The roles of individual differences in time perspective, promotion focus, and innovativeness: Testing technology acceptance model

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Abstract

The goal of this study is to examine the roles of Zimbardo's time perspective along with other individual differences such as promotion focus and innovativeness in perceived ease of use, perceived usefulness, and attitude toward SNSs (social networking sites) in the technology acceptance model (TAM). A total of 234 participants joined this online study in South Korea. As predicted, past positive time perspective (TP) positively affected promotion focus and innovativeness, whereas past negative TP negatively affected them. Present hedonic TP positively affected innovativeness, and present fatalistic TP negatively affected promotion focus each. Future TP also positively related to promotion focus and innovativeness. In addition, simple and serial mediation effects of perceived ease of use and perceived usefulness independently and sequentially mediated the impact of TP on attitude toward SNSs. By considering TP along with promotion focus and innovativeness in conjunction with beliefs in the TAM, this study identifies psychological underpinnings of how individual differences affect technology adoption attitude and behavior. Research implications and future research suggestions will be discussed in detail.

Keywords Zimbardo's time perspective · Promotion focus · Innovativeness · Perceived ease of use · Perceived usefulness · Attitude toward SNSs · Technology acceptance model

Introduction

Time perspective (TP) plays an important role in the cognitive processes through which people interact with other people. Time is one of our most precious resources because it provides us with reference points for our past history and our future directions (Rifkin, 1987). With the exponential growth of information and communication technology such as social network sites (SNSs), individuals are more likely to use SNSs in order to stay connected and maintain their networks online. Although it is necessary to adopt SNSs in our daily lives, the role of users' TP has not been explored to further understand technology acceptance behavior. Although researchers have conducted a few studies in relation to TP to understand SNS usage, most have attempted to examine maladaptive and problematic online behaviors (e.g., Facebook addiction) from the pathological and psychiatric perspectives (Przepiorka &

Blachino, 2016; Settanni et al., 2018; Weissenberger et al., 2016). Along with diagnostic and therapeutic approaches, it is critical to deepen our understanding of how general users with different TPs formulate different beliefs and attitudes toward SNSs by first incorporating Zimbardo's TP into the technology acceptance model (TAM).

There is a stream of research that identifies individual differences as antecedents of two key factors of the TAM, perceived ease of use and perceived usefulness. For example, individual differences such as role with regard to technology, tenure workforce, level of education, similar prior experiences, and participation in training directly and indirectly affect attitudes and behavioral intentions toward using new technology via beliefs about ease of use and beliefs about usefulness (Agarwal & Prasad, 1999). Burton-Jones and Hubona (2005) found that individual factors such as staff seniority, level of education, and age affect beliefs about ease of use and beliefs about usefulness, which subsequently affect usage volume and usage frequency of technology (e.g., word processor, email). Li (2013) revealed that security, privacy, and confidentiality risks affect perceived ease of use, perceived usefulness, and perceived risk of accepting Internet banking use in Taiwan. More recently, Manolika

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et al. (2022) found that general self-efficacy fully or partially mediates the impact of Big Five personality traits on these factors and audiovisual technology acceptance.

However, it is difficult to find research that focuses on individuals' TPs, regulatory focus (e.g., promotion focus), and user innovativeness simultaneously in conjunction with the TAM. In fact, past research has examined the independent effects of individual differences such as TP, promotion focus, and innovativeness on the acceptance of new technology assuming that these individual factors operate independently (Baltes et al., 2014; Karande et al., 2011). With this in mind, this study will holistically examine the complex relationship between these individual differences and will identify psychological mechanisms of how users with different TPs, regulatory focus, and innovativeness formulate beliefs and attitude toward new technology such as SNSs.

Given the argument above, the goals of this research are twofold. First, this research will closely examine how Zimbardo's five TPs affect other individual factors such as regulatory focus (e.g., promotion focus) and user innovativeness. Second, this research will examine how these individual differences function in the TAM as antecedents of belief constructs such as perceived ease of use and perceived usefulness. By connecting individual differences to belief constructs in TAM, this study will contribute to theoretical understanding of the role of individual differences in technology adoption behavior such as SNSs.

Literature review

Independent variable: Zimbardo's time perspectives

Past orientation: Past positive and past negative TP

Past orientation is defined as a "warm, sentimental attitude towards the past" (Zimbardo & Boyd, 1999, p. 1275). People with a high past orientation become sentimental when they think of the past, are prone to nostalgia, and are happy in their set ways of doing things (Holbrook, 1993; Zimbardo & Boyd, 1999). Past-oriented people act and decide in response to recurrent situations of their past experiences. These people do not take chances and tend to be conservative and stick with their existing routines (e.g., familiar product and leisure activities) (Baumeister, 2002; Braun-La Tour et al., 2007). Merchant et al. (2014) found that past TP and future TP negatively affect consumer innovativeness, whereas present TP positively affects consumer innovativeness.

However, when past TP is decomposed into past positive and past negative TP, these two types of past TP function differently. Past positive TP is characterized by a glowing, nostalgic, and positive construction of the past. High past positive TP is closely related to low depression, low

aggression, anxiety as well as high self-esteem and happiness. Past positive TP also taps into a healthy outlook on life (Zimbardo & Boyd, 1999). A positive feature of past-oriented people is their sense of personal continuity along with a stable sense of self through the years (D'Alessio et al., 2003). In contrast, past negative TP embodies a pessimistic, negative, or aversive attitude toward the past and is related to depression, anxiety, unhappiness, and low self-esteem (Zimbardo & Boyd, 1999).

Present orientation: Present hedonic and present fatalistic TP

Present orientation is defined as "being focused upon immediate events in themselves and diminished concern for, or interest in, future consequences" (Harber et al., 2003; Karande et al., 2011). Specifically, present TP can be decomposed into present–hedonic and present–fatalistic TP. Rather than being too concerned about their past and future, present–hedonic individuals live for the moment (Merchant et al., 2014). They tend to focus on seeking instant gratification rather than pondering potential future costs and consequences (Lennings & Burns, 1998). In addition, they are likely to have low self-control, seek sensory pleasures and stimulation, take risks, and value short-term rewards (Weissenberger et al., 2016; Zimbardo & Boyd, 1999). Present–hedonic TP is also closely related to addictive behaviors such as alcohol and illicit drug use, excessive Internet use, and excessive sweet and fast food consumption (Chavarria et al., 2015; Weissenberger et al., 2016).

Meanwhile, individuals with present–fatalistic TP tend to have helpless and hopeless attitudes toward life (Zimbardo & Boyd, 1999). They believe that outside forces such as spiritual or governmental forces control their lives, and they tend to search for some kind of meaning in their lives (Shterjovska & Achkovska-Leshkovska, 2014). Present–fatalistic TP could be an effective way of reducing anxiety by eliminating the tension created by wishing to control something uncontrollable. For example, people were determined to become motivated to helpless against Covid-19 to justify inaction and relieve anxiety (Lifshin et al., 2020). When fatalism is dominant, it tends to be closely related to depression and hopelessness (Seligman, 1975). Settanni et al. (2018) also found that ADHD (attention deficit hyperactivity disorder) symptoms positively predict addictive Facebook use. Specifically, past–negative and present–fatalistic TP mediate in the relationship between ADHD symptoms and addictive Facebook use.

Future orientation

Future orientation is defined as a "tendency to relate immediate choices to more distant objectives" (Harber et al., 2003,

p. 256). A longitudinal study revealed that future TP is positively related to promotion focus, which in turn affects selection, optimization, and compensation (Baltes et al., 2014). Future-oriented people strive for future goals and rewards; they are achievement oriented and do not hesitate to make short-term sacrifices for long-term gains (Sekścińska & Iwanicka, 2021). Future TP is closely related to high energy, openness, conscientiousness, consideration of future consequences, and impulse control (Zimbardo & Boyd, 1999) as well as to positive consequences including higher socio-economic status, superior academic achievement, and fewer risk-taking behaviors (De Volder & Lens, 1982; Nuttin, 2014). Upon systematically reviewing 17 future TP and 16 occupational future time perspective (OFTP) articles, Henry et al. (2017) concluded that general future TP is positively related to occupational well-being outcomes (e.g., job satisfaction, affective commitment, work engagement), motivational outcomes (e.g., growth motives, esteem motives, intrinsic and extrinsic work motivations), and attitudinal and behavioral outcomes (e.g., promotion focus, developmental fulfilment, career commitment). Moreover, Zacher and de Lange (2011) revealed that a promotion focus showed a positive effect on focus on opportunities ($r = 0.47$), while a prevention focus exhibited a positive effect on focus on limitations ($r = 0.41$). Also, it was found that focusing on opportunities in the future was positively related to learning self-efficacy ($r = 0.52$) and learning value ($r = 0.28$) (Kochoian et al., 2017).

Based on the findings from Baltes et al. (2014), it is expected that users with a specific TP tend to maintain their existing time perspectives at different time points. More importantly, a specific TP (e.g., future) should significantly positively affect promotion focus. As an extension of these findings, the prediction of this study is that all five TPs will be related to promotion focus. Additionally, Karande et al. (2011) explained that different TPs affect consumer innovativeness. Therefore, the relationships between TP and both promotion focus and consumer innovativeness will be further discussed below.

Mediator variables: Promotion focus and innovativeness

Regulatory focus: Promotion focus

Higgins (1997, 1998) explained two motivational systems that he termed regulatory foci: promotion focus and prevention focus. Regulatory focus has been widely used in many areas as it helps to explain the psychological processes that underlie how consumers make complex decisions (Higgins, 1997). A prevention focus describes people who are focused on their duties and responsibilities and who tend to avoid negative consequences in relation to unpredicted events;

they are motivated by a need to feel secure (Higgins, 1998). For example, prevention-focused individuals are likely to purchase insurance as an effective mean of helping them remain financially and psychologically stable (Sekścińska et al., 2016). Prevention-focused individuals are also more willing to save money toward achieving prevention-related goals (Cho et al., 2014).

A promotion focus describes people who are prone to concentrating on their personal development, accomplishments, and growth. Promotion focus tends to be most strongly linked to enhanced performance (Wallace et al., 2009). Promotion-oriented individuals are likely to monitor the environment for and recall success-related information (Lockwood et al., 2002), and they are attuned to emotions related to success (Higgins et al., 1997); they also focus on strategies that lead to achieving their desired results (Higgins et al., 1994). Promotion focus is also related to high motivation and persistence on tasks geared toward promotion (Shah et al., 1998) that enhance work productivity and task performance (Wallace et al., 2009).

Innovativeness

Consumer innovativeness can be defined as "a generalized unobservable trait that reflects a person's inherently innovative personality, predisposition, and cognitive style and can therefore be applied to multiple situations" (Im et al., 2007, p. 64). As explained, individuals' innovativeness involves changing familiar routines such as in products and services purchased or consumed, and thus, it entails risk taking (Karande et al., 2011). Thus, past-oriented people are less inclined to change in general (Merchant et al., 2014). However, the level of consumer innovativeness will be different depending on past positive TP and past negative TP. People with low trait anxiety, high self-esteem, and optimistic views toward life and its meaning, that is, people with a positive TP, are more likely to accept changes in their lives (D'Alessio et al., 2003; Zimbardo & Boyd, 1999). Past-positive TP is closely related to high energy and friendliness, creativity, and happiness (Zimbardo & Boyd, 1999), whereas past negative TP is negatively related to openness, energy, emotional stability, and impulse control (Zimbardo & Boyd, 1999). Finally, future TP is closely related to openness, creativity, energy, conscientiousness, and consideration of future consequences. Therefore, it is predicted that past-positive and future TP will positively affect innovativeness, whereas past negative TP will negatively affect innovativeness.

Considering that individuals with past positive TP have high self-esteem and a healthy outlook on life, they should be more promotion oriented and innovative, whereas individuals with negative TP and low self-esteem will have negative, pessimistic perspectives on life and will thus be less innovative or motivated to change their attitudes. In terms

of present TP, individuals with present hedonic TP are most likely focusing on seeking instant gratification rather than pondering potential costs and consequences in the future. As a result, they will be internally motivated to be more promotion focused and innovative to satisfy their current needs and wants. In contrast, individuals with present fatalistic TP tend to have helpless attitudes toward the future and life, and they do not have internal motivation to change their lives, so that they will be less promotion focused and innovative. Finally, individuals with future TP are likely to consider future goals and rewards and thus be more promotion oriented and innovative. Based on the above reasoning above, the following hypotheses 1-5 are proposed:

> **H1:** *Past–positive TP will positively affect (a) promotion focus and (b) innovativeness.*
> **H2:** *Past–negative TP will negatively affect (a) promotion focus and (b) innovativeness.*
> **H3:** *Present–hedonic TP will positively affect (a) promotion focus and (b) innovativeness.*
> **H4:** *Present–fatalistic TP will negatively affect (a) promotion focus and (b) innovativeness.*
> **H5:** *Future TP will positively affect (a) promotion focus and (b) innovativeness.*

Relationship among outcomes: Perceived ease of use, perceived usefulness, and attitude toward SNSs

One of the most widely used model of information technology (IT) acceptance is the technology acceptance model (TAM). The TAM proposes that users' perceived ease of use of a new technology and its perceived usefulness are the two antecedents of its adoption (Davis, 1989). Perceived ease of use can be defined as the degree to which a person believes that using a certain system will be free of effort. Perceived usefulness can be conceptualized as the degree to which a person believes that utilizing a system will enhance their job performances (Davis, 1989). In particular, Davis (1989) further explained that as perceived ease of use significantly correlates with actual use of new IT, perceived usefulness could mediate the impact of perceived ease of use on user intention to use the IT. Ridings and Geffen (2000) explained that some people adopt a promotion mind-set when considering a new IT (e.g., SNSs). Specifically, in their extended TAM, perceived usefulness of the new IT positively mediates the relationship between perceived ease of use of the new IT and users' preference to adopt the new IT. In contrast, perceived usefulness of the original or old IT negatively mediates the relationships between perceived ease of the old IT and users' preference to adopt the new IT.

In relation to regulatory focus, prevention focus and promotion focus can positively affect intentions to adopt new technology in two different routes (He et al., 2018). Specifically, the effect of self-efficacy on adoption intentions of new IT was significantly greater for users with promotion focus than for those with prevention focus. Furthermore, perceived ease of use and perceived usefulness in TAM were related to promotion focus as these two variables support an individual's need for achievement (Smith et al., 2014). For promotion-focused consumers, perceived ease of use and perceived usefulness are the predictors of new customer experience (e.g., health care) and attitude toward using the new technology (O'Connor et al., 2021).

Research has shown that consumer innovativeness is an important predictor of accepting new technology. For example, user innovativeness plays a moderating role in the impact of the relationship between subjective norms and behavioral intention on students' accepting an online learning system (Kim et al., 2021). Additionally, for high-involvement sustainable products such as electric vehicles, all factors from the theory of planned behavior (e.g., attitude, perceived behavioral control, subjective norms, and personal norms) partially mediate the effects of social innovativeness and purchase intention (Li et al., 2021). Taken together, we propose that perceive ease of use and perceived usefulness will mediate the impacts of promotion focus and innovativeness on attitudes toward SNSs in the following hypotheses.

> **H6:** *Perceived ease of use will positively mediate the impacts of (a) promotion focus and (b) innovativeness on attitudes toward SNSs.*
> **H7:** *Perceived usefulness will positively mediate the impacts of (a) promotion focus and (b) innovativeness on attitudes toward SNSs.*
> **H8:** *Perceived ease of use and perceived usefulness will sequentially mediate the impacts of (a) promotion focus and (b) innovativeness on attitudes toward SNSs.*

Based on the arguments above, Fig. 1 presents the study's hypothetical framework.

Method

Data collection and sample

Based on the literature, a questionnaire using a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strong agree*) was created to measure five different time perspectives, promotion focus, innovativeness, perceived ease of use, perceived usefulness, and attitude toward SNSs. An online self-report survey was developed and administered via a survey software, Google Forms to a convenience sample in South Korea. In December 15–30, 2021, the survey link was manually posted on individuals'

Fig. 1 Conceptual representation of the research model depicting the serial mediation of promotion focus and innovativeness. Note: H8a – Promotion focus ➔ Perceived ease of use ➔ Perceived usefulness ➔ Attitude toward SNSs; H8b: Innovativeness ➔ Perceived ease of use ➔ Perceived usefulness ➔ Attitude toward SNSs
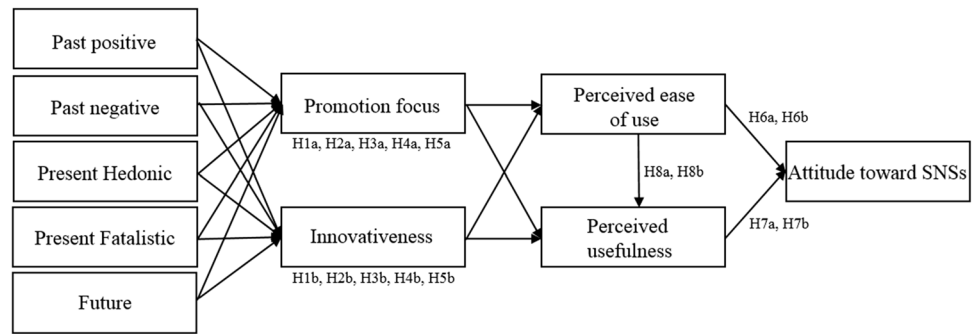
SNS platforms and distributed using personal human networks. In light of the goal of identifying the relationship between individual's internal factors and the attitude toward SNSs, having prior experiences of using SNSs is essential to participate in this study. Also, due to the COVID-19 pandemic in 2021, an online self-report survey was a viable option to collect data (Ali et al., 2020). As an incentive to complete the online survey, 10 participants were randomly selected to receive a coffee coupon that has value of 10,000 KRW (= 7.44 USD). All the participants voluntarily joined this study and provided informed consent prior to answering the questionnaire. To facilitate meta-analysis, collaboration, and cross-checking the validity of current findings, research data is available at Research Box in Wharton Credibility Lab (https://researchbox.org/850) (Besançon et al., 2021; Popkin, 2019).

Of the 234 participants in the online survey, 55.6% were men and 44.4% were women. Regarding age, 53.8% of the participants were in their 30 s followed by those in their 20 s (18.4%), 40 s (13.7%), 50 s (12.4%), and 60 s (1.7%). In terms of education level, 52.1% had a bachelor's degree, 23.9% had a master's degree, 11.54% had s doctoral degree, and 9.4% had a two-year college degree. For the length of employment, 38.9% had worked from one to fewer than five years, followed by five years to fewer than 10 years (23.9%), 10 years but fewer than 20 years (17.9%), less than one year (12%), and more than 20 years (7.3%). Regarding SNS platforms, Instagram was the most widely used platform (59.4%), followed by Facebook (47.9%), blogs (32.5%), and Twitter (6.8%). Regarding average use time per day, most participants used SNSs below an hour (43.6%), followed by from above an hour to below two hours (34.2%), from above two hours to below three hours (9.8%), from above three hours to below four hours (8.1%), and above four hours (4.3%).

Measures

Items from existing research were used to measure all the constructs in the research model. Before the data

collection process, a translation–back translation methodology from English to Korean was conducted to guarantee that the questionnaires were properly translated (Beaton et al., 2002), and a pretest of the items was conducted with a small sample (Behr, 2017; Brislin, 1970). Item reliabilities for each construct used in this study were acceptable based on Cronbach's alpha values from 0.84 to 0.89.

First, five TP dimensions were measured with 24 items from the original Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) that were translated into Korean and slightly modified. Specifically, to create a past–positive TP index, six items were used (e.g., "It's fun to look back on my past" and "Happy memories of the past often pop up in my head"). Past–negative TP was measured with three items (e.g., "I wish I could undo the mistakes I made in the past" and "I think about the things I've missed in my life"). Present–hedonic TP was measured with four items such as "I am swept away by the joy of the moment" and "I tend to work impulsively." Present–fatalistic TP was measured with five items including "Destiny determines many parts of my life" and "The course of my life is being controlled by a force I cannot control." Finally, future TP was measured with six items such as "I keep working on my project and finish it on time" and "I make a list of things to do."

Promotion focus was measured with nine items that were slightly modified from original items by Lockwood et al. (2002) (e.g., "I typically focus on the success I want to achieve in the future" and "In general, I focus on achieving positive outcomes in my life"). Innovativeness was measured with five items modified from Goldsmith and Hofacker's (1991) domain-specific innovativeness scale. Sample items include "I want to buy a new phone before everyone else" and "Among my colleagues and friends, I am the first to know the latest mobile phone brands."

Finally, TAM-related variables such as perceived ease of use, perceived usefulness (Davis, 1989), and attitude toward SNSs were measured after modification from existing scales (Pollay & Mittal, 1993). Perceived ease of use was measured with three items (e.g., "I think it is easy to use SNSs" and "I

can easily acquire information through SNSs"). Similarly, perceived usefulness was measured with three items such as "I think that SNSs help me to build knowledge" and "I believe that SNSs are effective." Attitude toward SNSs was measured with three items such as "I am very positive about our SNSs" and "I will like my SNSs very much."

Due to the cross-sectional nature of the study, the findings can be confounded by many third factors such as demographic variables that can be associated with the focal variables in the study. In order to control socio-demographic characteristics of the participants, perceived ease of use, perceived usefulness, and attitude toward SNSs were regressed on variables such as gender, age, education level, years of employment, and average time for SNS use per day. It was found that only gender (male = 0; female = 1) significantly positively affected perceived ease of use ($\beta = 0.23$, $p < 0.01$, $SE = 0.19$), perceived usefulness ($\beta = 0.21$, $p < 0.01$, $SE = 0.20$), and attitude toward SNSs ($\beta = 0.17$, $p < 0.05$, $SE = 0.22$). Thus, gender was factored into the main analysis.

Common method bias

Common method bias occurs when variations in responses are caused by the measurement items rather than the actual predispositions of the participants that the measurement items attempts to uncover. To address the concern of common method bias, Harman's single factor analysis was conducted. Specifically, all 47 measurement items that capture seven individual difference factors as well as three TAM elements were loaded into one common factor. As empirically judged by Podsakoff et al. (2003, 2012), the probability that common method bias will happen will be low if a single factor explains less than 50% of the total variance between the independent and dependent variables. The results showed that the highest variance explained by a first single factor was 22.53% (<50%) followed by second (15.23%), and third

factor (8.21%). Therefore, there was no common method bias in this study.

Results

SPSS 21.0 and AMOS 21.0 for path analysis were used to estimate the direct effects on promotion focus and innovativeness and indirect effects on attitude toward SNSs via perceived ease of use and perceived usefulness. To assess the strength of the linear relationships between constructs, Pearson's correlation tests were conducted; Table 1 shows the results. To reconfirm the parallel and sequential indirect effects of perceived ease of use and perceived usefulness, Macro Process v3.5 (Models 4 and 6) was used. Bootstrapping analysis was conducted to identify the causal relationships between multiple mediators (Hayes, 2017). Bootstrapping is known as the most appropriate method for measuring indirect effects because it does not need to meet the assumption of the shape of the sampling distribution (Hayes, 2017). Successful mediation effects occur when the confidence interval does not include zero (Preacher et al., 2007).

Prior to testing the proposed hypotheses, original model fit was examined. The overall fit indices of the path model were in the acceptable range ($\chi^2/df = 3.46$, $p < 0.05$, IFI = 0.96, TLI = 0.90, CFI = 0.96, RMSEA = 0.10). Although the root mean square error of approximation (RMSEA) is greater than the cut-off point (0.08), other fit indices such as CMIN/df (≤ 2–5), IFI, TLI, and CFI (≥ 0.90) met the recommended fit levels (Hoe, 2008; Hu & Bentler, 1998; Kline, 2005; Wan, 2002). Considering that gender affected the TAM elements in previous analysis, it was included as a covariate to assess alternative model fit. The overall path model fit increased comparing with the original model without gender ($\chi^2/df = 2.63$, $p < 0.00$, IFI = 0.96,

Table 1 Results of the correlation testing ($N = 234$)

	1	2	3	4	5	6	7	8	9	10
1	1									
2	.08	1								
3	.10	.47**	1							
4	.03	.58**	.59**	1						
5	.16*	-.19**	-.39**	-.23**	1					
6	.27**	-.08	-.10	-.17**	.49**	1				
7	.17**	-.14**	.09	.09	.16*	.31**	1			
8	.29**	-.23**	-.06	-.11	.41**	.36**	.36**	1		
9	.28**	-.18**	-.11	-.10	.39**	.39**	.37**	.85**	1	
10	.27**	-.17*	-.11	-.09	.41**	.36**	.34**	.84**	.84**	1

*—$p < .05$. **—$p < .01$. ***$p < .001$. 1 = Past–Positive TP; 2 = Past–Negative TP; 3 = Present–Hedonic TP; 4 = Present–Fatalistic TP; 5 = Future TP; 6 = Promotion Focus; 7 = Innovativeness; 8 = Perceived Ease of Use; 9 = Perceived Usefulness; 10 = Attitude toward SNSs

TLI = 0.92, CFI = 0.96, RMSEA = 0.08). Thus, alternative model was considered in subsequent analysis.

To reconfirm reliability and validity of construct of individual difference factors, a two-step exploratory factor analysis on 38 items of the seven individual difference constructs was conducted for examining factor loadings, dimensionalities, and eigenvalues. Varimax rotation and eigenvalues > 1 were designated. In the first step, five TP constructs with 24 items were factored into analysis. The results showed the five factors explain about 69.25%. Eigenvalues of five factors were minimum 1.16 to maximum 6.86 and factor loadings were all over 0.65 correspondingly. In the second step, promotion focus and innovativeness with 14 items were analyzed. Three factors were extracted and they explain 66.20%. Although one item (i.e., I try to be an obligatory person who fulfills my duties and responsibilities) created third dimension, it was incorporated into the promotion focus factor. Eigenvalues of two factors were greater than 3.80 and factor loadings were all over 0.57. In addition, discriminant validity of seven individual difference factors was assessed based on the confidence intervals ($\varphi \pm 2$ SE) of correlation coefficients among constructs which do not include 1 (Anderson & Gerbing, 1988). Confidence intervals ($\varphi \pm 2$ SE) of 21 correlation combinations ranged from lowest value of -0.051

to highest value of 0.70 so that discriminant validity of seven individual factors was ascertained.

H1 predicts that past–positive TP will positively affect (a) promotion focus and (b) innovativeness. Past–positive TP significantly positively affected promotion focus ($\beta = 0.19$, $p < 0.01$, SE = 0.07) and innovativeness ($\beta = 0.14$, $p < 0.05$, SE = 0.09). Table 2 summarizes the results of the hypothesis testing, and Fig. 2 shows the standardized path coefficients. H2 predicts that past–negative TP will negatively affect (a) promotion focus and (b) innovativeness. Past–negative TP showed a marginally significant negative effect on promotion focus ($\beta = -0.13$, $p < 0.10$, SE = 0.06) and innovativeness ($\beta = -0.31$, $p < 0.00$, SE = 0.09); thus, H1a, H1b, H2a, and H2b were supported. H3 posits that present–hedonic TP will positively affect (a) promotion focus and (b) innovativeness, whereas H4 predicts that present–fatalistic TP will negatively impact them. Present–hedonic TP did not significantly positively affect promotion focus ($\beta = 0.10$, $p = 0.19$, SE = 0.06), although it showed the expected direction. Meanwhile, present-hedonic TP showed a significant positive effect on innovativeness ($\beta = 0.18$, $p < 0.05$, SE = 0.09). Present–fatalistic TP exerted a significant negative impact on promotion focus ($\beta = -0.34$, $p < 0.00$, SE = 0.07), but there was a significant positive impact on innovativeness ($\beta = 0.20$, $p < 0.05$, SE = 0.11); taken together, only H3b and H4a were

Table 2 Hypothesis testing results (N = 234)

Path	B	SE	C.R	β	H	Result
Direct effects						
PPTP ➔ PF	.22	.07	3.31	.19***	H1a	Accepted
PPTP ➔ I	.22	.10	2.28	.14*	H1b	Accepted
PNTP ➔ PF	-.11	.06	-1.81	-.12†	H2a	Accepted
PNTP ➔ I	-.37	.09	-4.11	-.31***	H2b	Accepted
PHTP ➔ PF	.08	.06	1.32	.10	H3a	Not Accepted
PHTP ➔ I	.20	.09	2.17	.18*	H3b	Accepted
PFTP ➔ PF	-.32	.07	-4.43	-.34***	H4a	Accepted
PFTP ➔ I	.26	.11	2.37	.20*	H4b	Not Accepted
FTP ➔ PF	.36	.08	4.33	.27***	H5a	Accepted
FTP ➔ I	.34	.12	2.79	.19***	H5b	Accepted
Indirect effects	Bootstrapping		BC 95% CI			
	Estimate	SE	Lower	Upper		
PF ➔ PEOU ➔ att	.29	.06	.17	.40	H6a	Accepted
I ➔ PEOU ➔ att	.30	.05	.20	.39	H6b	Accepted
PF ➔ PU ➔ att	.32	.06	.21	.42	H7a	Accepted
I ➔ PU ➔ att	.30	.06	.20	.40	H7b	Accepted
PF ➔ PEOU ➔ PU ➔ att	.13	.06	.05	.25	H8a	Accepted
I ➔ PEOU ➔ PU ➔ att	.14	.04	.07	.23	H8b	Accepted

Model Fit: $\chi^2/df = 2.63$, $p < .00$; IFI = .96; TLI = .92; CFI = .96; RMSEA = .08

*—$p < .05$. **—$p < .01$. ***$p < .001$

B unstandardized path coefficient, *SE* standard error, *β* standardized path coefficient, *BC* bias corrected, *CI* confidence interval, *PF* promotion focus, *I* innovativeness, *PEOU* perceived ease of use, *PU* perceived usefulness, *Att* Attitude toward SNSs

Fig. 2 The standardized path coefficients of alternative model
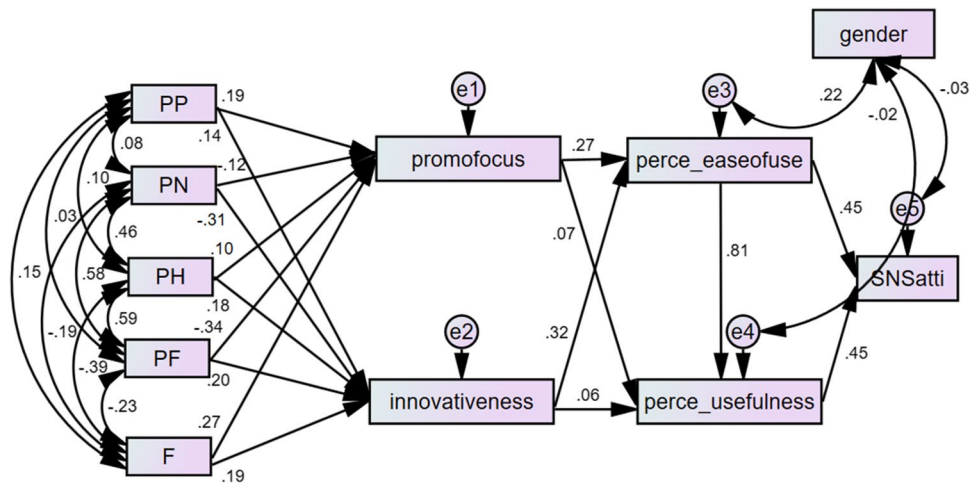
accepted. Finally, future TP showed significant positive effects on promotion focus ($\beta = 0.27$, $p < 0.00$, $SE = 0.08$) and innovativeness ($\beta = 0.19$, $p < 0.00$, $SE = 0.12$); thus, H5a and H5b were accepted.

To reconfirm the mediation effects of perceived ease of use and perceived usefulness, mediation analysis with Macro Process (Model 4 and 6) was conducted. This study utilized 95% biased-corrected bootstrapped confidence intervals considering 20,000 bootstrapped samples with a maximum likelihood model. H6 predicts that perceived ease of use will positively mediate the impacts of (a) promotion focus and (b) innovativeness on attitude toward SNSs. The results of Macro Process (Model 4) showed that promotion focus ($\beta = 0.29$, $SE = 0.06$, 95% CI [0.17, 0.40]) and innovativeness ($\beta = 0.30$, $SE = 0.05$, 95% CI [0.20, 0.39]) had significant mediation effects on attitude toward SNSs through perceived ease of use. H7 posits that perceived usefulness will positively mediate the impacts of (a) promotion focus and (b) innovativeness on attitude toward SNSs. Promotion focus ($\beta = 0.32$, $SE = 0.06$, 95% CI [0.21, 0.42]) and innovativeness ($\beta = 0.30$, $SE = 0.06$, 95% CI [0.20, 0.40]) showed significant mediation effects on attitude toward SNSs through perceived usefulness. Finally, H8 predicts that perceived ease of use and perceived usefulness will sequentially mediate the impacts of (a) promotion focus and (b) innovativeness. In the results, perceived ease of use and perceived usefulness sequentially mediated the impacts of promotion focus ($\beta = 0.13$, $SE = 0.06$, 95% CI [0.05, 0.25]) and innovativeness ($\beta = 0.14$, $SE = 0.04$, 95% CI [0.07, 0.23]) on attitude toward SNSs. Therefore, H6a, H6b, H7a, H7b, H8a, and H8b were all supported.

Furthermore, to identify substantive impact of five TPs on promotion focus and innovativeness, Cohen's f^2 were calculated (Cohen, 1988; Ferguson, 2009; Ferguson & Heene, 2021). The difference between squared multiple correlation including all five TPs and the squared multiple correlation excluding a specific TP was divided by the difference which

is one minus squared multiple correlations including all five TPs. The effect sizes for promotion focus ranged from 0.02 to 0.09 and the effect sizes for innovativeness ranged from 0.03 to 0.07. Following the same procedure, the effect sizes of promotion focus and innovativeness on perceived ease of use were 0.07 and 0.10. Also, the effect sizes of promotion focus and innovativeness on perceived usefulness were 0.01. Finally, the effect sizes of promotion focus and innovativeness on attitudes toward SNSs were found to be moderate as they were both 0.24. Although proposed hypotheses were theoretically relevant and statistically accepted, the real and true effects of individual difference predictors remain weak except two TAM elements which showed moderate effect sizes.

Discussion

Theoretical implications

The goal of this study was to identify the effects of Zimbardo's time perspective on promotion focus and consumer innovativeness as well as factors in the TAM. This study has attempted to examine how individual differences such as time perspective, promotion focus, and innovativeness sequentially affect perceived ease of use, perceived usefulness, and attitude toward SNSs. Although a few studies have attempted to applied the TAM in users' accepting new communication channels such as SNSs, it is rare to find research that systematically reveals how individual differences affect users' perceived ease of use, perceived usefulness, and attitude toward SNSs.

First, it was predicted that past–positive TP would positively affect promotion focus and innovativeness (H1a and H1b), whereas past–negative TP would negatively affect promotion focus and innovativeness (H2a and H2b). Owing to their warm and sentimental attitudes toward the past, people

with past–positive TP could be optimistic and actively consider options toward seeking positive feedback (Grant & Higgins, 2013) and finding the meaning in life (Zheng & Wang, 2022). These individuals are also motivated to persist at tasks geared toward promotion (Shah et al., 1998) and that enhance work productivity and task performance (Wallace et al., 2009). Considering their low trait anxiety, high self-esteem, and optimistic viewpoints, they are likely to be innovative (D'Alessio et al., 2003; Zimbardo & Boyd, 1999). In contrast, because past–negative TP is related to prevention focus, individuals with that perspective will take more conservative and cautious approaches (Marija & Elena, 2014). Thus, they will be less likely to be promotion focused and accept new changes.

Second, it was predicted that present–hedonic would positively affect promotion focus and innovativeness (H3a and H3b) and that present–fatalistic TP would be negatively related to them (H4a and H4b). Although present–hedonic TP did not significantly affect promotion focus, the results showed the expected direction; it is possible that this group no longer finds SNSs interesting or attractive as new channels of communication. Meanwhile, present–hedonic TP significantly positively affected innovativeness. The overall results reflect that present–hedonic individuals are likely to take risks and engage in exploratory and variety-seeking behavior in searching for sensory pleasure and stimulation without seriously considering potential costs (Karande et al., 2011; Lennings & Burns, 1998; Merchant et al., 2014).

In contrast with the above perspectives, the present–fatalistic TP significantly negatively affects promotion focus, although it shows a significant positive impact on innovativeness. Given their fatalistic, helpless, and hopeless attitudes toward life, people with high fatalism tend not to engage in future-oriented planning and exert little effort to achieve desirable goals (Hayes & Clerk, 2021). Considering that promotion focus is positively related to internal motivation to achieve desired outcomes, users with present–fatalistic TPs might not show a significant promotion focus (Lockwood et al., 2002; Wallace et al., 2009). Interestingly, individuals with present–fatalistic TP demonstrate innovativeness by haphazardly accepting SNSs and perhaps they are internally motivated to be addicted to SNSs (Settanni et al., 2018). Alternatively, people with more negative or fatalistic perspectives could be more open to changes and could intentionally hope to deviate from their existing attitudes and behaviors to increase their life satisfaction and enjoy the moment (Chen et al., 2016).

Third, it was predicted that future TP would positively affect promotion focus and innovativeness (H4a and H4b). As predicted, future TP was closely related to promotion focus (Baltes et al., 2014). People with future TP tend to have a long-term perspective and thus, perceived time as less limited and predicts more opportunity for success, gain

as well as accomplishment. Due to a long-view perspective, they will take advantage of sufficient time as resources for accomplishing goals and desires. Past research has found that people with high future TP are likely to endorse a promotion focus by setting goals and achieving success. Specifically, future TP is positively related to promotion focus which in turn affect selection, optimization, and compensation (Baltes et al., 2014). Meanwhile, future TP is closely related to high energy, openness, conscientiousness, consideration of future consequences, and impulse control (Zimbardo & Boyd, 1999), and individuals with future TP are more likely to be innovative. Therefore, the findings of this research are in accord with past research results.

This study also identified how individual differences affect elements in the TAM. Specifically, perceived ease of use successfully mediated the relationship between promotion focus and attitude toward SNSs as well as the relationship between innovativeness and attitude toward SNSs (H6a and H6b). Perceived usefulness mediated the impacts of promotion focus and innovativeness on attitude toward SNSs (H7a and H7b). The findings of this research indeed show that promotion focus and innovativeness are positively associated with perceived ease of use and perceived usefulness. In addition, perceived ease of use and perceived usefulness sequentially mediated the relationships between promotion focus and innovativeness and attitude toward SNSs (H8a and H8b). Considering the strongest standardized path coefficient from perceived ease of use on perceived usefulness (0.81), these two beliefs in the TAM are closely related and sequentially mediate individual differences and attitude toward SNSs (Agarwal & Prasad, 1999; Yi He & Kitkuakul, 2018).

This study provides theoretical implications by incorporating Zimbardo's TP as well as promotion focus and innovativeness into the belief constructs in the TAM. The study revealed the important roles of individual differences in TP, promotion focus, and innovativeness in TAM belief constructs and suggests the need for further development of the TAM (Agarwal & Prasad, 1999; Burton-Jones & Hubona, 2005; Li, 2013). This research successfully expanded Baltes et al.'s (2014) conceptual model that predicted a positive relationship between a future time perspective and promotion focus and the related behavioral coping strategies (e.g., selection, optimization, compensation) to Zimbardo's five TPs along with promotion focus and innovativeness. Although many researchers have identified individual difference factors in the TAM model, there is little holistic examination of Zimbardo's TPs as antecedents of other individual factors such as promotion focus and innovativeness in relation to the TAM.

Practical implications

From the practical standpoint, this research provides useful implications for local and global advertising and marketing professionals who hope to develop effective SNS campaigns when it comes to target markets in South Korea. By providing guidelines for user profiling and segmentation, advertising and marketing practitioners will be able to penetrate the markets of users with past–positive, present–hedonic, or future TPs who might be more open to SNS platforms and respond more favorably to campaign messages delivered via SNSs. Individuals with promotion focus and innovativeness are also more inclined to have positive attitudes toward SNSs via perceived ease of use and perceived usefulness, independently and sequentially. In addition, considering their promotion-oriented and innovative attitudes, they are more willing to engage in variety seeking behavior by exploring new product category or brand. Conversely, practitioners might avoid users with past–negative or present–fatalistic TPs considering that they are likely to be prevention-oriented and respond negatively to the persuasive message regarding product or services in SNSs.

Finally, it is also of importance to design user-friendly SNS interfaces and update useful information so that perceived ease of use and perceived usefulness together will garner effects of individual difference as well as increase positive attitudes toward SNSs. Increasing interactive functions and social interaction in SNSs may lead to enhance perceived ease of use, perceived usefulness, and perceived enjoyment (Lee et al., 2019). When users are able to interact with others more easily and find relevant information without having difficulties, they are more likely to form positive attitude toward the SNSs and accept persuasive messages. In regards to the moderate effect sizes of perceived ease of use and perceived usefulness on attitudes toward SNSs, improving consumers' perceived ease of use and perceived usefulness of SNS platforms will help advertising and marketing practitioners gain a better insight of understanding consumer tastes and preferences and thus utilize SNSs as an effective tool for brand communications.

Limitations

Despite the novel findings above, this study has several limitations. First, the effectiveness of recruitment incentive for this research is still in question. Normally, the rate of consent and response rate from participants significantly increase when participants are offered small monetary value incentives (Abdelazeem et al., 2022). In this research, coffee coupon was used as a recruitment incentive because the value

of coffee coupon was reasonable based on the complexities and inconvenience of this study. Although using coffee coupons as a remuneration was successful in recruiting enough samples, future research should consider other types (e.g., financial incentives), the amount of incentives as well as the unintended effect.

Second, the current study might be vulnerable to reverse causation due to the lack of temporal precedence (Rohrer et al., 2022). Although the causal relationship between TP, promotion focus, and innovativeness were developed based on past research, it is important that we cannot rule out the possibility of reverse causation. For instance, people with high promotion focus and innovativeness are more likely to have past-positive TP and less likely to have past-negative TP. Past research found that promotion orientation and present-hedonic TP were associated with risk-taking behaviors (e.g., driving) at the same level (Lemarié et al., 2019). Also, promotion-focus and innovativeness may not be affected by all five TPs simultaneously and they may mutually influence each other. Future studies should consider carrying out a longitudinal study to identify the directionality of the relationship (Baltes et al., 2014). Perhaps, weak effect sizes between individual factors may reflect the necessity of seeking hidden theoretically relevant predictors and finding practically significant implications in the future (Ferguson, 2009; Ferguson & Heene, 2021). Nonetheless, these weak effect sizes of individual factors provide recommendations for how future research should delve into identifying the complex relationships along with TAM elements.

Third, the study did not factor in the different characteristics of SNS platforms. For example, user responses to SNSs can differ based on the classifications of SNS, the content type (textual or visual oriented), and the content orientation (e.g., task, interaction, or self-orientation; Kim et al., 2019; Munar & Jacobsen, 2014). Thus, future research will need to factor in the different types of SNSs. Additionally, this study only examined one type of regulatory focus, promotion focus. Although past research has found a meaningful relationship between TP and promotion focus, future research should look into the role of prevention focus. Finally, future researchers should investigate behavioral intention and engagement beyond attitude toward SNSs. Understanding the relationship between attitude and behavior in SNSs will enhance the TAM's explanatory power.

Declarations

Disclosure of potential conflicts of interest There is no conflict of financial or non-financial interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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