourcing structures, namely turnkey (contract manufacturers who buy components directly from suppliers) and buy-sell (original equipment manufacturers buy components from suppliers and resell them to contract manufacturers). Their results show that the optimal outsourcing structure depends on a variety of factors, including compensation, external failure costs, cost differences between suppliers, and the contract manufacturer's skill level.

(Tan et al., 2023) have developed a dynamic moral hazard model to derive optimal incentive mechanisms in the context of construction waste recycling. They used Bayesian learning to update the estimates of waste collectors' personal information. The results of their research show collectors are always motivated to voluntarily maintain a supply of high-quality waste in an optimal mechanism. In addition, personal information is gradually revealed through learning, which is conducive to controlling incentive costs.

Quality control is a significant challenge in the context of outsourcing, especially when outsourced workers are paid based on the number of products produced (Uluskan et al., 2016). In this situation, outsourcing personnel may face a trade-off between quantity and quality, which can result in the passage of defective products to customers if there is no proper incentive to properly conduct quality checks.

Several researchers have analysed how to design incentive mechanisms to encourage quality control in the context of outsourcing. (Zhang et al., 2022) examined how original equipment manufacturers can design contracts with contract manufacturers to encourage them to use quality components and/or adopt the right production processes to produce quality products. They found that optimal contract design depends on a variety of factors, including compensation, external failure costs, and cost differences between

suppliers. (Liang et al., 2023) developed a quality incentive contract for the procurement of public technology innovations under asymmetrical information conditions. They found that under asymmetric information, the government can motivate companies to conduct independent selection and improve the quality of technological innovation by designing information filtering contracts.

In a more specific context of outsourcing labour, some researchers have analyzed how to design incentives to encourage honesty in quality checks (Zhang, 2024). However, research that specifically analyzes incentive mechanisms for outsourcing personnel in product quality inspection is still limited. This study aims to fill the gap by developing a comprehensive incentive mechanism model based on MDT and modelled with LP. LP is a Mathematical Optimization technique that aims to maximize or minimize the function of linear objectives by paying attention to linear constraints. This technique has been widely applied in a variety of contexts, due to its ability to handle optimization problems with many variables and constraints (Börgers, 2015).

In the context of incentive mechanism design, LP will be used to formulate optimization problems where principals seek to maximize the objective function (profit or social utility) by paying attention to constraints such as IC and IR. The LP formulation allows the principal to determine the optimal incentive structure that encourages the agent to act following the principal's objectives (Zhu et al., 2025).

Some studies apply the Optimization Model in the design of incentive mechanisms for several contexts. For example, (Jiang & Ma, 2025) used an optimization approach to develop incentive mechanisms in the data market, while (Tan et al., 2023) used an optimization model to obtain optimal incentive mechanisms in the context of waste recycling.

In this study, the LP model is used to formulate an optimization problem in which the company seeks to maximize profits by designing an incentive mechanism that encourages outsourced personnel to properly conduct quality checks. This LP model considers a variety of factors, including production costs, selling prices, losses due to defective products, and incentive structures for outsourced personnel.

Although several studies have analyzed incentive mechanisms in various contexts (Ihle et al., 2023), including outsourcing and quality control (He et al., 2024), there is still a gap in the literature regarding incentive mechanisms for outsourcing personnel in product quality inspection. In particular, research integrating MDT and LP to develop a comprehensive model that considers the honesty of outsourcing personnel is still limited.

This research aims to fill this gap by developing a model of an incentive mechanism with a comprehensive LP for outsourced personnel in product quality inspection. This model not only considers the economic aspects of the principal-agent relationship but also pays attention to the honesty factor of outsourcing personnel as a key element in ensuring product quality. In addition, this research also provides practical insights for companies in designing outsourcing contracts that can align incentives between companies and outsourcing personnel.

METHODS

This study develops a model of incentive mechanisms for outsourcing personnel in product quality inspection using the MDT and LP approaches (Figure 1). The conceptual framework of this research is based on the principal-agent relationship between the company (principal) and outsourced personnel (agent) (Bernhold & Wiesweg, 2021), where companies seek to design incentive mechanisms that encourage outsourced personnel to properly conduct quality checks, even though such actions may conflict with their incentives to maximize output.

In this model, companies face the problem of information asymmetry in two forms, namely adverse selection, the ability of outsourced personnel cannot be fully observed by the company, and moral hazard, the level of effort of outsourced personnel in quality checks that cannot be fully observed by the company. To address this issue, companies need to design incentive mechanisms that meet two main requirements: IC and IR (Börgers, 2015). IC ensures that outsourced personnel have the incentive to act honestly in reporting quality inspection results (Mohammadi & Hashemi Golpayegani, 2021). IR ensures outsourced personnel are willing to participate in the mechanism, by ensuring that the expected utility of participation is at least equal to their reservation utility (Sadiq & Ahmed, 2020). By observing these two requirements, the company strives to maximize profits by minimizing the number of defective products that pass to customers.

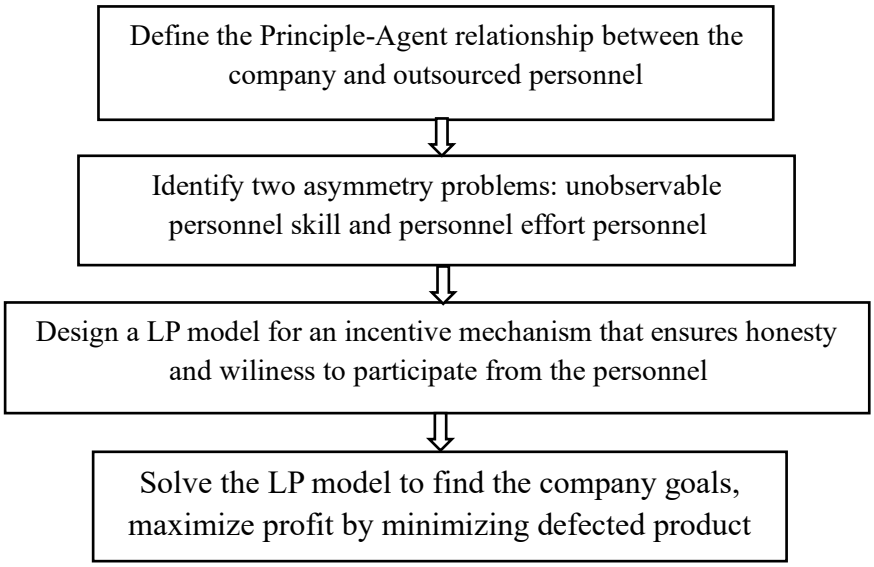

Figure 1. Research Methods: Development of Integration Model of MDT and LP
Source: Authors' work, 2025

The model developed in this study is a conceptual model, or mathematical model-based research. This study does not use empirical sampling; it simply develops and analyses a mathematical model, rather than generalizing findings from the sample to the population.

The model developed in this study is based on several assumptions. Outsourcing workers are initially rewarded based on the number of products produced (piece-rate system). The model develops additional incentive structures to encourage correct quality checks. Outsourcing personnel have different types of abilities in conducting quality checks (Daniel et al., 2018). This type of ability is the personal information of the outsourcing

personnel that cannot be fully observed by the company. Outsourcing personnel can choose the level of effort in conducting quality checks (Gunasekaran et al., 2015). This level of effort cannot be fully observed by the company, but it affects the probability of detecting defective products. The probability of outsourcing personnel detecting defective products depends on their level of effort and the type of ability they are capable of (Dong et al., 2016). The higher the level of effort and the type of ability, the higher the probability of detection. Outsourcing workers face increasing effort costs as the level of effort in quality checks increases. (Lee & Li, 2018). These costs can be time, energy, or lost opportunities to produce more products. Companies face losses when defective products pass to customers (Maharaj, 2019). These losses can be in the form of warranty fees, complaint handling, or reputational damage. Finally, both companies and outsourced personnel are assumed to act rationally to maximize their utility or profits.

In developing the Mathematical Model, the following notations and variables are used:

$i \in I$: Index for outsourced personnel

$j \in J$: Index for product type

$q \in Q$: Index for product quality level (q=*1* defective, q = 2 good)

p_j : The selling price of product type *j*

c_j : Production cost per unit product type *j*

e_i : Outsourced personnel effort level *i* in quality inspection

θ_i : Types of outsourced personnel's capabilities *i* (personal parameters)

π_j : Probability of product type *j* defects before check

δ_j : Company losses due to type-defective products *j* that pass to the customer

α : Defect detection sensitivity parameters to check efforts

β : Defect detection sensitivity parameters to the capabilities of outsourced personnel

γ : Marginal cost of quality check efforts

w_0 : Basic wage of outsourcing personnel per unit of product produced

w_i : Total wages for outsourced workers *i*

b_i: Bonuses for outsourcing personnel *i* if performing quality checks correctly

x_{ijq} : Number of product types *j* with quality *q* that are inspected by outsourced personnel *i*

y_{ijq} : Number of product types *j* with quality *q* reported by outsourcing personnel *i*

z_{ijq} : Number of product types *j* with quality *q* that passes to customers from outsourcing personnel *i.*

The probability of defect detection function, namely the probability of outsourced personnel *i* detecting defects in product types *j* defined as:

$$P_{ij}(e_i, \theta_i) = \alpha e_i + \beta \theta_i \qquad (1)$$

where $0 \leq P_{ij}(e_i, \theta_i) \leq 1, e_i \geq 0$ (effort level), and $\theta_i \epsilon [\underline{\theta}, \overline{\theta}]$ (ability type).

The α and β parameters (in equation 1) determine the sensitivity of the detection probability to the level of effort and capability type, respectively. (Dunn et al., 2019). The higher the α value, the greater the effect of the effort level on the probability of detection. The higher the β value, the greater the influence of the ability type on the probability of detection.

Based on the above notation and variables, the LP model can be formulated as follows:

Objectives function (Maximization of Company Profits)

$$Max \ \sum_{i \epsilon I} \sum_{j \epsilon J} \sum_{q \epsilon Q} (p_j - c_j - w_i) x_{ijq} - \sum_{i \epsilon I} \sum_{j \epsilon J} \delta_j z_{ij1} - \sum_{i \epsilon I} b_i \qquad (2)$$

This objective function (2) maximizes the company's profits, which consist of revenue from product sales minus production costs, wages for outsourced personnel, losses due to defective products that pass to customers, and bonuses for outsourcing personnel.

IC requirements to ensure the honesty of outsourced personnel, the incentive to report honestly should be greater than the incentive to report dishonestly (Nasiri et al., 2023).

$$w_0 \sum_{j \epsilon J} \sum_{q \epsilon Q} x_{ijq} + b_i - \gamma e_i \geq w_0 \sum_{j \epsilon J} \sum_{q \epsilon Q} x_{ijq} + b_i \, P_{ij}(0, \theta_i) / P_{ij}(e_i, \theta_i) \qquad (3)$$

further simplified to:

$$b_i \left(1 - \frac{P_{ij}(0, \theta_i)}{P_{ij}(e_i, \theta_i)}\right) \geq \gamma e_i \qquad (4)$$

This requirement (4) is to ensure that outsourced personnel have an incentive to conduct quality checks with a level of effort e_i and report the checking results honestly, rather than making no effort at all ($e_i = 0$) and reporting results randomly.

IR requirements to ensure the participation of outsourced personnel, i.e. the expected utility must be greater than or equal to the reservation utility (Basu et al., 2019):

$$w_0 \sum_{j \epsilon J} \sum_{q \epsilon Q} x_{ijq} + b_i - \gamma e_i \geq U_0 \qquad (5)$$

where U_0 is an outsourcing personnel reservation utility. This requirement (5) ensures that outsourced personnel are willing to participate in the incentive mechanism designed by the company.

Product balance requirements (6), i.e. the number of products inspected must be equal to the number of products reported:

$$\sum_{q \epsilon Q} x_{ijq} = \sum_{q \epsilon Q} y_{ijq}, \forall i \epsilon I, \forall j \epsilon J \qquad (6)$$

Defect detection requirements (7) i.e. the number of defective products detected depend on the probability of detection:

$$y_{ij1} = x_{ij1} P_{ij}(e_i, \theta_i), \forall i \epsilon I, \forall j \epsilon J \qquad (7)$$

Product requirements pass to customers (8) i.e. defective products that pass to customers:

$$z_{ij1} = x_{ij1} - y_{ij1}, \forall i \epsilon I, \forall j \epsilon J \qquad (8)$$

and, good or undefective product that passes to the customer (9):

$$z_{ij2} = x_{ij2}, \forall\, i \in I, \forall\, j \in J \qquad (9)$$

Non-negative constraints are $x_{ijq}, y_{ijq}, z_{ijq}, w_i, b_i, e_i \geq 0, \forall\, i \in I, \forall\, j \in J, \forall\, q \in Q$.

To analyze the models that have been developed, analytical and numerical approaches are used (Akinsola & Oluyo, 2019). The analytical approach involves deriving the characteristics of the optimal solution from the LP model, including the optimal incentive structure, the optimal effort level, and the optimal examination allocation. The numerical approach involves sensitivity analysis to evaluate how changes in model parameters affect the optimal solution.

In particular, an analysis was carried out on how changes in the following parameters affect the optimal solution, namely losses due to defective products (δ_j), marginal cost of effort (γ), sensitivity parameter (α and β), and distribution of outsourced personnel types (θ_i). In addition, an analysis of the practical implications of the model for the company, outsourced personnel, and customer satisfaction was carried out.

RESULT AND DISCUSSION

Based on the LP developed, an analysis of the characteristics of the optimal solution for the outsourcing personnel incentive mechanism in product quality inspection was carried out. This analysis provides insights into optimal incentive structures, optimal effort levels, and optimal check allocation.

The optimal incentive structure consists of two components, namely the basic wage w_0 per unit of product produced and bonuses b_i^* which is given when the outsourcing personnel conduct quality checks correctly. From the requirements of the IC, it is obtained:

$$b_i^* = \gamma e_i^* \left(1 - \frac{P_{ij}(0,\theta_i)}{P_{ij}(e_i^*,\theta_i)}\right) \qquad (10)$$

This equation (10) shows that the optimal bonus b_i^* must be proportionate to the marginal cost of the audit effort γe_i^* and inversely proportional to the increased probability of defect detection resulting from such efforts (Peng et al., 2017). In other words, the higher the cost of the inspection effort, the greater the bonus required to encourage outsourcing personnel to conduct the inspection properly. Conversely, the greater the increased probability of defect detection resulting from the effort, the smaller the bonus required.
In addition, from the IR requirements, it is obtained:

$$w_0 \sum_{j\epsilon J} \sum_{q\epsilon Q} x_{ijq} + b_i^* - \gamma e_i^* \geq U_0 \qquad (11)$$

This equation (11) shows the combination of base wages and bonuses, minus the cost of the check effort, is at least equal to the utility of outsourcing personnel reservations. If these requirements are not met, the outsourcing personnel will not be willing to participate in the incentive mechanism designed by the company.

The optimal level of effort e_i^* for outsourced personnel type θ_i determined by the conditions:

$$\frac{\partial P_{ij}(e_i,\theta_i)}{\partial e_i} \sum_{j\epsilon J} \delta_j x_{ij1} = \gamma \qquad (12)$$

This equation (12) shows the optimal level of effort, the marginal benefit of increased defect detection (reduction of losses due to defective products) is equal to the marginal cost

of the checking effort (Nas, 2016). With detection probability function $P_{ij}(e_i, \theta_i) = \alpha e_i + \beta\theta_i$, Obtained $\frac{\partial P_{ij}(e_i,\theta_i)}{\partial e_i} = \alpha$, so that:

$$\alpha \sum_{j\epsilon J} \delta_j x_{ij1} = \gamma \qquad (13)$$

From this equation (13), it can be seen that the optimal effort rate increases as the sensitivity of detection to effort increases. α, increased losses due to defective products δ_j, and an increase in the number of defective products inspected x_{ij1}. In contrast, the optimal effort rate decreases as the marginal cost of effort increases γ.

Optimal allocation of products for inspection x^*_{ijq} depends on a variety of factors, including the ability of outsourced personnel θ_i, probability of defective product π_j, and losses due to defective products δ_j. From the model analysis, it was found that outsourcing personnel with higher capabilities should be allocated to inspect products with a higher probability of defects and losses due to greater defects. For outsourced personnel with the same capabilities, the optimal allocation depends on the trade-off between the cost of inspection and the expected losses due to defective products passing to the customer.
Mathematically, the optimal allocation must meet the following conditions:

$$\frac{\partial}{\partial x_{ijq}}\left[(p_j - c_j - w_i)x_{ijq} - \delta_j z_{ij1}\right] = 0 \qquad (14)$$

This condition (14) shows that at the optimal allocation, the marginal benefit of allocating one additional unit of product for inspection is equal to the marginal cost. To understand how changes in LP model parameters affect the optimal solution, a sensitivity analysis of several key parameters was then carried out (Więckowski & Sałabun, 2024).

Effects of losses due to defective products δ_j, when losses due to defective products $\boldsymbol{\delta_j}$ increase (Figure 2), observable the following changes in the optimal solution. The optimal effort rate increases as the increase δ_j. This makes sense because the greater the losses due to defective products, the more important it is to increase the probability of defect detection through increased effort. Optimal bonuses increase as the increase of δ_j. This is due to an increase in the optimal effort rate, which requires a greater bonus to meet the IC requirements. Inspection allocation, products with greater defect losses get higher priority in inspection allocation, especially for outsourced personnel with higher capabilities (Lee & Li, 2018).

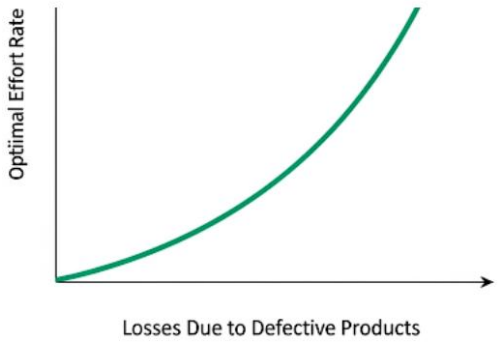

Figure 2. Relationship Between Losses Due to Defective Product and Optimal Effort
Source: Lee & Li, 2018

Overall, increased losses due to defective products cause companies to provide greater incentives for quality checks and allocate more resources to products with higher failure consequences. The effect of marginal costs of effort γ, when the marginal cost of effort γ increases, can be observed in the following changes in the optimal solution. The optimal effort rate decreases as the increase γ (Figure 3). This is due to the intuition that the higher the cost of effort, the lower the optimal level of effort from the perspective of economic efficiency (Dong et al., 2016). The optimal bonus increases per unit of effort, but may decrease overall due to a decrease in the optimal effort rate.

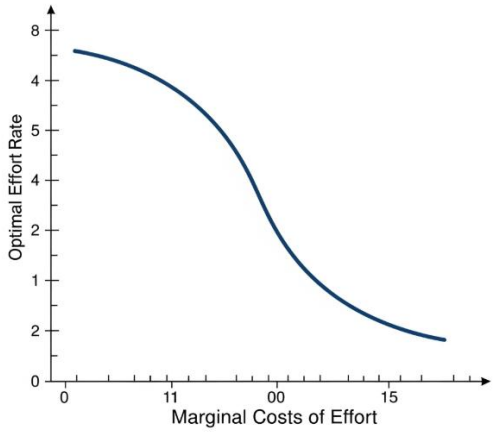

Figure 3. Relationship Between Marginal Costs of Effort and Optimal Effort Rate
Source: Dong et al., 2016

Mathematically:

$$\frac{\partial b_i^*}{\partial \gamma} = \frac{e_i^* + \gamma \frac{\partial e_i^*}{\partial \gamma}}{1 - P_{ij}(0,\theta_i)/P_{ij}(e_i^*,\theta_i)} - \frac{\gamma e_i^* \frac{\partial}{\partial \gamma}(P_{ij}(0,\theta_i)/P_{ij}(e_i^*,\theta_i))}{\left(1 - P_{ij}(0,\theta_i)/P_{ij}(e_i^*,\theta_i)\right)^2} \qquad (15)$$

The sign of this derivative (15) depends on the amount of the decrease in the optimal effort rate relative to the increase in marginal costs. The company's profits decline along with the increase γ, because the company has to pay a larger bonus per unit of effort or receive a lower effort rate, both of which reduce profits. These results show the trade-off between the effort of the examination and the cost of incentives (Monghasemi et al., 2015). If quality checks become more laborious or require more time (higher marginal effort costs), companies need to provide greater incentives per unit of effort but may expect lower effort rates overall.

The influence of sensitivity parameters α and β, parameters α and β determine the sensitivity of the probability of defect detection to the level of effort and type of ability, respectively. The sensitivity analysis to these parameters provides the following insights (Table 1).

When α (sensitivity to effort) increases, optimal effort level e_i^* increases as efforts become more effective in increasing the probability of detection. Bonus optimal b_i^* may decrease due to higher effort effectiveness, even if the effort rate increases. The company's profits increased due to increased effectiveness of efforts in detecting defective products (Porter & Heppelmann, 2015).

When β (sensitivity to capabilities) increases, the difference in the allocation of checks between outsourced personnel with different capabilities becomes more significant.

Companies must be more selective in choosing outsourced personnel for quality inspection tasks, by giving higher priority to outsourced personnel with higher capabilities. The company's profits increase due to the increased effectiveness of the ability to detect defective products (Realyvásquez-Vargas et al., 2018).

Table 1. Sensitivity Analysis

Parameter Change	Impact on Variables	Insight
When sensitivity to effort increases	• Optimal effort level increases. • Optimal bonus may decrease. • Company profit increases.	• Effort becomes more effective at increasing the probability of defect detection. • The higher effectiveness of effort may reduce the bonus needed to meet Incentive Compatibility requirements, even as the effort level rises. • Increased effectiveness in detecting defective products leads to higher profits.
When sensitivity to capabilities increases	• Inspection allocation becomes more significant between personnel with different capabilities. • Companies must be more selective. • Company profit increases.	• A higher sensitivity makes the difference in personnel capabilities more pronounced in defect detection. • Companies should prioritize personnel with higher capabilities for inspection tasks. • The increased effectiveness of capabilities in defect detection leads to higher profits.

Source: Authors' work, 2025

Distribution of outsourced workforce types θ_i has important implications in the design of incentive mechanisms. The results of the analysis show that the variation in capabilities, i.e. when the variation in the capabilities of outsourced personnel increases, the design of incentive mechanisms becomes more complex. Companies need to implement different contract menus for different types of outsourced personnel, which can increase administrative costs (Akkermans et al., 2019). However, companies can also take advantage of this variation by allocating outsourced personnel with higher capabilities to products with higher failure consequences. As the average ability increases, the optimal effort level may decrease because the ability and effort are substitutions in the detection probability function (Kim et al., 2018). The optimal bonus may decrease due to the higher probability of basic (effortless) detection. The company's profits increase due to the increased probability of defect detection.

Based on the analysis of the model above, there are several practical implications for companies in designing incentive mechanisms. The company must design an optimal contract with outsourced personnel that includes a fixed wage component based on the

amount of production and a bonus component based on quality inspection performance (Abdullah et al., 2021). The bonus structure should be adjusted to the cost of the examination effort and the effectiveness of the effort in increasing the probability of defect detection. Companies need to develop verification mechanisms to assess the accuracy of the examination, which may involve sample examination or periodic audits.

Companies must assess the capabilities of outsourcing personnel before assignment, either through tests or probationary periods (Sampson & dos Santos, 2023). Outsourced personnel with higher capabilities should be allocated to inspect products with a higher probability of defects or losses due to greater defects. Companies need to consider investing in training to improve the capabilities of outsourced personnel, especially if the sensitivity parameter to capability (β) is high.

Companies need to develop a monitoring system to assess the accuracy of quality checks, involving sample checks or periodic audits. Timely feedback to outsourcing personnel on their audit performance can help improve accuracy and build trust in the incentive system (Asif, 2022). The Company periodically evaluates and adjusts the parameters of the incentive mechanism based on performance data and changes in the business environment.

Companies need to conduct a cost-benefit analysis to compare the costs of incentive mechanisms with the reduction of losses due to defective products (Coplan, 2017). The trade-off between quality check costs and customer satisfaction needs to be evaluated explicitly. The allocation of resources for quality inspection is optimized based on cost-benefit analysis.

The incentive mechanism designed based on this model also has important implications for outsourced personnel. Outsourcing personnel can increase revenue through quality inspection bonuses, which compensate for additional effort in inspections. A well-designed incentive structure ensures outsourced personnel are fairly rewarded for their extra efforts. Outsourcing personnel have a clear path to increasing revenue through improved skills and inspection capabilities. Outsourced personnel are encouraged to improve quality inspection capabilities, to increase their value to the company. They can learn more efficient inspection techniques to reduce effort costs while maintaining accuracy. The development of expertise in detecting product defects can open up new career opportunities in quality control. Balancing quantity and quality, outsourcing personnel need to balance quantitative production goals (the number of products produced) and qualitative goals (accuracy of quality checks). They need to allocate time and effort optimally between production and inspection to maximize their revenue. A well-designed incentive structure helps align the goals of outsourcing with the company's goals (Kang et al., 2022).

The implementation of effective incentive mechanisms for quality checks has positive implications for customer satisfaction (Zhao et al., 2019). Improved product quality by reducing the number of defective products reaching customers improves customer experience. Improving product quality consistency builds customer trust in the brand. Reduced warranty costs and complaint handling allow companies to offer more competitive prices or improve product features. With increased customer trust, with better product quality, the company can build a reputation for quality and reliability. Increased customer trust can increase customer loyalty and repeat purchases. Companies can gain a competitive advantage in the market through quality differentiation. Customer feedback on product quality can be used to adjust the parameters of the incentive mechanism. Companies can

identify areas for improvement in the inspection process based on customer complaint patterns.

Although the model developed in this study provides valuable insights into the design of incentive mechanisms for outsourcing personnel in product quality inspection, this model has some limitations. The model assumes the company can verify the results of quality checks, which may not always be practical in a real-world setting. The model also assumes that the distribution of outsourced workforce capability types is known, which may be difficult to estimate accurately. The relationship between effort and detection probability is assumed to be linear, which may be a simplification of a more complex relationship. The complexity of practical implementation, the model faces challenges in estimating accurate model parameters, which require historical or experimental data. The design of an effective monitoring system to assess the accuracy of quality checks can be complex and expensive. Communicating the incentive structure to outsourced workers clearly and transparently can be challenging. Dynamic factors, the model does not fully capture the learning and upskilling of outsourced personnel over time. Social dynamics and teamwork among outsourced workers are not considered in the model. Changes in production technology and inspection methods may affect the parameters of the model over time (Chen et al., 2021).

Based on these limitations, several directions for future research. Expand the model to account for learning and temporal dynamics, including how capabilities and costs of effort change over time. Integrate social and psychological factors in incentive design, such as intrinsic motivation, social norms, and peer effects. Develop models for scenarios with more limited information, where the company cannot fully verify the results of quality checks. Next, conduct empirical studies to validate model predictions in real-world settings, including field experiments or case studies. Estimate key model parameters from industry data, including effort cost, detection sensitivity, and capability distribution. Evaluate the effectiveness of different incentive mechanisms in improving product quality and customer satisfaction.

CONCLUSION

This research develops an incentive mechanism model based on Mechanism Design Theory and Linear Programming to encourage outsourcing personnel to conduct honest and optimal product quality inspections. This model is designed by considering two main principles, namely Incentive Compatibility to ensure honesty of reporting, and Individual Rationality to ensure the participation of outsourced personnel. The results of the analysis show that incentives consisting of a combination of basic wages and bonuses based on inspection quality can align the interests of the company and outsourced personnel. The level of optimal product quality inspection efforts increases in line with the increase in losses due to defective products and the effectiveness of efforts, while the allocation of inspections should be given to outsourced personnel with higher capabilities on products at high risk of defects.

This model has some limitations. Assumptions about the company's ability to verify the results of the audit and know the distribution of the capabilities of outsourced personnel may not be realistic in the field. The relationship between effort and detection probability assumed to be linear also simplifies complexity in the real world. In addition, aspects of learning, social dynamics, and examination technology have not been included in the model.

For future development, it is recommended that the study expand the model by taking into account temporal dynamics such as learning and cost changes, as well as integrating social-psychological factors and verification limitations. In the future, it is necessary to conduct empirical research through direct interviews with samples or sources from two parties, namely a minimum of three sourcing personnel and a quality control manager, to validate the effectiveness of the model in real industrial practice.

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