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碩士學位論文

千禧世代採用理財科技 APP 之意圖研究

論財務自我效能及主觀知識的影響

**How do Millennials Adopt to Use
WealthTech Mobile Apps?**

The Role of Financial Self-efficacy and Subjective Knowledge

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Abstract

摘要

Covid-19 疫情加速了所有仰賴實體服務客戶產業的數位化進程，金融服務業也不例外。其中，財富管理產品向來是金融業很重要的獲利來源之一，隨著開放銀行(open banking)以及應用程式介面(application programming interface)等議題興起，成為各家金融服務提供者下一個創新策略的發展方向，因此研究使用者為何採用財富管理 APP 就顯得重要。隨著千禧世代成為財富管理 APP 的潛力的高價值客群，人們或許會疑惑千禧世代是否具備足夠的金融理財素養來使用投資理財 APP。因此，本研究試圖分析千禧世代的金融知識對於財富管理 APP 採用行為的影響，以及什麼因素可以強化金融理財素養。

關鍵字：理財科技 APP、金融理財素養、主觀知識、財務自我效能、千禧世代

Abstract

Covid-19 pandemic accelerated digital transformation in any industry, relying on physical interaction with customers, especially financial services. For the financial services industry, wealth management contributes a significant portion of revenue. As open banking and banking API (application programming interface) recently have become key drivers in innovation strategy for financial service providers, it is important to examine the factors that affect WealthTech app adoption. Furthermore, since millennials became a group of high-value potential adopters, marketers might wonder whether they are equipped with sufficient financial literacy to adopt and use such investment mobile apps. Therefore, this paper aims to examine the effect of financial literacy (or knowledge) on WealthTech app adoption within the millennial generation.

Key word: WealthTech mobile apps, financial literacy, subjective knowledge, financial self-efficacy, millennials

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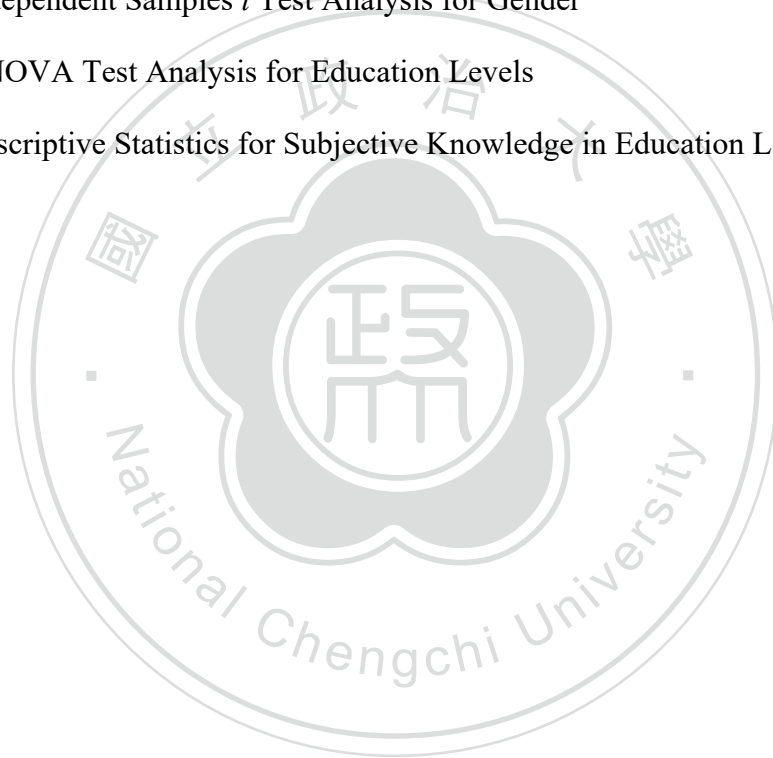
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Chapter 1 - Introduction

One of the key influencers in global banking innovation, Brett King, mentioned that “banking is no longer somewhere you go, but something you do.” Technology is already impacting the way we socialize and communicate not only among each other but also with the institutions offering us goods and services. Thus, the financial services industry has inevitably been facing the trend of digital transformation. In addition, the Covid-19 pandemic accelerated the digital transformation in any industry highly relying on physical interaction with customers. According to a Fintech market report by the World Bank Group, there was an 11% increase on average in the transaction volumes of Fintech firms that participated in the survey. The WealthTech sectors even reported an excess of 20% in their transaction volumes, higher than digital payment and digital banking sectors (Cambridge Centre for Alternative Finance, World Bank, & World Economic Forum, 2020). Besides its growth in Fintech, wealth management always contributes a significant portion of revenue other than the traditional deposit and loan business. For example, Morgan Stanley generated almost half of its revenue from the wealth management business unit; Bank of America represented over \$US 1 trillion of assets under management, which was the highest milestone of its history (Maxfield, 2017).

Recently, wealth management has been flooded with novel technology applications in customer management, advisory, and asset management processes. Not surprisingly, the total assets managed by online investment services are estimated to be \$460 billion in 2020, with a 30% increase in 2019 (Lee, 2021). Among the various technology applications in WealthTech, there are some reasons why the adoption of wealth management apps is an emerging topic. First, WealthTech mobile app is a digital

platform for firms to interact, serve, and do business with consumers. Second, considering mobile apps are usually free for downloading, digital platforms are powerful and effective customer acquisition tools. Third, open banking and banking API (application programming interface) recently have become key drivers in innovation strategy for financial service providers. However, most of the literature relevant to Fintech studied innovations in the deposit and payment business, such as mobile banking and e-payment. For example, Yoshino, Morgan, and Long (2020) examined financial literacy's impact on Japanese mobile payment adoption and crypto-wallets. Koya, Matrix, Venture, & Jones (2021) studied mobile banking apps for young adults in the U.K. Thus, WealthTech app adoption seems to be under-researched comparing to the Fintech innovations as mentioned above.

Considering that millennials are so-called digital-savvy and entering their prime years with savings surging, this generation became a group of high-value potential adopters for WealthTech mobile apps. The research within millennials' adoption in WealthTech mobile apps may have a contribution to the practice. When it comes to the factors that influence adoption in financial services, financial literacy (or financial knowledge) still influences the decision-making behaviors on relevant financial services and products (Huston, 2010). Due to their familiarity with technology, sometimes millennials are criticized as "Generation Me," implying they value their thoughts a lot (Hershat & Epstein, 2010). Since the researchers suggested that objective knowledge can predict the adoption of mobile banking in the literature review (Koya, Matrix, Venture, & Jones, 2021), I wonder if individuals perceive that they know more about how finance works, they will be willing to adopt new tools to their investment processes. Thus, this paper aims to examine the influence of subjective financial knowledge on WealthTech app adoption within the millennial generation.

Chapter 2 – Literature Review

2.1 Consumer Knowledge

In consumer research, consumer knowledge has been initially treated as a single-component construct, referred to as prior knowledge or product category information. The constructs mentioned above have been individually theorized for predicting consumers' decision processes. Several studies have examined that prior experience impacts not only on information search but also on business attitudes and product satisfaction (e.g., Bettman & Park, 1980; Brucks, 1985; Kiel & Layton, 1981; Anderson, Engledow, & Becker, 1979). Apart from prior experience, product category knowledge appears to be a tool to process the incoming information for consumers. Category knowledge is not prior experience itself but described as expectations about product attributes and performance levels (Sujan, 1985). However, Alba and Hutchinson (1987) have proposed that product-related experience and factual knowledge toward product categories are two main components of consumer knowledge, and there is a positive relationship between the two components.

While the measures adopted in testing consumer knowledge vary among relevant studies, they could be divided into two main groups: consumers' perception of their knowledge, usually referred to as subjective knowledge, and the actual knowledge, generally considered as objective knowledge (Brucks, 1985; Moorman, Diehl, Brinberg, & Kidwell, 2004). One of the differences between subjective and objective knowledge lies in the accessibility of two types of memory: memory for product-related experience and memory for product-class information. Prior experience significantly contributes to self-assessed knowledge (or subjective knowledge); however, product information

relatively represents objective knowledge (Whan, Mothersbaugh, & Feick, 1994). On the other hand, some researchers regarded using experience as one type of knowledge since its impact on consumer decision-making may differ from how subjective and objective knowledge can influence decision-making behaviors (Raju, Lonial, & Mangold, 1995).

Previous studies have proposed that objective and subjective knowledge are not always positively correlated, and empirical evidence has shown the weak correlation between the above two constructs (Whan, Mothersbaugh, & Feick, 1994; Alba & Hutchinson, 2000; Hadar, Sood, & Fox, 2013). However, some experts found that service domains would lead to weaker objective and subjective knowledge correlations than product domains in the study of medical services and health plans. The low correlations may result from the possibilities of miscalibration; that is, consumers could find difficulties coping with incomplete information regarding service domains, leading to a lower correspondence between objective and subjective knowledge (Alba & Hutchinson, 2000; Carlson, Vincent, Hardesty, & Bearden, 2009). By reviewing the prior consumer research findings, subjective knowledge has been examined to predict consumers' decision processes, including information search and choices. The effect has been tested in the context of financial decisions, food choices, electronic shopping, and traditional retailing scenario (Raju, Lonial, & Mangold, 1995; Moorman, Diehl, Brinberg, & Kidwell, 2004; Hadar, Sood, & Fox, 2013; Hochstein et al., 2021). In terms of financial decisions, people with low subjective knowledge resisted investing in high-risk funds compared to safer investment alternatives. In addition, when given a sophisticated and advanced description of a specific investment option, the participants who perceived less knowledgeable would intend to invest in other options with simply elaborately information (Hadar, Sood, & Fox, 2013).

2.2 Self-efficacy

In most literature, self-efficacy refers to Bandura's definition (1982), the belief in people's capabilities to execute the required actions well in a given task. However, there are more aspects of self-efficacy beyond this description. First, the judgment of their capabilities mobilizes not only the courses of action but also the motivation and cognitions (Wood & Bandura, 1989). Second, perceived efficacy is not an absolute estimate of future action and consequential outcome. Self-efficacy is an expectation that a person can perform a certain task and may not accordingly indicate one's exact strength or understanding. In contrast, the outcome expectation refers to an estimate for the outcome achieved by a given action (Bandura, 1982). In addition, self-percepts of efficacy are determined from four main sources of information. First, performance accomplishment is an antecedent based on personal successes and failures related to experience, and emotional arousal is another individual factor that affects self-efficacy. However, vicarious experiences and verbal persuasion are other two sources similar to social influence. Seeing others' performance and receiving suggestions from others can influence how people perceive their beliefs in capabilities (Bandura, 1977). Among the main four sources, applying the master experiences is the most effective way to develop a strong self-efficacy (Wood & Bandura, 1989).

Since the perceived belief in competence is a dynamic term that could be nurtured and trained (Wood & Bandura, 1989), researchers have found several influencers to increase self-efficacy in the marketing context. Similar to performance accomplishment source, successfully attaining a goal follows a rise in perceptions of self-efficacy (Drèze & Nunes, 2011). Besides, using a brand could enhance consumers' sense of self-efficacy due to its promise of a certain performance level or benefits that people expect to receive (Park & John, 2014). When involving technological innovations, users would

apply surrounding information to developing their feelings of self-efficacy. Therefore, the promotion of innovation, such as training programs or free trials, may help consumers enhance their perceptions of self-efficacy, which also helps to develop a possible solution for overcoming resistance to technical change (Ellen, Bearden, & Sharma, 1991).

Bandura's social cognitive theory (1986) stated that self-efficacy determines the choice of behavioral settings, incorporating motivations and commitment to desired goals. Thus, people who shared the same competencies may perform inadequately due to different levels of perceived self-efficacy since high self-efficacy leads to a willingness to devote more effort to a challenging task (Wood & Bandura, 1989). Self-efficacy was often examined as a mediator in the empirical study of marketing. For example, the relationship between brand using and task performance was mediated by self-efficacy. Exposure to brand use enhances percepts of self-efficacy, resulting in better performance; that is, consumers may feel more knowledgeable since brands would ensure the products' benefits and functions performance for users (Park & John, 2014). Second, financial self-efficacy can mediate the relationship between high-BMI individuals' exposure to human-like shape and spending preferences, based on the widely-shared association between fitness and financial discipline in western society. (Romero & Craig, 2017). In terms of financial services, self-efficacy can not only influence financial decision-making but also predict the consumers' and service providers' participation enjoyment. When self-efficacy is high, consumer participation has a positive impact on participant's satisfaction evaluation.

2.3 Adoption of Wealth Management Mobile Apps

Technology adoption literature incorporates several models and concepts to explain consumer adoption behaviors in terms of technological innovations. Since contemporary and modern innovations are widely concerned with technology, researchers have applied diffusion of innovation theory to technology adoption studies. Bass (1969) introduced the original diffusion model, which elaborates the people's difference of adopter categories and the communication process between the early adopters and potential adopters (Roger 1995; Mahajan & Muller, 1979). Afterward, Roger (1995) argued that the innovations could not be regarded as homogeneous in the analysis; therefore, innovation characteristics have been widely examined as constructs to determine behavioral intentions. The relationship between adoption behavior and specific innovation or individual differences often generates inconsistent results across different diffusion and innovation literature contexts. The use of mediators such as consumer readiness is included to clarify the inconsistency, implying that consumer self-evaluation plays a role in predicting adoption behaviors (Meuter, Bitner, Ostrom, & Brown, 2005). The technology acceptance model (TAM) is another theory that has captured massive attention in adoption research. In 1985, Fred Davis proposed that perceived ease of use (PEOU) and perceived usefulness (PU) determine people's attitude toward using based on the Theory of Reasoned Action. By examining abounding replication studies, the user motivation-relevant model has been tested in the various application contexts, and its measurement instruments have been validated. The evolving process includes eliminating attitude and replacing behavioral intention and extension with different variables as the external variables for PE and PEOU. Regardless of the limitations and weaknesses, TAM seems to be a popular and well-explained system to predict varied technology adoption in both voluntary and

mandatory situations (Lee, Kozar, & Larsen, 2003; Chuttur, 2009; Marangunić & Granić, 2015).

"WealthTech," a contraction of wealth technology, is referred to as a FinTech sector that promotes technology application in the process of wealth management and investment (Tammass-Hastings, 2017; Puschmann, 2017). By employing emerging technologies, such as blockchain, Big Data, and artificial intelligence, WealthTech can provide digital investment solutions with more competitive pricing than traditional investment management firms' alternatives (Cheng, 2019). Two factors are considered to drive the disruption trend in the wealth management industry. One is the increased operating cost pressure from the demanding regulatory change since the 2008 financial crisis, whereas the digital savvy has been changing the customer profile in the financial advisory service (Phoon & Koh, 2017; Chishti & Puschmann, 2018). However, putting the service online does not reach the definition of WealthTech. It must be a novel business model serving with better user experience and quality (Tammass-Hastings, 2017). Robo-advising may be described as the focus of attention in WealthTech since the digital platform can offer mainly passive automated portfolio management advice driven by algorithms with little to no manual control. (Traff, 2016; Phoon & Koh, 2017; Grace & Sarta, 2020). In addition, mobile technology has significantly transformed the sharing and presenting of information, creating a better opportunity to enhance customer relationship management. (Malhotra, 2014). Therefore, the mobile platform can offer an investment advisory service that combines other financial services to address clients' needs. Through this service, consumers can access and benefit from financial services beyond the bounds of time and space.

2.4 Millennials and WealthTech

The millennial generation is one of the critical issues widely discussed by news media and researchers; therefore, several range definitions of the generation involve people born from the 1980s to early 2000s. The defining range by Pew Research Center, 1981-1996, maybe considerably accepted not only based on its dedication to millennials studies for dozens of years, but also relying on the reasons that made the people born in this period distinguished from other generations, like Gen X, and Gen Z. From the political perspective, most millennials experienced the shadow emerging from terrorist incidents like 911 and the following war on terror in the Middle East. In terms of economics, most millennials were faced with the Great Recession in 2008 when entering the workforce as new graduates (Dimock, 2019). The above showed that the millennials shared the same background. In addition, millennials are also known as digital natives since they have witnessed the information revolution and enjoy the benefits from technology innovations since their childhoods. Technology has been their first choice to interact and know the world (Hershatter & Epstein, 2010). Although some of the statements and reasoning behind the defining range seem to be from American or Westernized viewpoints, globalization and social media have made the millennials more similar among the nations than the older generations. Therefore, the year range and findings from the studies may be generalized across the border (Stein, 2013).

Some studies revealed that millennials are considered to have more narcissistic personalities than other generations, and people refer to them as “Generation Me.” The innovation of the Internet and electronic communication devices have empowered millennials to fight against organizations in a couple of industries, such as blogging vs. journalism and YouTube vs. broadcasting (Stein, 2013; Hershatter & Epstein, 2010).

However, ambition and confidence may be better descriptions for them since the mentioned negative impression may come from the ongoing conflicts and challenges of new technology to our current lifestyles. Besides millennials' willingness to adopt new technology, as the traditional investment firms on Wall Street were blamed for the financial crisis, WealthTech has become an ideal solution to risky human interference in the investment process. Moreover, the Great Recession may leave a lasting effect that millennials are estimated to have lower income than previous generations at comparable ages. With the help of technology, the robo-advising services usually charge low fees and seem to be more appealing for non-high-net-wealth individuals such as millennials (Traff, 2016; Grace & Sarta, 2020). Reflecting these trends, the emergence of investment apps considerably increased due to the demand from the potential generation of investors—the Millennials (Malhotra, 2014). According to the free of charge and individual-use designed traits of mobile apps, there might be a gap between the factors that influence the adoption of mobile apps and previous findings in information system community literature (Xu, Frey, Fleisch & Ilic, 2016).

Chapter 3 – Hypotheses

3.1 Influence of Subjective Knowledge on WealthTech App adoption

In previous research findings, consumers' decision processes can be attributed to the influence of subjective knowledge since people are motivated to perform consistently with their levels of subjective knowledge (Moorman, Diehl, Brinberg, & Kidwell, 2004). Considering that people with higher subjective knowledge prefer risky investment options (Hadar, Sood, & Fox, 2013), this paper proposes that people in high subjective knowledge conditions are willing to adopt WealthTech mobile apps, as the investment apps provide novel functions that seem more challenging than traditional investment processes. In innovation adoption literature, consumer readiness constructs were examined to predict trial adoption behaviors. One of the readiness constructs is defined in terms of consumer knowledge and their understanding of adopting self-service technologies (Meuter, Bitner, Ostrom, & Brown, 2005). It shows another convincing proof that subjective knowledge can determine the adopting intentions of mobile apps, because mobile apps are also considered as one of the self-service technologies. In addition, there might be a gap between the factors that influence the adoption of mobile apps and previous findings in information system community literature (Xu, Frey, Fleisch, & Ilic, 2016). However, several researchers have tested various constructs to influence mobile app adoption based on the technology acceptance literature (Malik, Suresh, & Sharma, 2017; Zhang, Lu, & Kizildag, 2018). Among the constructs, facilitating conditions are used to scale whether a user is equipped with enough resources and knowledge to use new technology. Zhang, Lu, and Kizildag (2018) have particularly examined facilitating conditions in mobile banking

platforms, and found a positive association between consumer knowledge and banking app adoption. Accordingly, this paper expects the following hypothesis:

H1: Consumers with a higher level of subjective knowledge in financial literacy are more likely to adopt to use WealthTech apps on their mobile.

3.2 Self-efficacy's Mediation Effect on WealthTech App adoption

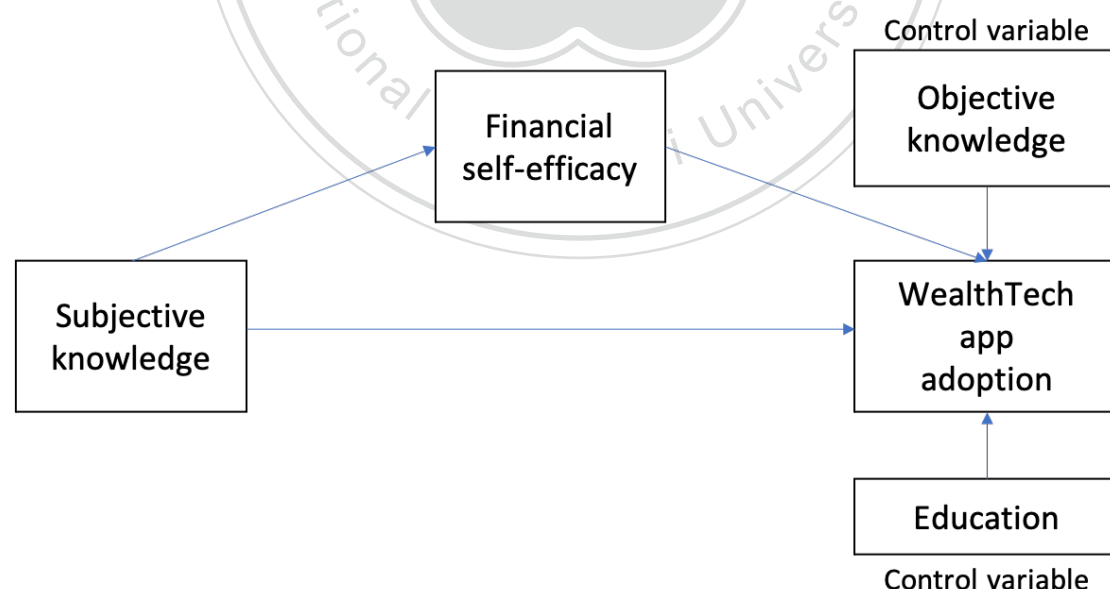
This paper proposes that subjective knowledge on WealthTech app adoption is mediated by self-efficacy for a couple of reasons. First, prior experience is the dominant source for consumer knowledge and self-efficacy (Alba & Hutchinson, 1987; Wood & Bandura, 1989). Although subjective knowledge gives relatively access to more prior experience memory (Whan, Mothersbaugh, & Feick, 1994), the prior experience can enhance people's perceptions of self-efficacy as well. Second, people with more self-efficacy can devote themselves to a more demanding task. Since the first robo-advisor was introduced after the Great Recession (Phoon & Koh, 2017) and the emergence of WealthTech products and services increased within the decade, new platforms such as investment apps may require users much effort to engage. In the innovation adoption context, self-efficacy is more likely to predict consumer technology acceptance. Furthermore, Wood and Bandura (1989) indicated that self-efficacy could cause different adoption actions by people who display the same skill levels. Therefore, people with the same subjective knowledge may vary in WealthTech app adoption behaviors due to distinctive levels of perceived self-efficacy.

Self-efficacy is a relevant concept in financial decision-making. For example, high self-efficacy conditions can help intensify both consumers' and service providers' participation enjoyment during financial services. Participation enjoyment has also been proposed to be one of the influencers for mobile app adoption (Yim, Chan, & Lam,

2012; Malik, Suresh, & Sharma, 2017). Another example is that financial self-efficacy can exert mediation effects on spending behaviors. People with a low level of financial self-efficacy can lead to indulgent spending behaviors (Romero & Craig, 2017). From a technology acceptance perspective, self-efficacy is a critical force for technological innovations, considering that self-evaluating and perceived processes were usually tested as mediators in innovation adoption studies (Meuter, Bitner, Ostrom, & Brown, 2005). Individuals who perceive low self-efficacy tend to choose the options that they can control, leading to a high likelihood of resistance to applying new platforms in their investment processes (Seltzer, 1983). Thus, this paper expects the following hypothesis. Figure 1 summarizes overall conceptual model of this paper.

H2: Self-efficacy mediates the relationship between subjective knowledge and WealthTech app adoption.

Figure 1.1 Conceptual Model



Chapter 4 – Methods

4.1. Sampling and participants

Based on a convenience sampling, 194 adults were finally recruited through MTurk to participate in this study through an age-related screening question in accordance with this paper's research objective, millennials' intention of investment application adoption. This paper defined millennials as those who were born between 1981 and 1996. This definition was provided by The Pew Research Center in 2019 and the Federal Reserve Board in 2019. Therefore, the results of 194 participants who met the age requirement were included in the analysis.

4.2. Measurement

Variables and references

The survey incorporated three parts. First, the following information was provided to enhance the participants' subjective knowledge by describing investment applications' features and illustrating that the users can enjoy property trading, information browsing, and related advisory services on the mobile platform. Although some participants may already be exposed to fintech products, the given introduction session helped ensure that all respondents have similar understandings of investment applications.

Second, the participants were asked items regarding objective knowledge, subjective knowledge (Hadar, Sood, & Fox, 2013), financial self-efficacy (Schwarzer & Jerusalem, 1995), and WealthTech app adoption (Ahn, Ryu, & Han, 2007).

Generally, the original items were edited to the extent that they fit with the research context. For example, the observed items of financial self-efficacy were developed based on the General Self-Efficacy Scale (GSES) (Schwarzer & Jerusalem, 1995). Lown (2011) also has adapted GSES and did specific adjustment to measure financial self-efficacy, because GSES is a general measure and it is essential to take the context being measured into consideration (Bandura, 2006). Appendix provides the completed list of items and their references.

Lastly, the participants were asked to fill in their answers on the demographic session, such as education level, employment status, and age.

Regression analysis

The research performed a regression analysis to examine the association of a few factors with app adoption. The dependent variable was adoption, and the key independent variables were subjective knowledge and financial self-efficacy. This paper included objective knowledge as a covariate to control for the possible impact of financial literacy levels.

Chapter 5 - Results

5.1 Descriptive Statistics

5.1.1 Demographic Profile of Participants

Table 5.1 reveals demographic information and financial literacy levels for the survey participants, provided on the following page. In terms of gender, males comprised almost 70% of the sample. The respondents' average objective financial knowledge was considered intermediate level, as 2.43 out of 4 reported. Over 80% of the respondents were either employed full-time or self-employed, while less than 5% were students or unemployed. Almost half of the household had an income of \$50,000 or above. The mean of respondents' age was 31.42 as of 2020. As the sample demographics described, the results and relevant insights seem to be an adequate reference to the institutions that aim to offer investment application services to millennial users.

Table 5.1 Demographic Profile

Variable	Frequency	%	Mean (SD)
Age			31.42 (4.17)
Gender			
1. Male	135	69.6	
2. Female	59	30.4	
Education			
1. Less than a high school diploma	3	1.5	
2. High school degree or equivalent	33	17.0	
3. Bachelor's degree (e.g., BA, BS)	116	59.8	
4. Master's degree (e.g., MA, MS, MEd)	38	19.6	
5. Doctorate (e.g. PhD, EdD)	4	2.1	
Employment Status			
1. Employed full-time (40 hours+ a week)	149	76.8	
2. Employed part-time	24	12.4	
3. Unemployed	6	3.1	
4. Student	2	1.0	
5. Self-employed	13	6.7	
Annual household income			
1. Less than or equal to \$10,000	8	4.1	
2. \$10,001 ~ \$50,000	92	47.4	
3. \$50,001 ~ \$100,000	75	38.7	
4. \$100,001 ~ \$150,000	15	7.7	
5. Greater than or equal to \$150,001	4	2.1	
Total	N=194		

5.1.2 Descriptive Steps for Variables

Table 5.2 reveals means, standard deviation and Pearson correlation result between the continuous variables, including age, objective knowledge, subjective knowledge, financial self-efficacy, and WealthTech app adoption. There was a significant negative correlation between objective knowledge and subjective knowledge; however subjective knowledge has a significant positive correlation with financial self-efficacy. In addition, increases in subjective knowledge and financial self-efficacy were correlated with increases in WealthTech app adoption.

Table 5.2 Means, Standard Deviation and Correlation Matrix (n=194)

	M	SD	1	2	3	4	5
1. Age	31.42	4.17	1				
2. Objective knowledge	4.85	1.46	-.060	1			
3. Subjective knowledge	4.73	1.31	-.124	-.144*	1		
4. Financial self-efficacy	3.82	0.73	-.200*	-.116	.441**	1	
5. WealthTech app adoption	4.04	0.65	-.016	-.065	.221**	.301**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

5.2 Measurement Model

Factor analysis

This paper first conducted Exploratory Factor Analysis (EFA) to ensure that the variability narrowed into four factors. By applying Principal Component Analysis, the rotated component matrix indicates four constructs based on Varimax rotation. The results are listed in Table 5.3.

Table 5.3 Factor Analysis

Rotated Component Matrix					
		Component			
		1	2	3	4
Self-efficacy	SE1	.719	.153	.179	-.057
	SE2	.732	.085	.076	.003
	SE3	.781	.143	.110	.129
	SE4	.798	.147	.122	-.057
	SE5	.733	.139	.159	-.046
	SE6	.705	.184	.157	-.084
	SE7	.733	.258	.061	-.098
	SE8	.625	.322	-.063	-.101
Subjective knowledge	SK1	.285	.858	.094	-.025
	SK2	.237	.846	.135	-.075
	SK3	.262	.886	.086	-.028
	SK4	.210	.884	.054	-.044
WealthTech app adoption	Adoption1	.118	.043	.811	-.024
	Adoption2	.069	.073	.734	-.183
	Adoptionb3	.150	.049	.794	.148
	Adoption4	.161	.027	.793	-.125
	Adoption5	.078	.152	.800	.117
Objective knowledge	OK ETF	.081	-.088	-.038	.792
	OK REIT	-.194	-.020	-.005	.607

Reliability

This study evaluated the research constructs' reliability through SPSS 21.0. Each alpha coefficient for each construct was greater than 0.80, showing a relatively high internal consistency. The results are shown in Table 5.4.

Table 5.4 Reliability Analysis

Construct	Number of items	Cronbach's alpha (α)
WealthTech app adoption	5	0.857
Subjective knowledge	4	0.931
Financial self-efficacy	8	0.895

5.3 Regression model

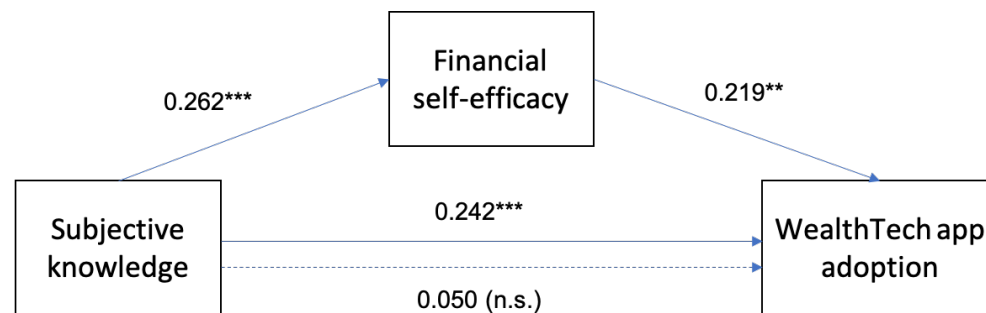
Main effect

Figure 5.1 proposes all coefficients in the model. The results show a marginally significant interaction between the variables. Hypotheses H1 illustrates that subjective knowledge has a positive effect on adoption. The regression analysis reveals that subjective knowledge positively influences WealthTech app adoption ($\beta = 0.107$, t -value = 3.027, $p < 0.01$).

Mediation effect

Additionally, following Baron and Kenny (1986), a mediation test was conducted using a hierarchical regression to test a mediating role of self-efficacy between subjective knowledge and Wealth Tech App adoption when objective knowledge was controlled. As shown in Table 5.5, the indirect effect of financial self-efficacy was significant, while the main effect of subjective knowledge became no longer significant. Therefore, the results support a full mediation.

Figure 5.1 Mediation Effect



Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5.5 Hierarchical Regression Analysis

Dependent variable	Independent variable	β	Std. error	t-value	p-value
WealthTech app adoption	(Constant)		0.256	10.988	0.000
	Objective knowledge	-0.054	0.066	-0.827	0.409
	Subjective knowledge	0.242	0.037	6.612	0.000
Financial self-efficacy	(Constant)		0.236	11.571	0.000
	Objective knowledge	-0.038	0.030	-1.253	0.212
	Subjective knowledge	0.262	0.034	7.734	0.000
WealthTech app adoption	(Constant)		0.317	9.494	0.000
	Objective knowledge	-0.007	0.031	-0.224	0.823
	Subjective knowledge	0.050	0.040	1.258	0.210
	Financial self-efficacy	0.219	0.074	2.939	0.004

Indirect effect

Additionally, the indirect path was analyzed using Model 4 in the PROCESS macro for SPSS (Hayes, 2017). The results using a 5,000-bootstrapping method

indicate a significant indirect effect ($\beta = 0.115$) with a 95% confidence interval excluding zero (.016-.229). Thus, the indirect effect of self-efficacy between subjective knowledge and WealthTech app adoption was significant.

Post hoc analysis

Table 5.6 reveals the independent samples *t* test result for gender. There was no significant effect for sex, despite men reporting higher scores than women in terms of the four constructs.

Table 5.6 Independent Samples *t* Test Analysis for Gender

Construct	Male (mean)	Female (mean)	<i>t</i>	<i>p</i> -value
Objective knowledge	4.96	4.61	1.522	0.130
Subjective knowledge	4.856	4.432	1.936	0.056
Financial self-efficacy	3.867	3.722	1.271	0.205
WealthTech app adoption	4.055	4.014	0.405	0.686
Male (n=135), Female (n=59)				

A one-way ANOVA was conducted to test whether there are significant differences in education levels between the means of objective knowledge, subjective knowledge, financial self-efficacy, and WealthTech app adoption. Except three other constructs, the results from the ANOVA analysis revealed at least one significant difference in the subjective knowledge between the education levels, as shown in Table 5.7. The post-hoc test results showed that subjective knowledge significantly differed in the comparison between less than a high school diploma and master's degree, the comparison between high school degree or equivalent and bachelor's degree, the

comparison between high school degree or equivalent and master's degree, the comparison between bachelor's degree and master's degree, and the comparison between bachelor's degree and doctorate. Table 5.8 represents the descriptive statistics for subjective knowledge in five education level groups.

Table 5.7 ANOVA Test Analysis for Education Levels

		Sum of Squares	df	Mean Square	F	Sig.
Subjective knowledge	Between Groups	60.997	4	15.249	10.743	0.000
	Within Groups	268.273	189	1.419		
	Total	329.271	193			
Financial self-efficacy	Between Groups	3.824	4	0.956	1.824	0.126
	Within Groups	99.036	189	0.524		
	Total	102.860	193			
WealthTech app adoption	Between Groups	1.020	4	0.255	0.597	0.665
	Within Groups	80.674	189	0.427		
	Total	81.693	193			
Objective knowledge	Between Groups	12.974	4	3.243	1.541	0.192
	Within Groups	397.691	189	2.104		
	Total	410.665	193			

Table 5.8 Descriptive Statistics for Subjective Knowledge in Education Levels

	N	Mean	Std. Deviation
1 Less than a high school diploma	3	4.000	1.750
2 High school degree or equivalent	33	3.765	1.392
3 Bachelor's degree	116	4.825	1.160
4 Master's degree	38	5.461	1.006
5 Doctorate	4	3.375	1.639
Total	194	4.727	1.306

Chapter 6 – General Discussion

Earlier papers reported that consumer knowledge and self-efficacy could affect people's behaviors in technology adoption and financial decision context. However, few of the papers are relevant to WealthTech app adoption or even mobile app adoption. With the particular interest in wealth management innovations, subjective knowledge, and financial self-efficacy are tested to predict the adoption behaviors. Two hypotheses were derived based on previous literature, and they were tested with 194 millennials in the USA. The results indicate that an increase in subjective knowledge and self-efficacy can positively help their adoption behaviors of WealthTech apps. In addition, this paper found financial self-efficacy's mediation effect on the relationship between subjective knowledge and WealthTech app adoption. Taken together, an individual's positive intentions to engage in mobile investment services are significantly influenced by financial self-efficacy.

6.1 Theoretical Implications

This paper examines reasons for millennials' adoption and use of investment mobile apps. Through the mediation test, the result finds positive associations between subjective knowledge and financial self-efficacy. While consumer knowledge and self-efficacy share the same component, prior experience, the relationship between consumer knowledge and self-efficacy was not often discussed in the financial decision literature. A majority of earlier studies focused on financial knowledge and self-efficacy to predict financial behaviors (Farrell, Fry, & Risse, 2016; Mindra & Moya, 2017). However, a study shows a significant mediation effect of self-efficacy between objective knowledge and individuals' saving behaviors (Rothwell, Khan, & Cherney, 2016). By extending the earlier findings, this paper examined subjective knowledge to determine the levels of financial self-efficacy in financial domains, indicating that subjective knowledge is associated with self-efficacy.

The importance of financial self-efficacy within the technology adoption in the investment process is the study's primary contribution. Self-efficacy has been respectively tested on its effect in technology acceptance and financial decision-making contexts. However, in terms of mobile apps, personality traits and constructs from the TAM model were widely examined to affect users' adoption (Pentina, Zhang, Bata, & Chen, 2016; Xu, Frey, Fleisch, & Ilic, 2016; Malik, Suresh, & Sharma, 2017). When it comes to using mobile technology in the FinTech domain, Zhang, Lu and Kizildag also found positive relationships between TAM's factors and attitude toward the adoption of mobile banking apps. In contrast, this paper shows additional evidence that financial self-efficacy can strongly influence adopting WealthTech innovation products.

6.2. Managerial Implications

Mobile technology has been generally applied to digital transformation in financial services. As Bill Gates said, “Banking is necessary, banks are not,” mobile app platform gave marketers in the financial industry a new tool to interact and do business with customers. Many financial institutions and FinTech companies have invested millions and billions of dollars into developing innovative functions, improving user experience, and proposing differentiation of value for their mobile app products. To increase the penetration rates of the apps, marketers have planned promotions like delivering value proposition through digital ads, implementing consumer incentive and rebate programs. However, not every consumer is familiar with the emergence of various FinTech apps, and they might not possess the required skills and knowledge to perform the given functions well. Hence, marketers should consider targeting those potential adopters equipped with the required skills and cultivate their current users to perform the innovative financial platform more efficiently.

For most WealthTech products, content marketing by owned media is an essential strategy for engaging with customers. They might have YouTube, podcast, or Medium accounts posting just-in-time and investment-relevant information to their users. Therefore, marketers can educate customers and add another advantage to their sets of benefit offerings. However, one-way education might not work well because subjective knowledge relies more on accessibility of product-related experience. Thus, marketers should create more opportunities for users to help them develop their product-related experience such as free trials. Based on the current study results, enhancing people's subjective financial knowledge is not enough to increase adoption behaviors. Considering the importance of consumers' belief in brilliantly using the WealthTech mobile apps, the executives also need to identify practical solutions to

building self-efficacy. Since both personal accomplishment and vicarious experience determine people's levels of self-efficacy, demo videos could enhance the users' self-efficacy in the same way that free trials do.

6.3. Limitations and Future Research

This paper has several limitations, which leads to suggestions for future research. First, since the participants were recruited from the USA through MTurk, which hampers the cross-cultural generalizability of the results. The financial services industry is a highly regulated industry by local governments. Each financial regulatory authority has a different attitude to FinTech innovations and diverse applications of technologies in financial services. A particular WealthTech product can face different levels of regulatory compliance and supervision, which could influence individuals' adoption behaviors. For example, the US regulator allowed financial institutions to conduct transactions of stablecoin cryptocurrency (Satran, 2021), while in East Asia, China has banned payment companies and banks from offering crypto-related services (Reuters, 2021). Thus, future research is suggested to confirm this paper's result in other countries.

Second, the measurement of objective knowledge leads to low reliability of the construct. The index of objective knowledge is the summation of two items, the participants' awareness of ETF and REITs features. While some participants were scored high in the assessment of ETF knowledge, they might be unfamiliar with investing in REITs. However, examining the familiarity of different investment alternatives help the study capture more facets of participants' financial knowledge. In terms of wealth management, diversification is usually applied in the investment process because people can enjoy more stable returns on a less risky investment portfolio. That is, people require a broad range of understanding among investment

alternatives to master their investing, and they would be considered to possess high financial literacy once they understand more investment products. For future research, assessing various investment alternatives should be conducted more in quantity to measure objective knowledge in light of the comprehensiveness of financial literacy. The survey items can cover several perspectives on investment, such as the knowledge of the stock market, interest calculation, and foreign exchange.

Finally, another limitation of this paper is that subcategories were not considered in the study. WealthTech industry includes diversified technologies and innovations developed into specific services. Some WealthTech mobile apps focus on trading and transaction features, and other apps mainly offer robo-advisory services. Moreover, not every WealthTech app is free for use; some apps may charge by using the service, transaction fee, or the assets under management (AUM). The mentioned distinction somehow can affect consumers' adoptions toward using WealthTech apps. In the future, the influence of financial self-efficacy and subjective knowledge on adoption should be examined in different subcategories.

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Appendix

Observed Items

Subjective knowledge (adapted from Hadar, L., Sood, S., and Fox, C. R., 2013)

- | | |
|--|--|
| 1. How much understanding do you have about financial markets? | 1=none, 4=average, 7=above average |
| 2. How competent do you feel about financial knowledge? | 1=not at all, 4=average, 7=very competent |
| 3. Please rate your level of confidence in your knowledge of investment options. | 1=very low, 4=average, 7=very high |
| 4. Please rate your level of confidence in your knowledge of investment options. | 1=not at all confident, 4=moderately confident, 7=very confident |
-

WealthTech app adoption (adapted from Ahn, T., Ryu, S., and Han, I., 2007)

- | | |
|--|---|
| 1. Using a wealth management app is a good idea. | 1= strongly disagree, 3=neutral, 5=strongly agree |
| 2. Using a wealth management app is a wise idea. | 1= strongly disagree, 3=neutral, 5=strongly agree |
| 3. Using a wealth management app is a satisfactory idea. | 1= strongly disagree, 3=neutral, 5=strongly agree |
| 4. Using a wealth management app is a positive idea. | 1= strongly disagree, 3=neutral, 5=strongly agree |
| 5. Using a wealth management app is an appealing idea. | 1= strongly disagree, 3=neutral, 5=strongly agree |
-

Objective knowledge (adapted from Hadar, L., Sood, S., and Fox, C. R., 2013)

1. MSCI Emerging Markets ETF invests mainly in: a. Companies that invest in emerging markets; b. Companies located in emerging markets (Ans. b)
 2. MSCI Emerging Markets ETF invests in emerging markets: a. In the far east; b. Around the world (Ans. b)
 3. MSCI Emerging Markets ETF share values may swing up and down _____ than that of stock funds that invest in developed countries. a. More; b. Less (Ans. a)
 4. Foreign country/regional risk is _____ in emerging markets. a. High; b. Low (Ans. a)
 5. REIT Index Fund Investor Shares invests in: a. Companies that develop revolving energy technologies; b. Companies that purchase real estate (Ans. b)
 6. REIT Index Fund Investor Shares tend to perform _____ stocks and bonds. a. Similarly to; b. Differently than (Ans. b)
 7. One of the REIT Index Fund Investor Shares' primary risks is: a. Its narrow scope; b. Stock market risk (Ans. a)
 8. REIT Index Fund Investor Shares may offer diversification to a portfolio of: a. Stocks and bonds; b. Foreign investments (Ans. a)
-

Financial self-efficacy (adapted from Schwarzer, R. and Jerusalem, M.,1995)

- | | |
|--|---|
| 1. I will be able to achieve most of the financial goals that I have set for myself. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 2. In difficult times, I am certain that I will accomplish my financial goals. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 3. In general, I think that I can reach financial outcomes that are important to me. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 4. I believe I can reach most any financial goal I set for myself. | 1= strongly disagree,
3=neutral, 5= strongly agree |

- | | |
|--|---|
| 5. I will be able to successfully overcome many challenges of financial investing. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 6. I am confident that I can perform effectively on many different tasks related to financing. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 7. Compared to other people, I can perform most financial investment tasks very well. | 1= strongly disagree,
3=neutral, 5= strongly agree |
| 8. Even when things are tough, my financial investments perform quite well. | 1= strongly disagree,
3=neutral, 5= strongly agree |
-

