

Beyond Rational Choice: Habit Drives Generation Z's Social Commerce Adoption in the Digital Transformation Era

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Abstract

Social commerce has emerged as a growing element of Indonesia's digital economy, although the psychological drivers behind its adoption among Generation Z remain relatively underexplored. Much of the existing research applies the UTAUT framework within traditional e-commerce contexts, providing limited insight into how socially embedded digital environments influence this generation's adoption behavior. This study investigates the roles of Performance Expectancy, Effort Expectancy, Social Influence, and Habits in shaping Generation Z's Behavioral Intentions toward social commerce. Data were obtained through a quantitative survey involving 151 Generation Z respondents selected using purposive sampling and subsequently analyzed through multiple linear regression with IBM SPSS Statistics 27. The results reveal that only Habits exhibit a significant positive relationship with Behavioral Intentions, whereas Performance Expectancy, Effort Expectancy, and Social Influence show no statistically significant influence. These findings indicate that Generation Z's tendency to engage with social commerce in this context appears to stem primarily from established digital routines rather than deliberate judgments of usefulness, ease, or interpersonal influence.

Keywords:

Social Commerce; UTAUT; Digital Transformation; Gen Z; Behavioral Intention.

1. INTRODUCTION

In this digital era, significant changes have occurred, ranging from the ways people interact and communicate to how they conduct economic transactions. Among the most significant of these changes is the remarkable growth of social commerce, a digital commerce that integrates social interactions, communities, and networks into the buying and selling process (Liang & Turban, 2011). Unlike conventional e-commerce, which is solely transactional, social commerce provides social experiences such as user reviews, recommendations from friends, and User Generated Content / UGC as the core of the purchasing decision-making process (Hajli, 2014). This fundamental difference makes social commerce more than just a technology application, but also a shift in the digital consumption behavior of modern society.

Globally, social commerce growth has been significant. Similarly, Indonesia recorded 3.6% of online shopping revenue from social commerce transactions, and this is expected to continue to increase to 5% by 2028 (Goodstats, 2024). The rapid development of social commerce platforms in Indonesia is marked by the rise of TikTok Shop, Instagram Shopping, and the integration of shopping features into messaging apps. At the domestic level, (Katadata, 2023) noted that the value of social commerce transactions in Indonesia grew by 32% annually, far exceeding the growth of conventional e-commerce, which stood at 18%. This data shows that social commerce in Indonesia has become a part of the daily digital lives of Indonesian consumers.

Digital technology has become deeply woven into the lives of Gen Z, a cohort commonly defined as those born between 1997 and 2012 (Kotler et al., 2021). Within Indonesia's social commerce ecosystem, this generation stands out not only for its frequent platform use but also for its considerable market relevance.

Unlike previous cohorts, Gen Z encountered digital devices and online platforms from an early stage of life, making technology feel less like a specialized tool and more like an unremarkable part of daily existence (Twenge, 2017).

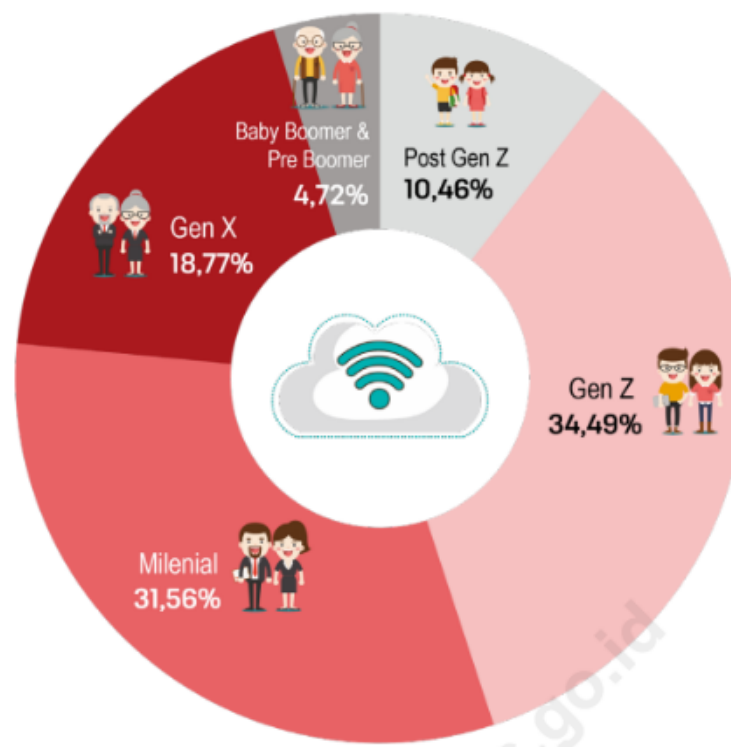


Figure 1. Percentage of Population Accessing the Internet, Source: (BPS, 2024)

Figure 1 shows that in 2024, the largest number of internet users will be from the Gen Z age group, at 34.49%. Next, Millennials will make up 31.56%, Gen X 18.77%, followed by Post Gen Z and Baby Boomers (BPS, 2024). This indicates that Gen Z is not only the largest user base for the digital world, but also the group with the greatest potential to become a key driver of social commerce adoption and growth in Indonesia.

However, being highly immersed in social media does not necessarily mean that Gen Z will readily adopt social commerce. Technology-use intention can arise from a combination of mental appraisal, interpersonal surroundings, and ingrained behavioral patterns, all of which require systematic empirical examination (Venkatesh et al., 2012). Clarifying these drivers matters not only from an academic standpoint but also for social commerce platforms, digital business actors, and policymakers concerned with the development of Indonesia's digital economy.

This study draws upon the UTAUT proposed by Venkatesh et al. (2003). Its use is grounded in the framework's synthesis of eight earlier perspectives on technology acceptance and its reported ability to explain up to 70% of the variation in Behavioral Intention (Venkatesh et al., 2003). Four constructs are brought into the model to reflect both Gen Z's behavioral characteristics and the socially intertwined character of social commerce. Performance Expectancy captures the benefits users anticipate from engaging with social commerce, while Effort Expectancy concerns how effortless the platform is perceived to be. Social Influence refers to the perceived pull exerted by people considered important, whereas Habit describes the tendency to use social commerce almost reflexively once repeated digital behavior has become routine (Limayem et al., 2007; Venkatesh et al., 2003).

The study is motivated by three gaps in the available literature. First, UTAUT-based evidence concerning social commerce adoption among Indonesian Gen Z is still limited. Prior investigations have tended to concentrate on conventional e-commerce (Agrebi & Jallais, 2015) or general social-media behavior, neither of which captures the particular situation in which purchasing activity is intertwined with social interaction. Second, a substantial portion of UTAUT research has been produced in developed-country contexts. Applying such findings wholesale to Indonesia therefore warrants caution, given differences in its socio-cultural conditions and digital ecosystem (Ampornklinkaew, 2025; Hossain & Dwivedi, 2014). Third, despite Habit being theoretically pertinent to the repetitive and increasingly automatic digital practices of Gen Z, its direct placement within social commerce adoption models remains relatively uncommon, although previous technology-use research has identified its explanatory relevance (Limayem et al., 2007; Venkatesh et al., 2012). These three gaps define the empirical territory explored in this study.

A quantitative descriptive-causal survey approach was employed. The study gathered responses from 151 Gen Z participants through an online questionnaire, with respondents selected purposively. The collected data were examined using multiple linear regression in IBM SPSS Statistics 27. When assessed collectively, the four predictors demonstrate a significant relationship with Behavioral Intention. Individually, however, Habit is the only predictor reaching statistical significance and contributes more strongly than the other variables examined. This finding invites reconsideration of whether technology-adoption models centered on conscious and deliberate evaluation can fully describe behavior among digitally immersed users participating in social commerce.

The article is organized into five sections. The first introduces the phenomenon, explains the study rationale, and states the research questions. The second presents the theoretical basis and relevant earlier research. The third details the methodology, covering the research design, population, sampling procedure, measurement, and analytical methods. The fourth reports and discusses the empirical findings in connection with previous literature. The final section consolidates the main findings, addresses their theoretical and practical implications, and points toward potential directions for future research.

1.1. Social Commerce: Definition, Characteristics, and Development

Social commerce can be viewed as the next stage of online commerce, where the networking and interactional functions of social media are repurposed to support commercial activity. Liang and Turban (2011) describe it as a branch of electronic commerce in which social-networking facilities are embedded to foster interpersonal interaction alongside the exchange of products and services. Its distinction from conventional e-commerce lies in the prominence given to the social layer of the purchasing process. Reviews, peer recommendations, and user-generated content become influential sources through which consumers develop trust and shape their buying choices (Hajli, 2014).

Social commerce can be distinguished through four main features: ratings and reviews, recommendations and referrals, forums and communities, and social shopping (Liang & Turban, 2011). These features shift purchasing away from a seller-centered flow of information toward a more participatory setting, where consumers can incorporate the experiences and judgments of other users into their own decisions. In Indonesia, this pattern is gaining momentum as Gen Z and younger millennials become increasingly prominent in the digital marketplace. Their purchasing journeys often begin with product discovery on mobile platforms, continue through spontaneous buying, and are shaped by recommendations circulating across their online networks.

1.2. Unified Theory of Acceptance and Use of Technology

Venkatesh et al. (2003) introduced UTAUT as a synthesis of eight prominent approaches to technology acceptance: Theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behavior, Combined TAM and TPB, Model of PC Utilization, Innovation Diffusion Theory, and Social Cognitive Theory. Instead of examining these approaches as separate explanations, the authors distilled their most consequential elements into a single framework intended to strengthen the prediction of technology-related behavior. The resulting model was reported to explain up to 70% of the variance in Behavioral Intention (Venkatesh et al., 2003).

At its inception, UTAUT revolved around four core determinants: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Their effects were further shaped by gender, age, experience, and voluntariness of use. Venkatesh et al. (2012) subsequently adapted the framework to consumer technology contexts through UTAUT2, adding Hedonic Motivation, Price Value, and Habit as three additional dimensions. With this extension, the reported explanatory power for Behavioral Intention rose from 56% to 74% (Venkatesh et al., 2012).

This study adopts four constructs spanning UTAUT and UTAUT2: Performance Expectancy, Effort Expectancy, Social Influence, and Habit. Their selection corresponds to the behavioral tendencies associated with Gen Z, the inherently social character of digitally mediated commerce, and gaps that remain visible in prior studies. These four constructs are therefore used as the principal explanatory dimensions for examining Behavioral Intention toward social commerce in the population investigated.

1.3. Performance Expectancy and Behavioral Intention

Performance Expectancy (PE) describes the extent to which users foresee a technology as capable of yielding tangible benefits, improving effectiveness, and making routine activities more productive (Venkatesh et al., 2003). The notion is not confined to a single technology-acceptance theory; it echoes perceived usefulness in TAM (Davis & Granić, 2024), extrinsic motivation within the Motivational Model, job-fit in the Model of PC Utilization, relative advantage in Innovation Diffusion Theory, and outcome expectations in Social Cognitive Theory (Bandura, 2023). In a social-commerce setting, PE concerns Gen Z consumers' expectations that socially connected purchasing platforms can bring practical gains, including faster product discovery, less time spent shopping, and a more satisfying experience than conventional purchasing routes.

Evidence from various technology contexts has frequently linked PE with Behavioral Intention. For example, research involving Indonesian Gen Z users of online travel platforms found that PE contributes

significantly to trust and purchasing decisions (Octaviani et al., 2023). Whether this pattern persists in social commerce, however, still requires empirical verification, as Gen Z purchasing behavior may be driven by considerations that go beyond a simple calculation of functional usefulness (Gupta et al., 2020). Accordingly, the first hypothesis is formulated as follows:

H1: Performance Expectancy positively and significantly impacts Generation Z's Behavioral Intention to adopt social commerce.

1.4. Effort Expectancy and Behavioral Intention

Effort Expectancy (EE) reflects the degree of ease that users anticipate when interacting with a technological system, particularly the extent to which its use is expected to demand little mental or operational strain (Venkatesh et al., 2003). The construct is rooted in the perceived ease-of-use notion developed within TAM. In the realm of social commerce, EE concerns how readily Gen Z users can grasp an interface, move through its features, and handle the platform while completing online purchasing activities (Venkatesh et al., 2003).

Within the original UTAUT model, Venkatesh et al. (2003) positioned EE as a factor expected to meaningfully shape Behavioral Intention. Its influence, however, may be more conspicuous during the early stages of technology exposure, when users are still learning how a system works, and may diminish as repeated interaction turns unfamiliar operations into routine behavior. This consideration is particularly relevant to Gen Z, whose daily exposure to digital devices exceeds six hours on average (BPS, 2024). Even so, recent studies have documented a positive and statistically significant association between Effort Expectancy and Behavioral Intention (Hendrajaya et al., 2024; Makarim & Wahyudi, 2025). Accordingly, the second hypothesis is formulated as follows:

H2: Effort Expectancy positively and significantly impacts Generation Z's Behavioral Intention to adopt social commerce.

1.5. Social Influence and Behavioral Intention

Social Influence (SI) refers to the extent to which users perceive that people who matter to them—such as family, friends, or individuals they admire—regard the adoption of a particular technology as sensible or desirable (Venkatesh et al., 2003). Its relevance becomes especially apparent in social commerce, where technological use is inseparable from social interaction. Recommendations, consumer reviews, and purchasing behavior that users observe within their surrounding networks may function as subtle social signals, potentially steering their decision to engage with these platforms.

Gen Z is frequently portrayed as a cohort whose choices are strongly colored by personal values and whose decision-making may be more selective than that of earlier generations (Francis & Hoefel, 2018). Such characteristics, however, do not necessarily render social influence irrelevant. Empirical research across different settings continues to document its association with Behavioral Intention. Evidence within social commerce also points toward a positive and significant relationship. Refsi and Soma (2025), for instance, found that social influence significantly and positively affected adoption intention among respondents in Greater Bandung, while Ibrahim (2025) reported a similar significant role of social influence in determining Behavioral Intention among TikTok users. Based on these considerations, the third hypothesis is formulated as follows:

H3: Social Influence positively and significantly affects Generation Z's Behavioral Intention to engage in social commerce.

1.6. Habit and Behavioral Intention

Habit (HB) describes a behavioral tendency that develops through repeated learning and eventually enables an action to be carried out with little or no deliberate thought (Venkatesh et al., 2012). This distinguishes Habit from the preceding constructs, which primarily represent conscious judgments about the usefulness, ease, or social acceptability of a technology. Once a particular behavior becomes deeply routinized, its execution can shift from intentional decision-making toward automatic enactment. Consequently, Habit may either reinforce or constrain Behavioral Intention and, under sufficiently established routines, may exert greater behavioral force than deliberate cognitive appraisal (Limayem et al., 2007). Within social commerce, HB therefore represents the degree to which purchasing through social platforms has become an embedded part of Gen Z's everyday digital routine, occurring almost instinctively rather than through extensive deliberation.

This construct holds particular significance for Gen Z given their persistent and intensive immersion in social media, where repeated exposure may gradually erode the distinction between simply consuming digital content and moving toward actual purchasing behavior (Huwaita et al., 2024). Evidence from TikTok Shop further shows that Habit is positively and significantly associated with Behavioral Intention (Pradita et al., 2025). Consistent with this pattern, Zheng et al. (2025) found Habit to be the most influential antecedent of Behavioral Intention. On the basis of these findings, the fourth hypothesis is formulated as follows:

H4: Habit positively and significantly affects Generation Z's Behavioral Intention to adopt social commerce.

1.7. Research Conceptual Framework

The conceptual model developed in this study is grounded in UTAUT (Venkatesh et al., 2003) and its consumer-oriented extension, UTAUT2 (Venkatesh et al., 2012). Four factors are placed on the explanatory side of the model: Performance Expectancy (H1), Effort Expectancy (H2), Social Influence (H3), and Habit (H4). All four are directed toward one focal outcome, namely the Behavioral Intention of Indonesian Generation Z to participate in social commerce. The proposed links are interpreted within the inherently social character of digitally mediated commerce while also considering behavioral tendencies that distinguish the Gen Z population.

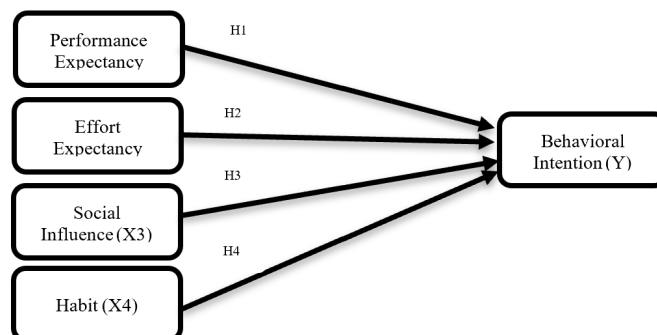


Figure. Theoretical Framework (Source: Data Processed, 2026)

2. RESEARCH METHOD

2.1. Types of research

This study follows a quantitative route, employing a descriptive-causal survey to capture not merely whether relationships exist, but also their direction and strength between the proposed predictors and Behavioral Intention. Quantitative inquiry is used so that each relationship can be translated into measurable indicators and examined through statistical procedures. Such an approach enables the findings to be interpreted in an objective manner and, within the limits of the selected sample, provides a basis for extending the findings to the broader population (Creswell, 2014). Philosophically, the study is anchored in positivism, which regards social phenomena as realities that can be observed, measured, and empirically scrutinized. Knowledge is therefore constructed through systematic measurement, statistical analysis, and the testing of predetermined hypotheses (Sekaran & Bougie, 2016).

The causal orientation is adopted to investigate the theoretically anticipated links between Performance Expectancy, Effort Expectancy, Social Influence, Habit, and Behavioral Intention, as formulated within the UTAUT framework. The study proceeds deductively: theoretical propositions derived from UTAUT are established first and then brought into confrontation with evidence gathered from respondents in the field.

2.2. Research Location and Time

The empirical work was carried out in Central Java Province, with Google Forms serving as the channel through which the online questionnaire was administered. Considering that the target population consists of Gen Z, an online survey was regarded as a practical approach that aligns with the group's familiarity with digital-based activities (Sugiyono, 2013).

Questionnaire distribution took place between September 2025 and February 2026. This timeframe was deliberately selected to avoid extended holiday periods, thereby allowing respondents to remain within their ordinary day-to-day digital patterns. As a result, the responses were expected to portray social commerce behavior under relatively routine conditions rather than behavior influenced by atypical holiday circumstances.

2.3. Population and Sample

The target population comprises individuals classified as Generation Z, specifically those born from 1997 to 2012 (Kotler et al., 2021), who have engaged with or completed a transaction through a social commerce platform at least once during the preceding three months. This cohort was selected because Gen Z constitutes the largest share of internet users in Indonesia, accounting for 34.49% of users (BPS, 2024). Its intensive presence within the country's social commerce environment further makes this population pertinent for examining technology-adoption behavior in such settings.

Participants were recruited through purposive sampling, a non-probability procedure in which inclusion is determined according to predefined characteristics relevant to the research objectives (Sekaran & Bougie, 2016). Eligibility was restricted to individuals satisfying three conditions: (1) birth between 1997 and 2012, corresponding to the Gen Z classification; (2) possession of an active account on at least one social commerce service, including TikTok Shop, Instagram Shopping, or comparable platforms; and (3) experience of either

purchasing through social commerce or engaging with commercial content on such platforms within the previous three months.

The required number of observations was established using the 10:1 sample-to-indicator guideline proposed by Hair et al. (2014). Since the research instrument contains 17 final statement items distributed across five constructs, the resulting minimum requirement was 150 respondents. A total of 151 eligible responses were ultimately obtained, thereby exceeding the stipulated minimum. In addition, the sample falls within the 30–500 respondent interval recommended by Roscoe (1975) for multivariate research.

2.4. Data Collection Technique

Primary data in this study came directly from the respondents through an online questionnaire. Each item was answered on a five-point Likert scale, ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). The scale was used to turn respondents’ perceptions and attitudes into uniform numerical observations, making the resulting data amenable to statistical processing.

The questionnaire items were adapted from established instruments developed by Venkatesh et al. (2003, 2012) and Limayem et al. (2007). Their original measures were reshaped to fit the social-commerce context and rendered into Indonesian to match the research setting. Before the main data collection took place, a preliminary trial was carried out with 30 respondents to examine the instrument’s initial suitability.

Table 1. Definition and Operationalization

Variables	Operationalization	Indicator	Instrument
Performance Expectancy (PE)	The level of individual belief that the use of social commerce provides real benefits in increasing the effectiveness of their shopping activities	Effectiveness Efficiency Real Benefits	Venkatesh et al. (2003), adapted
Effort Expectancy (EE)	The degree of ease associated with the use of social commerce platforms as perceived by the individual.	Ease of use Ease of learning Clarity of interaction Ease of becoming skillful	Venkatesh et al. (2003), adapted
Social Influence (SI)	The extent to which an individual perceives that important others believe he or she should use social commerce.	Influence of significant others Influence of others' opinions	Venkatesh et al. (2003), adapted
Habit (HB)	An individual's tendency to use social commerce automatically as a result of an established digital routine.	Usage routine Formed habit Automaticity Periodic checking	Venkatesh et al. (2012); Limayem et al. (2007), adapted
Behavioral Intention (BI)	The strength of an individual's intention to use social commerce in the future.	Intention to continue using Intention to increase usage Intention to recommend Usage commitment	Venkatesh et al. (2003; 2012), adapted

2.5. Data Analysis Techniques

All statistical processing was performed in IBM SPSS Statistics 27. The analysis followed a three-stage sequence, beginning with the examination of the measurement instrument, followed by diagnostic checks of the regression assumptions, and ending with multiple linear regression.

Questionnaire quality was first checked by means of the Pearson Product Moment correlation. An item was judged acceptable when its computed correlation coefficient surpassed the critical *r*-table value at $\alpha = 0.05$, namely 0.312 for $n = 40$. Reliability was then inspected through Cronbach’s Alpha, where a coefficient of 0.70 or higher was treated as evidence of adequate internal consistency (Nunnally, 1978). All 17 items retained for the final instrument exceeded the prescribed *r*-table threshold, while the overall Cronbach’s Alpha reached 0.877. Thus, the instrument met the required validity and reliability criteria.

Before the regression estimation was carried out, the dataset was subjected to three assumption checks. The K-S test was used for normality, with residuals regarded as normally distributed when the Asymp. Sig.

value was greater than 0.05. Multicollinearity was inspected using the VIF, where a value below 10 indicated the absence of substantial collinearity among the predictors. Homoscedasticity was assessed by observing a scatterplot of standardized residuals; a point cloud that spread randomly without forming a recognizable pattern was taken as evidence that the assumption was met.

Multiple linear regression was then fitted to determine whether the four independent variables were associated with the dependent variable, both when considered together and when examined separately. The regression model applied in this study is expressed as follows:

$$BI = \alpha + \beta_1PE + \beta_2EE + \beta_3SI + \beta_4HB + \varepsilon$$

Information: BI = Behavioral Intention;

α = konstanta;

β_1 – β_4 = regression coefficient of each independent variable;

PE = Performance Expectancy;

EE = Effort Expectancy;

SI = Social Influence;

HB = Habit;

ε = error term.

The closing phase of the analysis was devoted to determining whether the proposed hypotheses were supported by the statistical evidence. An individual effect was examined through the partial t-test, which assessed the contribution of each predictor to the dependent variable while considering the predictors separately. An independent variable was interpreted as having a statistically significant effect when its t-count was greater than the t-table benchmark of 1.976 and its significance value fell below 0.05. The analysis also incorporated the R^2 , which was used to quantify the proportion of variation in the dependent variable that could be jointly explained by the independent variables included in the regression model.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Respondent Characteristics

A total of 151 individuals participated in the survey, with every participant satisfying the predetermined requirements for purposive selection. Their demographic characteristics and distribution are summarized in Tables 2 and 3.

Table 2. Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	36	23,84
Female	115	76,16
Total	151	100

Source: Processed primary data, 2026

Table 3. Distribution of Respondents by Age

Age (Years)	Frequency	Percentage (%)
18	31	20,53
19	78	51,66
20	26	17,22
21	10	6,62
22	3	1,99
23	2	1,32
24	1	0,66
Total	151	100

Source: Processed primary data, 2026

The respondent profile in Table 2 is predominantly female, comprising 115 participants (76.16%), whereas 36 participants (23.84%) were male. This gender composition is in line with findings reported by Agrebi and Jallais (2015), which indicate that women generally show greater involvement in online purchasing, including transactions conducted through social commerce platforms.

Age distribution in Table 3 reveals a clear concentration among younger respondents. Participants aged 19 constituted the largest segment, with 78 individuals (51.66%), followed by those aged 18 at 31 individuals (20.53%) and aged 20 at 26 individuals (17.22%). Taken together, respondents between 18 and 20 years old accounted for 89.41% of the sample. This concentration represents Gen Z individuals who are moving into the

emerging-adulthood stage, a period associated with intensive engagement in social media and other digital activities (Arnett, 2000).

3.1.2. Validity and Reliability Test Results

Validity screening was carried out on responses obtained from 30 participants in the preliminary trial, using the Pearson Product Moment correlation technique. With α fixed at 0.05 and $n = 30$, the comparison point was an r -table value of 0.312. As shown in Table 4, the calculated correlation for each of the 17 retained statements was higher than the specified r -table benchmark. Accordingly, all 17 items cleared the required validity threshold.

Table 4. Results of Instrument Validity Test

Variable	Item Code	r-count	r-table	Description
Performance Expectancy	PE01	0,504	0,312	Valid
	PE02	0,582	0,312	Valid
	PE03	0,478	0,312	Valid
Effort Expectancy	EE01	0,322	0,312	Valid
	EE02	0,334	0,312	Valid
	EE03	0,576	0,312	Valid
	EE04	0,600	0,312	Valid
Social Influence	SI01	0,408	0,312	Valid
	SI02	0,312	0,312	Valid
Habit	HB01	0,593	0,312	Valid
	HB02	0,762	0,312	Valid
	HB03	0,738	0,312	Valid
	HB04	0,581	0,312	Valid
Behavioral Intention	BI01	0,584	0,312	Valid
	BI02	0,707	0,312	Valid
	BI03	0,609	0,312	Valid
	BI04	0,667	0,312	Valid

Source: Processed primary data, 2026

The questionnaire produced a Cronbach's Alpha of 0.877 when all items were evaluated together. This coefficient exceeds the 0.70 threshold recommended by Nunnally (1978) by a clear margin. The magnitude of the coefficient suggests that the items operate with strong internal consistency, supporting the use of the questionnaire as a reliable instrument for capturing the constructs investigated in this study.

3.1.3. Classical Assumption Test Results

3.1.3.1. Normality Test

Table 5. Results of the Kolmogorov-Smirnov Normality Test

Information	Value
N	151
Test Statistic	0,048
Asymp. Sig. (2-tailed)	0,2
Monte Carlo Sig.	0,538

Source: Processed primary data, 2026

The Kolmogorov-Smirnov test produced an Asymp. Sig. value of 0.200, exceeding the 0.05 cutoff. This result provides no indication of a significant non-normal pattern in the residuals. Therefore, the residual distribution can be regarded as normal, meaning that the regression model meets the normality assumption.

3.1.3.2. Multicollinearity Test

Table 6. Multicollinearity Test Results

Variable	Tolerance	VIF	Description
Performance Expectancy	0,361	2,767	There is no multicollinearity
Effort Expectancy	0,402	2,487	There is no multicollinearity
Social Influence	0,619	1,616	There is no multicollinearity
Habit	0,613	1,631	There is no multicollinearity

Source: Output SPSS 27, Procces 2026

Across all explanatory variables, the VIF coefficients remain under 10, while their corresponding Tolerance values exceed 0.10. This pattern indicates that the predictors are sufficiently distinct from one another and that the regression model is not affected by any substantial multicollinearity concern.

3.1.3.3. Heteroscedasticity Test

Heteroscedasticity was assessed by inspecting a scatterplot that juxtaposed the standardized residuals with the standardized predicted values. The resulting plot displayed no discernible or recurring pattern, with the observations dispersed irregularly on both sides of the zero line along the Y-axis. Such a distribution suggests that the residual variance remains relatively constant, indicating that the model does not exhibit a heteroscedasticity problem.

Taken together, the three diagnostic checks confirmed that the required classical assumptions were satisfied. The multiple linear regression model could therefore be considered appropriate for proceeding to the hypothesis-testing stage.

3.1.3.4. Results of Multiple Linear Regression Analysis and Hypothesis Testing

Table 7 serves as a compact overview of the multiple linear regression results. It assembles the R^2 alongside the t-test outcomes in one place, providing a consolidated view of the main statistical findings.

Variable	Koefisien (B)	Std. Error	Beta (β)	t-Count	Sig.	Description
Konstanta	3,283	0,959	—	3,422	0,001	—
Performance Expectancy	0,186	0,125	0,138	1,49	0,138	Not Significant
Effort Expectancy	0,004	0,079	0,004	0,048	0,962	Not Significant
Social Influence	0,181	0,13	0,099	1,394	0,165	Not Significant
Habit	0,509	0,061	0,591	8,313	0	Significant
R = 0,740	R Square = 0,547	Adjusted R Square = 0,535				
F-hitung = 44,107	Sig. F = 0,000	F-tabel = 2,432	t-tabel = 1,976			

Sources: Output SPSS 27, diolah 2025

The coefficients reported in Table 7 yield the following multiple linear regression specification:

$$BI = 3,283 + 0,186 PE + 0,004 EE + 0,181 SI + 0,509 HB + \varepsilon$$

3.2. Discussion

3.2.1. The Impact of Performance Expectancy on Behavioral Intention

For Performance Expectancy, the regression coefficient is $\beta = 0.186$, accompanied by a t-count of 1.490 and $p = 0.138$. The t-statistic falls short of the 1.976 t-table benchmark, and the corresponding p-value also exceeds the 0.05 threshold. The statistical evidence therefore does not substantiate H1. Hence, H1 is rejected, indicating that Performance Expectancy has no statistically significant partial effect on Gen Z's Behavioral Intention to use social commerce.

One possible explanation lies in the digital environment in which Gen Z has developed. As a cohort commonly characterized as digital natives, Gen Z has grown up alongside an already mature technological ecosystem (Kotler et al., 2021). Consequently, technological speed, convenience, and productivity support may no longer be perceived as exceptional advantages. Instead, such attributes can function as basic conditions that users simply expect from contemporary digital services. Even when a platform demonstrates useful capabilities for instance, supporting the expansion of professional networks Gen Z may still gravitate toward platforms that resonate more strongly with current trends and their surrounding communities. From this perspective, functional gains such as efficiency and speed appear to have shifted from being active sources of motivation toward becoming hygiene factors that are largely taken for granted.

The outcome observed here does not fully echo the pattern reported in several preceding studies, where Performance Expectancy was found to matter. Refsi and Soma (2025), for instance, investigated UTAUT-based service use among Gen Z and identified Performance Expectancy as a significant behavioral determinant, although its influence was transmitted through Behavioral Intention. In another context, Kiran and Sailaja (2025), through their study in India published in *Humanities and Social Sciences Communications*, found that Performance Expectancy, Effort Expectancy, and Social Influence jointly contributed positively and significantly to Behavioral Intention in UPI adoption. Makarim and Wahyudi (2025) also observed significant positive effects of both Performance Expectancy and Effort Expectancy on Behavioral Intention within e-commerce adoption.

A different strand of evidence, however, sits closer to the present result. Ibrahim (2025) reported that Performance Expectancy did not produce a significant direct relationship with Behavioral Intention, despite showing a positive association with user satisfaction. Pradita et al. (2025) reached a similar conclusion in their UTAUT2 study of Gen Z TikTok Shop users, where Performance Expectancy was unable to significantly account for Behavioral Intention. Findings pointing in the same direction were likewise reported by Wibowo et al. (2019) and Hendrajaya et al. (2024).

3.2.2. The Impact of Effort Expectancy on Behavioral Intention

Effort Expectancy contributes virtually no detectable variation to the regression outcome. Its unstandardized coefficient stands at $\beta = 0.004$, with a Standardized Beta of 0.004, t-count of 0.048, and $p = 0.962$. The near-zero coefficient is accompanied by a p-value far beyond the 0.05 criterion, while its absolute coefficient magnitude is the smallest among all predictors in the model. Moreover, the obtained t-value is substantially lower than the 1.976 t-table reference. On this basis, H2 is rejected, indicating that perceived ease of use does not provide a statistically significant explanation for Gen Z's Behavioral Intention to adopt social commerce.

This result may be understood from the technological environment surrounding Gen Z. Having grown up amid rapid digital development, this generation is generally accustomed to navigating technological systems with relatively little difficulty and possesses a high degree of digital familiarity. At the same time, contemporary application design has become increasingly standardized: gestures such as swiping and scrolling, together with clean and intuitive user interfaces, are now commonplace. As a result, users may enter a digital platform with the prior expectation that it should already be easy to operate. When this condition is routinely fulfilled, ease of use loses much of its ability to distinguish one platform from another, while users' attention may migrate toward other considerations when forming adoption intentions.

The present evidence sits at odds with a number of earlier reports. Wardani and Masdiantini (2022), for example, identified Effort Expectancy as a significant determinant of Behavioral Intention. A similar positive and significant contribution was documented by Kiran and Sailaja (2025) in the context of digital payment services in India and by Makarim and Wahyudi (2025) in Indonesia. Such differences imply that the role of perceived ease may not be uniform across settings, potentially shifting with the type of technology involved, the characteristics of its users, and how accustomed they are to digital systems, as suggested by Ampornklinkaew (2025).

Yet, the current result also finds support in research from comparable settings. Ibrahim (2025) found that Effort Expectancy, alongside Performance Expectancy, did not exert a significant direct effect on Behavioral Intention among Indonesian TikTok users. Pradita et al. (2025) reported the same lack of significance among Gen Z TikTok Shop users. Hendrajaya et al. (2024) likewise found that Effort Expectancy did not significantly affect Behavioral Intention in the Indonesian social commerce setting.

3.2.3. The Impact of Social Influence on Behavioral Intention

Social Influence yielded an unstandardized coefficient of $\beta = 0.181$ and a Standardized Beta of 0.099, accompanied by a t-count of 1.394 and $p = 0.165$. Neither statistical indicator reaches the required threshold: the p-value remains above 0.05, while the t-statistic falls short of the 1.976 t-table reference. The evidence therefore does not substantiate H3. Consequently, H3 is rejected, indicating that Social Influence does not make a statistically significant partial contribution to Gen Z's Behavioral Intention to use social commerce.

A possible explanation for this pattern can be traced to Gen Z's relatively autonomous manner of dealing with digital technology. As a cohort continuously surrounded by internet-connected devices, Gen Z can remain engaged with digital content even while participating in social settings, potentially reducing the weight given to immediate social cues (Kotler et al., 2021). Rather than accepting a recommendation simply because it is widely circulated within their social circle, many users may independently inspect reviews and other available information before forming a judgment. In this sense, social persuasion is not necessarily dismissed, but is subjected to personal scrutiny before it becomes a basis for digital decision-making. Their adoption choices may therefore reflect individual verification more strongly than conventional peer pressure.

The finding obtained in this study does not mirror the evidence reported in several earlier works that placed Social Influence as an important driver of Behavioral Intention. In their structural-equation-modeling meta-analysis, Dwivedi et al. (2023) repeatedly identified Social Influence as one of the major factors linked to social commerce adoption. Sadiq et al. (2025) similarly documented a positive and significant association between Social Influence and Behavioral Intention within social commerce. Evidence from Indonesia also points in that direction, with Hendrajaya et al. (2024) reporting a positive and significant effect of Social Influence on users' intention to adopt social commerce. The divergence may indicate that the influence of social cues is context-dependent, with its role potentially shifting alongside respondent characteristics, technological familiarity, and the social surroundings in which technology is used.

However, the present nonsignificant outcome is not without precedent. Pradita et al. (2025) found that Social Influence did not significantly account for Behavioral Intention, while Hendrajaya et al. (2024) also reported a nonsignificant result in their analysis. Francis and Hoefel (2018) describe Gen Z as a generation that tends to filter conventional social pressures more selectively and critically than earlier cohorts. Such a

characteristic may help contextualize why signals originating from other people did not emerge as a statistically significant determinant of Behavioral Intention in this study.

3.2.4. The Impact of Habit on Behavioral Intention

The four predictors tested, Habit stands apart as the most pronounced statistical contributor to Behavioral Intention. It recorded an unstandardized coefficient of $\beta = 0.509$, a Standardized Beta of 0.591, a t-count of 8.313, and $p = 0.000$ ($p < 0.001$). With 0.591 being the largest Standardized Beta in the regression model, Habit represents the strongest predictor among the variables examined. The statistical evidence meets the required significance criterion; therefore, H4 is accepted. In other words, Habit exerts a positive and statistically significant effect on Gen Z's Behavioral Intention to use social commerce.

The strong position of Habit can be viewed against the backdrop of Gen Z's everyday entanglement with digital technology. This cohort generally interacts with technology in a practical, routine-oriented manner and maintains intensive connectivity through digital devices (Kotler et al., 2021). A simple cue—such as a smartphone notification or a moment of boredom—may be enough to prompt users to open an already familiar application without consciously weighing the decision. Through repetition, an action that initially requires deliberate choice can become increasingly automatic, reinforcing the intention to continue using the technology (Limayem et al., 2007). The size of the Habit coefficient consequently points toward a cue-oriented pattern of social commerce engagement among Gen Z, in which ordinary digital routines and passive content exposure can spill into transactional intentions with relatively little deliberate evaluation.

Nevertheless, this result does not coincide with every previous finding. Putra et al. (2025), for example, reported that Habit did not significantly affect Behavioral Intention. Their findings suggested that repeated exposure to the same system or treatment did not necessarily translate into stronger intention to continue using it.

The present result finds considerable resonance with several earlier investigations. Nasution et al. (2024), in their study titled “Effect of Social Influence and Habit,” found that Habit exerted a positive and significant influence. A significant effect was likewise reported by Sadiq et al. (2025) within the social commerce domain. Of particular relevance, Pradita et al. (2025) employed the UTAUT2 framework and found Habit to be the strongest predictor, while Performance Expectancy, Effort Expectancy, and Social Influence failed to reach statistical significance. This configuration closely parallels the pattern observed in the present study. The interpretation is further supported by UTAUT2 as formulated by Venkatesh et al. (2012), where Habit is conceptualized as a factor that can feed directly into Behavioral Intention as repeated actions gradually become established behavioral patterns.

4. CONCLUSION

This study drew on the UTAUT/UTAUT2 lens to investigate the relationship of Performance Expectancy, Effort Expectancy, Social Influence, and Habit with Gen Z's Behavioral Intention toward social commerce in Indonesia. The results reveal a marked separation among the four predictors. Performance Expectancy, Effort Expectancy, and Social Influence did not reach statistical significance. For users who have grown up surrounded by digital technology, usefulness and ease of operation may already be taken for granted, leaving little room for these attributes to become active triggers of adoption. Social cues appear similarly restrained: peer influence and familiar recommendation patterns may have limited leverage because Gen Z users often exercise personal judgment and cross-check information before making digital choices.

Habit tells a different story. It emerged as a positive and statistically significant predictor, recording a Standardized Beta of 0.591 with $p < 0.001$, and thus represented the most prominent predictor in the model. Taken together, the findings suggest that Gen Z's engagement with social commerce is more tightly intertwined with repeated digital routines and cue-triggered actions than with deliberate, conscious appraisal of the technology.

The findings also open several implications. From a theoretical standpoint, they raise questions about whether conventional rational-oriented technology acceptance explanations remain sufficient for populations that have grown up within highly developed digital environments. Greater attention may therefore be warranted for constructs involving behavioral automaticity, routine formation, and situational cues. From a practical and managerial perspective, social commerce providers may need to move beyond simply presenting a platform as useful or easy to operate. User experiences could instead be structured around mechanisms that reinforce recurring engagement, including daily check-in rewards, algorithmically tailored feeds, and gamified interaction cues capable of carrying users gradually from passive content browsing toward commercial activity. For policy stakeholders, particularly the Ministry of Communication and Digital, the strong role of habitual behavior also points to the relevance of incorporating awareness of digital consumption patterns into national digital-literacy initiatives. Such efforts could help younger consumers identify and regulate automated purchasing tendencies while supporting a healthier digital economy.

Several caveats need to be kept in view. The first concerns the uneven age distribution of the respondents: 72.19% fall within the 18–19 age bracket, leaving Gen Z participants aged 20–24 comparatively

underrepresented. A future study could counter this skew by applying stratified sampling across a broader span of the Gen Z cohort. The second issue relates to the nature of Habit itself. Habit develops through repeated exposure and use, yet the cross-sectional design adopted here captures Behavioral Intention only at a single moment. Following respondents over time through a longitudinal approach would offer a clearer picture of how digital routines take shape, become ingrained, and endure.

Another constraint is the model's relatively narrow scope, which centers on four main constructs. Further work could bring additional influences into the picture, including perceived trust, influencer credibility, hedonic motivation, perceived risk, and AI-driven personalization. Lastly, placing Gen Z alongside Millennials and Gen X in a comparative design could reveal whether the prominence of Habit over more rational considerations is a distinctive feature of digital-native users or part of a broader shift in how consumers behave in digital environments.

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REFERENCES

- Agrebi, S., & Jallais, J. (2015). Explain the intention to use smartphones for mobile shopping. *Journal of Retailing and Consumer Services*, 22, 16–23. <https://doi.org/10.1016/j.jretconser.2014.09.003>
- Ampornklinkaew, C. (2025). The role of social media influencers in influencing consumers' imitation intentions. *Digital Business*, 5(2), 100143. <https://doi.org/10.1016/j.digbus.2025.100143>
- Bandura, A. (2023). *Social Cognitive Theory: An Agentic Perspective on Human Nature*. John Willey & Sons, Inc.
- BPS. (2024). *Statistik Telekomunikasi Indonesia*.
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). SAGE Publications.
- Davis, F. D., & Granić, A. (2024). *The Technology Acceptance Model*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-45274-2>
- Dwivedi, Y. K., Ismagilova, E., Sarker, P., Jeyaraj, A., Jadhav, Y., & Hughes, L. (2023). A Meta-Analytic Structural Equation Model for Understanding Social Commerce Adoption. *Information Systems Frontiers*, 25(4), 1421–1437. <https://doi.org/10.1007/s10796-021-10172-2>
- Francis, T., & Hoefel, F. (2018). 'True Gen': Generation Z and its implications for companies.
- Goodstats. (2024). *Tren Social Commerce Makin Populer, Masyarakat Kini Hobi Belanja di Media Sosial*.
- Gupta, A., Yousaf, A., & Mishra, A. (2020). How pre-adoption expectancies shape post-adoption continuance intentions: An extended expectation-confirmation model. *International Journal of Information Management*, 52, 102094. <https://doi.org/10.1016/j.ijinfomgt.2020.102094>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson Education.
- Hajli, M. N. (2014). A study of the impact of social media on consumers. *International Journal of Market Research*, 56(3), 387–404. <https://doi.org/10.2501/IJMR-2014-025>
- Hendrajaya, C. T., Brahmasari, I. A., & Ratih, I. A. B. (2024). The influence of effort expectancy, performance expectancy, and social influence on perceived risk, behavioral intention, and actual use moderated by user trust in social commerce in Indonesia. *Edelweiss Applied Science and Technology*, 8(6), 4683–4699. <https://doi.org/10.55214/25768484.v8i6.3017>

- Hossain, M. A., & Dwivedi, Y. K. (2014). What improves citizens' privacy perceptions toward RFID technology? A cross-country investigation using mixed method approach. *International Journal of Information Management*, 34(6), 711–719. <https://doi.org/10.1016/j.ijinfomgt.2014.07.002>
- Huwaida, L. A., Yusuf, A., Satria, A. N., Darmawan, M. A., Ammar, M. F., Yanuar, M. W., Hidayanto, A. N., & Yaiprasert, C. (2024). Generation Z and Indonesian Social Commerce: Unraveling key drivers of their shopping decisions. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(2), 100256. <https://doi.org/10.1016/j.joitmc.2024.100256>
- Ibrahim, I. (2025). Determinasi User Satisfaction dan Behavioral Intention Pengguna TikTok: Perspektif UTAUT. *Indonesian Journal of Digital. Indonesian Journal of Digital Business*. <https://ejournal.upi.edu/index.php/IJDB/article/view/95077>
- Katadata. (2023). *Perilaku Konsumen E-commerce Indonesia 2023*.
- Kiran, K. P., & Sailaja, V. N. (2025). Exploring behavioral intentions of consumers towards different digital payment services through the interplay of perceived risks and adoption factors. *Humanities and Social Sciences Communications*, 12(1), 1141. <https://doi.org/10.1057/s41599-025-05468-6>
- Kotler, P., Kartajaya, H., & Setiawan, I. (2021). *Marketing 5.0: Technology for Humanity*. John Willey & Sons.
- Liang, T.-P., & Turban, E. (2011). Introduction to the Special Issue Social Commerce: A Research Framework for Social Commerce. *International Journal of Electronic Commerce*, 16(2), 5–14. <https://doi.org/10.2753/JEC1086-4415160201>
- Limayem, Hirt, & Cheung. (2007). How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance. *MIS Quarterly*, 31(4), 705. <https://doi.org/10.2307/25148817>
- Makarim, A., & Wahyudi, E. (2025). Pengaruh Performance Expectancy dan Effort Expectancy terhadap E-commerce Adoption Usage melalui Behavioral Intention. *Indonesian Journal of Digital Business*. <https://ejournal.upi.edu/index.php/IJDB/article/view/95694>
- Nasution, R. P., F. Sembiring, B. K., & Situmorang, S. H. (2024). The Effect of Social Influence and Habit on Use Behavior with Behavioural Intention as an Intervening Variable in the Gojek Application User at the Medan Helvetia District. *International Journal of Research and Review*, 11(6), 147–157. <https://doi.org/10.52403/ijrr.20240617>
- Octaviani, D. R., Sucherly, Prabowo, H., & Sari, D. (2023). Determinants of Indonesian Gen Z's purchase behavior on online travel platforms: Extending UTAUT model. *Innovative Marketing*, 19(4), 54–65. [https://doi.org/10.21511/im.19\(4\).2023.05](https://doi.org/10.21511/im.19(4).2023.05)
- Pradita, F. N. S., Adityaputra, M. R., & Gunadi, W. (2025). Analysis of Gen Z's Continuous Intention to Use Tiktok Shop in DKI Jakarta Through the UTAUT2 Perspective. *Journal Research of Social Science, Economics, and Management*, 5(3), 3561–3578. <https://doi.org/10.59141/jrssem.v5i3.1107>
- Putra, A. O., Lita, R. P., & Besra, E. (2025). Habit, Trust, dan Continuous Intention sebagai Determinasi Use Behavior pada Pengguna PLN Mobile di Sumatera Barat. *Jurnal Manajemen Strategik Dan Simulasi Bisnis*, 6(2), 1–14. <https://doi.org/10.25077/mssb.6.2.1-14.2025>
- Refsi, F., & Soma, M. A. (2025). The Influence of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, And Financial Literacy on Use Behavior of Buy Now Pay Later Services with Behavior Intention as A Mediating Variable Among Generation Z In the Bandung Raya Area. *International Journal of Educational Research & Social Sciences*, 6(2), 281–286. <https://doi.org/10.51601/ijersc.v6i2.981>
- Roscoe, J. T.. (1975). *Fundamental research statistics for the behavioral sciences* [by] John T. Roscoe. Holt, Rinehart and Winston.
- Sadiq, S., Kaiwei, J., Aman, I., & Mansab, M. (2025). Examine the factors influencing the behavioral intention to use social commerce adoption and the role of AI in SC adoption. *European Research on Management and Business Economics*, 31(1), 100268. <https://doi.org/10.1016/j.iiedeen.2024.100268>

- Sekaran, & Bougie. (2016). *Research Methods for Business: A Skill-Building Approach* (S. Wiley, Ed.; 7th ed.). West Sussex.
- Sugiyono. (2013). *Metode penelitian kuantitatif, kualitatif dan R&D*. Alfabeta.
- Twenge, J. M. (2017). *iGen: Why today's super-connected kids are growing up less rebellious, more tolerant, less happy — and completely unprepared for adulthood*. Atria Books.
- Venkatesh, Thong, & Xu. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157. <https://doi.org/10.2307/41410412>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward A Unified View1. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Wardani, L. P. A. K., & Masdiantini, P. R. (2022). Pengaruh Ekspektasi Kinerja, Ekspektasi Usaha, Faktor Sosial Budaya, Motivasi Hedonis dan Nilai Harga terhadap Minat Penggunaan Quick Response Code Indonesian Standard. *Jurnal Ilmiah Akuntansi Dan Humanika*, 12(1). <https://ejournal.undiksha.ac.id/index.php/JJA/article/view/38188>
- Wibowo, A. H., Mursityo, Y. T., & Herlambang. (2019). Pengaruh Performance Expectancy, Effort Expectancy dan Social Influence terhadap Behavioral Intention dalam Implementasi Aplikasi SIMPG PT Perkebunan Nusantara XI Surabaya. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 3(9).
- Zheng, H., Han, F., Huang, Y., Wu, Y., & Wu, X. (2025). Factors influencing behavioral intention to use e-learning in higher education during the COVID-19 pandemic: A meta-analytic review based on the UTAUT2 model. *Education and Information Technologies*, 30(9), 12015–12053. <https://doi.org/10.1007/s10639-024-13299-2>