FACTORS INFLUENCING INFORMATION TECHNOLOGY ADOPTION IN CHINESE RETAILING PHARMACY SECTOR: A CASE STUDY FROM HUAIAN CITY, CHINA

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ABSTRACT

Title of Thesis	FACTORS INFLUENCING INFORMATION TECHNOLOGY ADOPTION IN CHINESE RETAILING PHARMACY SECTOR: A CASE STUDY FROM HUAIAN CITY, CHINA
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In modern society, information technology plays an important role in the field of health care. This study first explored the UTAUT (Unified Theory Acceptance and Use of Technology) to study Chinese Retailing Pharmacy Sector's IT adoption in new mandatory context. By constructing research model Pharmacy-UTAUT, the author tried to find out the core factors influencing IT adoption, the moderators affecting the strength of relationships between variables and the new model's explanatory power. Pharmacy-UTAUT incorporates two constructs (attitude and habit) and two moderators (pharmacy type and pharmacy professional level). Data collection was conducted in Huaian, a random sample of 420 retail pharmacies were selected from a total of 1,878 retail pharmacies. Based on 377 valid sample data, the author constructed initial measurement model and structure model. During the model testing and modifying stage, three constructs: habit, actual use, and facilitating conditions were removed, and the construct social influence was subdivided into industry support and government policy. The final results showed that (1) attitude, performance expectancy, effort expectancy and social influence were the core factors influencing China pharmacy's IT behavioral intention, (2) age, gender, pharmacy type and pharmacy professional level are the moderators affecting the strength of relationships between partial variables in Pharmacy-UTAUT, (3) the final structure model explains about 75 percent of variance

in behavioral intention to use IT. In addition, practical implication, managerial recommendations, limitations and future research are discussed.

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I thank my family, who always believed in me, for supporting my studies.

And I am indebted to the words of Sima Qian, “we may gaze up to the mountain’s brow, we may travel along the greater road, signifying that although we cannot hope to reach the goal, still we may push on thitherwards in spirit.” This proverb always encourages me to keep going forward, to see the scenery I have never seen before.

Now that the writing of this paper has been completed, I hope this will be a starting point for a new long journey.

Su Zhang

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CHAPTER 1

GENERALITIES OF THE STUDY

1.1 Research Background

With the rapid development of Chinese economy, the continuous expansion of the social medical system, the acceleration of urbanization and the aging of the population, and the gradual improvement of people's awareness of health care, the market demand for the pharmaceutical retail industry has been steadily rising. The pharmaceutical retail industry has a reputation of "Eternal Sunrise Industry" in current China (Sun, 2012). According to the 2017 annual statistical report published by the National Bureau of Statistics of China (NBS), in 2015, the total health expenditure was CNY 4.097464 trillion, the total retail sales of pharmaceuticals were CNY 573.185 billion, and the total retail sales grew at an average annual rate of 23.18% from 2007 to 2015.

However, huge opportunity always creates huge competition. Chinese retail pharmacy, especially chain retail pharmacy, as the subject of medicine retailing, has to confront such problems as management costs and difficulty increase. Meanwhile, the customer, as the object of medicine retailing, hope retail pharmacy can provide higher quality services scientifically and efficiently. All this calls for stronger information processing capability, traditional management rely on person cannot satisfy the request of new situation. Development and application of management information system (MIS) is put on the business agenda. Compared with other industries, IT construction in the pharmaceutical retail industry started late, but developed fast (Ju, 2015). In 2000, Tong Jun Ge pharmacy first applied MIS to the

whole enterprise scope (Yang, 2011). Afterwards a series of MIS for retail pharmacy was developed, but limited to enterprise scale and capital, mainly used by medium and large chain retail pharmacies (Yang, 2011).

Meanwhile, as a special commodity, medicine is closely related to body health and life safety of people. Therefore the government has strict and meticulous management control measures for it. In 2013, China Food and Drug Administration (CFDA) issued the new Good Supply Practice (GSP). Collated with early edition, GSP 2013 states new laws for medicine quality management from the IT aspect (Xi et al., 2014). For retail pharmacies, it is clearly proposed to establish and use computer information systems that are compatible with enterprises and meet the need for drug traceability. Meanwhile, enterprises are required to have informational dynamic supervision in the process of import, storage and sale of drugs, and use information management tools to build modern pharmaceutical logistics. Jiangsu Province, because of its superior economic and policy environment, was selected as one of the pilot areas of this medical reform. In 2014, Chinese Food and Drug Administration issued the revised draft of on-site inspection guidelines for GSP. Some of the guidelines, specifically Regulation No. 12313, 14101 and 14601 (Appendix B), translate the pharmacy IT requirements in GSP into detailed inspection content. So far, the use of MIS becomes a major threshold for retail pharmacies to obtain legal business qualification.

1.2 Research Question

In the field of MIS, there is a “Productivity Paradox” that the huge investment in IT does not bring about the expected rapid growth of productivity, but makes productivity growth stagnate or even decline (Solow, 1987). Many scholars analyzed this phenomenon and came to a similar conclusion, which was the value of IT can be

revealed only when IT is accepted and continuously used by users (Venkatesh et al., 2003).

A series of theoretical models emerged concerning “User IT Acceptance and Use”. It can be traced back to 1989 when Davis, Bagozzi and Warshaw pioneered Technology Acceptance Model (TAM) based on the Theory of Reasoned Action (TRA). Then, in 2000, Venkatesh and Davis developed Extension Technology Acceptance Model (TAM2) based on TAM. In 2003, Venkatesh, Morris, Davis, G.B. and Davis, F.D., based upon conceptual and empirical similarities across prior 8 models, formulated Unified Theory of Acceptance and Use of Technology (UTAUT). In 2012, Venkatesh, Thong and Xu extended UTAUT to study IT acceptance and use in consumer context, proposed Extension Unified Theory of Acceptance and Use of Technology (UTAUT2).

This study first explored the UTAUT to study Chinese Retailing Pharmacy Sector’s IT adoption in current mandatory context. The research questions this empirical study aimed to address were:

1. What are the core factors and relationships influencing IT adoption by Chinese retail pharmacies?

2. What are the moderators influencing relationships between variables in Pharmacy-UTAUT model?

3. Compared with TAM and UTAUT model, to what extent does Pharmacy-UTAUT model explain and predict IT adoption among Chinese retail pharmacies?

4. What managerial recommendations arise from the results of this study for related groups involved in the informatization construction to enhance adoption of IT by Chinese retail pharmacies?

1.3 Aims and Significance of the Research

1.3.1 Research Aims

First, by reviewing related literature, to construct Chinese Pharmacy-UTAUT model, which is developed from previous famous IT adoption theory with fewer limitations and higher explanatory power.

Second, on the basis of Pharmacy-UTAUT, by empirical study and data analysis, to explore the core factors and relationships influencing IT adoption, the moderators influencing relationships between variables and the new model's explanatory power of IT adoption compared with old ones.

Third, based on the empirical study results, to propose managerial recommendations for related groups involved in the informatization construction especially for retail pharmacy, the enterprise which provides IT services and the local government.

1.3.2 Research Significance

From the perspective of academic significance, the research on User's IT acceptance and intention to use has progressed more than 40 years in the world. Chinese scholars have introduced information technology acceptance models and developed a suitable social and cultural background on this basis. The new model has a history of more than 10 years, but it is still very inadequate to take the segmentation field of the Chinese pharmaceutical retail enterprise as a research object. At the same time, the previous research of Chinese scholars mostly focused on individual users' attitudes and acceptance of information technology, and less on the acceptance behavior of enterprise users, that is, more research on "information technology users in non-organizational backgrounds" than those on "information technology users in the background of organizations" (He, 2011). Based on the technology acceptance

model of UTAUT and the characteristics of information technology use in Chinese retail pharmacies, this study explored the establishment of retail pharmacy information technology acceptance and use models. Through a questionnaire, this thesis tested the model, analyzed the relationship between the various influencing factors and the direction and extent of the influence of these factors on the intention to use information technology in retail pharmacies, thus provides a scientific and rigorous theoretical basis for the acceptance and use of information technology by Chinese retail pharmacies and supplements the insufficiency in this field of research.

From the perspective of empirical use, the retail pharmacy is not only an important part of the drug distribution field, but also one of the most important sales terminals for consumers, whose IT construction plays an extremely important role in improving the quality of medicine supply services. The research result of this thesis can provide a valuable reference for related groups involved in Chinese retail pharmacy informatization construction, and finally benefit the public.

1.4 Definition of Terms

1.4.1 Chinese Retail Pharmacy

Article 77 of the Regulation for Implementation on China Pharmaceutical Administration Law states that “Retail pharmacy refers to pharmaceutical business enterprise that sells purchased medicine directly to consumers”. As shown in Figure 1.1, the retail pharmacy is an important part of the drug distribution field, and at the same time it is one of the most important sales terminals for consumers. They bear the burden of medicine quality assurance. It is precisely for this reason that China Pharmaceutical Administration Law detailed strict contents for the application of “Medicine Business License” and certification of GSP. According to the latest statistics from the National Bureau of Statistics of China, there were 447,034 drug

retailers with legal business qualifications recorded in 2016. In 2015, the total retail sales of pharmaceutical retail enterprises was CNY 573.185 billion, accounting for 13.99% of the total national health expenditure.

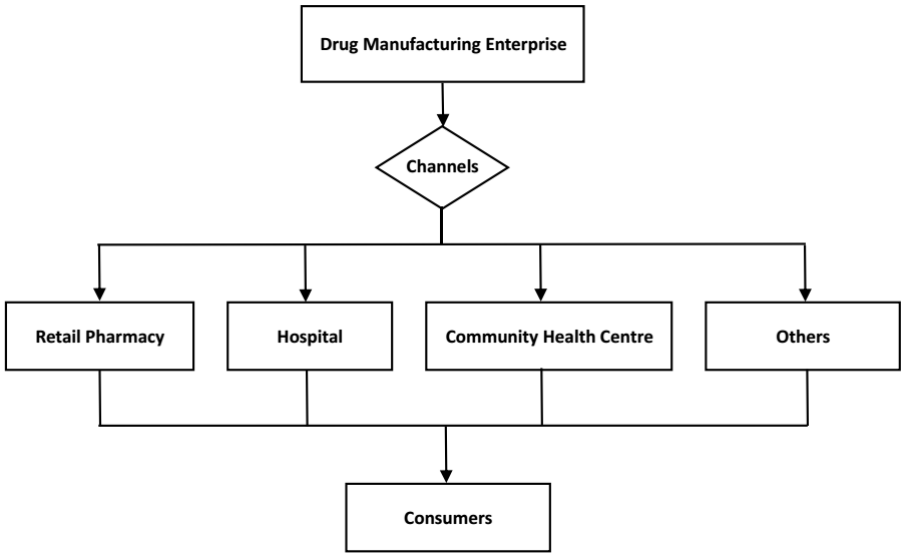

Figure 1.1 Chinese Drug Distribution System
Note: The word "Others" represents other forms of primary health service institutions, such as rural community health centers. Adapted from Shuimu Tinghua Research Center (2009).

1.4.2 Information Technology (IT)

Scholars from different disciplines have different definitions of information technology. This thesis mainly refers to the definition of IT in the field of Application Information Economics, which states "IT refers to all technologies, related methods, systems, skills, tools, and material equipment that involve the production, collection, storage, processing, circulation, and application of information (Zhang, 2008)." At the same time, according to the relevant provisions of GSP 2013 and on-site inspection guidelines for GSP 2014 issued by CFDA, the Chinese retail pharmacy IT should take modern network technology and computer database technology as the main form.

Based on the above, IT in this thesis refers to the information technology used by Chinese retail pharmacy after the implementation of GSP 2013, taking modern network technology and computer database technology as the main form to organize production and operation activities. This type of retail pharmacy IT mainly includes GSP supervision, inventory management, HR management and administration, financial management and customer relationship management.

1.4.3 Adoption

The “Adoption” of retail pharmacy IT in this thesis refers to the user’s acceptance, use, and continuous use of an IT, including user’s behavioral intention and actual usage. Behavioral Intention and actual usage are also important dependent variables in IT adoption theory. Adoption differs from purely actual usage, which focuses on the statue and result of the behavior. Adoption, on the basis of actual usage, also reflects the user’s behavioral intention to use IT (Su, 2014). Besides, adoption distinguishes the user’s initial purchase from continuous use and reflects that retail pharmacy operators have made decisions on the continuous use of IT after the trial period (Xu, 2016).

In addition, Venkatesh et al. (2003) pointed out that in IT adoption research, it is generally assumed that positive adoption will produce positive output for individuals or organizations. However, there is little research to analyze and discuss relationships between user’s IT adoption and IT output. This study then explored this area of interest and also followed the implicit assumption that positive adoption of information technology by retail pharmacies would produce positive output.

1.4.4 Organizational Setting

Dessler and Phillips (2007) pointed out that an organization is composed of officially assigned personnel and those who must work together to achieve the

organizational goal. Therefore, the organizational setting in this study referred to the work situation of employees in the organization. The IT in the organizational setting refers to the organizational IT used by the employees in their work. In this way, IT users in the organizational setting can be distinguished from IT users in the non-organizational setting. The organizational IT used by the former is more complex and profound (Venkatesh et al., 2003), and its empirical research result is more beneficial to production practices.

It is important to note that organizational setting is not the same as mandatory use setting. In TAM2 and UTAUT, researchers classified surveyed organizations as mandatory use setting and voluntary use setting. In this study, Chinese retail pharmacies use IT in the mandatory setting.

1.5 Research Progress and Chapter Arrangement

This study started from the research topic “Factors Influencing IT Adoption in Chinese Retail Pharmacy” and focused on four research questions. The research progress was divided into two phases, and the overall situation is shown in Figure 1.2.

The first phase is model revision and development, including defining research context and questions (chap. 1), literature review (chap. 2), constructing research model (chap. 2), suggesting hypotheses (chap. 2) and operationalizing core variables (chap. 3). The second phase is behavioral intention and usage study, including designing the questionnaire and sampling procedure (chap. 3), analysing empirical data (chap. 4), discussing the empirical results (chap. 4) and research conclusion and future research (chap. 5).

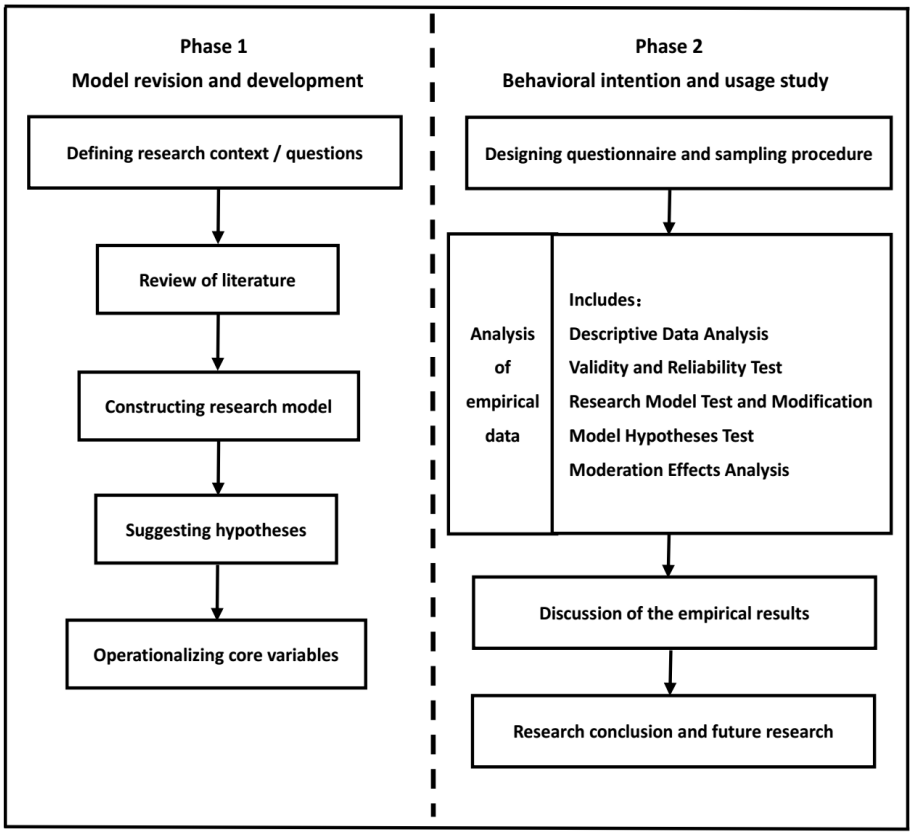

Figure 1.2 Research Process

CHAPTER 2

LITERATURE REVIEW AND MODEL DEVELOPMENT

Based on the research process design, this chapter is divided into four parts: the first part reviews the development history of IT adoption theory, which focused on UTATU model; the second part outlines empirical research on the extension of UTAUT model to different cultural environments or organizational settings by following scholars; the third part is based on UTAUT model to construct Chinese retail pharmacy IT adoption model, which is referred to as Pharmacy-UTATU model; the fourth part presents definition of terms, theoretical source explanation and hypotheses on core variables.

2.1 IT Adoption Models and Theories

The theoretical foundation for research on IT adoption is the basic theory of social psychology and organizational behavior (Davis et al., 1989), such as TRA and Theory of Planned Behavior (TPB). IT adoption theory assumes that external factors, such as system features and user characteristics, can only affect the individual behavioral intention and actual usage through the individual's intrinsic values and ideas system (Venkatesh et al., 2012). This section takes a view on TAM, TAM2, UTAUT and UTAUT2. The evolution of these models reflects mutual learning and improvement of different IT adoption theories.

2.1.1 Technology Acceptance Model (TAM)

In order to study a user's intention to use a new IT, and to explore the core factors and their relationships influencing intention, the American scholar Davis (1985) first proposed TAM in his PhD dissertation. TAM is based on TRA of Ajzen and Fishbein (1975), while Davis (1985) also absorbed relevant research results of other scholars, such as Schultz and Slevin's (1975) performance factor (similar to perceived usefulness) and Bandura's (1982) self-efficacy (similar to perceived ease of use).

In TAM, Davis et al. (1989) believed that user's system use is determined by user's behavioral intention. Behavioral intention is influenced by user's attitude and perceived usefulness, and perceived usefulness and perceived ease of use are the key direct factors affecting attitude. Perceived usefulness and perceived ease of use are the core indicators of TAM. Perceived usefulness is defined as the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context, and perceived ease of use is defined as the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989). Perceived ease of use also has a direct effect on perceived usefulness. In addition, external variables such as system features and user characteristics, as antecedent variables directly affect perceived usefulness and perceived ease of use. The entire theoretical model is shown in Figure 2.1.

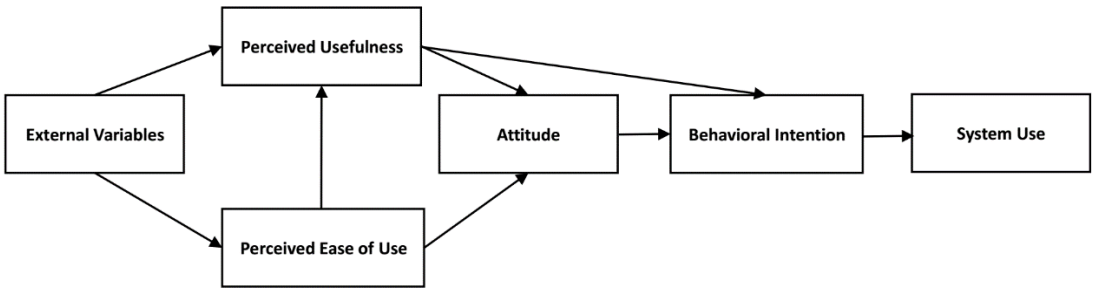

Figure 2.1 Technology Acceptance Model (TAM)
Source: Davis et al. (1989)

To empirically test how well TAM predicts and explains voluntary usage of a word processing system (WriteOne), Davis et al. (1989) gathered data via questionnaire from 107 full-time MBA freshman students at the University of Michigan. The survey had two stages: the first stage survey was conducted at the beginning of the semester, and the second stage survey was conducted at the end of the semester after 14 weeks of use. Their results yielded two main insights:

1. User's actual usage can be predicted reasonably well from their intentions. TAM accounted for 45% and 57% of the variance in intentions at the beginning and end of the 14 weeks study period respectively. This is in accordance with the Ajzen and Fishbein's (1975) view that "Intention-behavior correlation would diminish with increased elapsed time."

2. Perceived usefulness is a major determinant of user's intention to use computers, and perceived ease of use is a significant secondary determinant of intentions. Specifically, in time 1, perceived usefulness ($\beta = 0.62$) and perceived ease of use ($\beta = 0.20$) directly affected intentions. In time 2, perceived usefulness ($\beta = 0.79$) directly affected intentions alone, perceived ease of use indirectly affected intentions via usefulness ($\beta = 0.24$). In other words, when IT was first introduced, intention was determined by perceived usefulness and perceived ease of use. After a period of time (14 weeks), intention was only directly affected by perceived usefulness, perceived ease of use, through perceived usefulness, which indirectly affected intention.

After TAM was proposed, because of its simple and high explanatory power features, it was widely accepted by many scholars. However, with the increase of empirical study, the limitations of TAM were gradually exposed:

1. The research method measuring actual use is relatively simple. They employed self-report use as the measure of computer use. The data collected in this way has high subjectivity, which leads to low credibility.

2. There is a problem with the selection of research objects. The volunteers are all students. They have the same quality, which makes the results difficult to promote. Plouffe et al. (2001) selected businessman as their objects to investigate the acceptance of Smart Card. Their research results showed that the explanatory power of TAM on businessman was only 33%.

3. The exogenous variable "Subjective Norm" is discarded. Subjective norm is also known as social norm or social influence. Ajzen and Fishbein (1975) defined it as "An individual's positive or negative feeling about performing the target behavior." That is the pressure that individuals feel from social network members when taking action. Legris et al. (2003) also pointed out that in IT actual use, users would face many social pressures; the impact of subjective norm should be included.

2.1.2 Extension Technology Acceptance Model (TAM2)

Because of the shortcomings in TAM, Venkatesh and Davis (2000), based on original model, synthesized other scholars' research, proposed TAM2. TAM2 removed behavioral attitude, and incorporated two additional theoretical constructs: Social Influence Processes (subjective norm, voluntariness, and image) and Cognitive Instrumental Processes (output quality, job relevance, result demonstrability, and perceived ease of use). Experience and voluntariness were introduced as moderator variables. Figure 2.2 presents the TAM2.

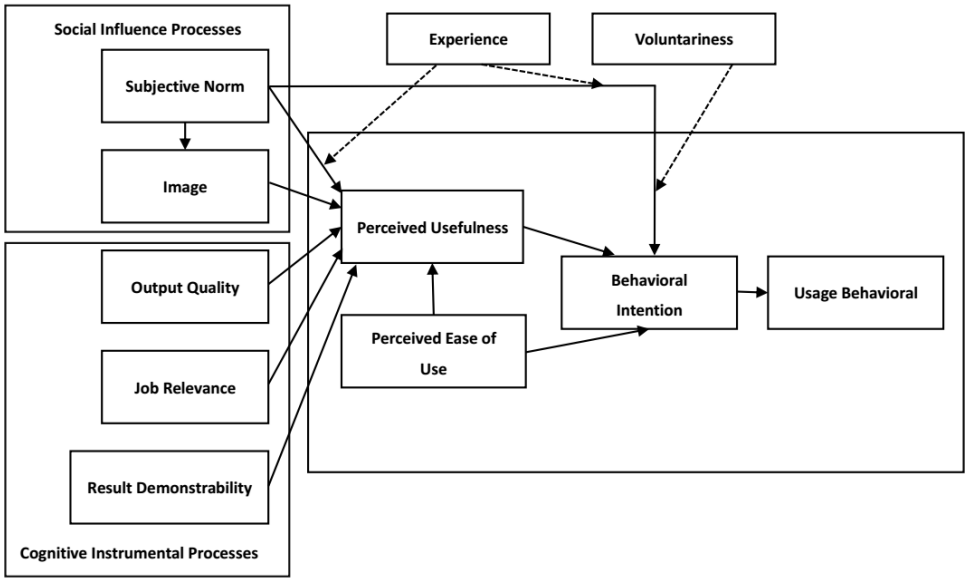

Figure 2.2 Extension TAM (TAM2)
Source: Venkatesh and Davis (2000)

To empirical test TAM2, Venkatesh and Davis (2000) conducted four longitudinal field studies. The four field sites spanned a range of industries, organizational settings, functional areas, and types of system being introduced. They chose two sites in voluntary use, and two in mandatory use. The survey had four stages. Questionnaires were distributed in T1 (after initial training), T2 (one month after implementation) and T3 (three months after implementation). Self-reported usage behavior was measured in T2, T3 and T4 (five months after implementation). Finally, a total of 468 valid samples were collected. Main statistical analysis results are as follows:

1. All measurement scales have strong psychometric properties. Scales reliability and construct validity are strongly supported.

2. TAM2 explains between 37% and 52% of the variance in usage intention. Perceived usefulness is a strong determinant of intention, and perceived ease of use is a significant secondary determinant across all stages in four study sites. But for subjective norm, when in the settings of voluntary use, it has a direct effect on

intentions at T1 and T2, and this effect weakens to the point of non significance by T3. In contrast, when in the settings of mandatory use, subjective norm has no direct effect on intention.

3. TAM2 explains 40% to 60% of the variance in perceived usefulness. Perceived ease of use is significant across all stages in four studies. The effect of subjective norm on perceived usefulness is significant at T1 and T2, but weakens by T3.

4. Perceived usefulness is the most stable determinant (0.56 to 0.79) of intention. The cross-temporal stability correlations for subjective norm are relatively high (0.51 to 0.65). In contrast, the correlations are systematically lower for perceived ease of use (0.12 to 0.37).

In general, the applicability of TAM2 to explain users' IT adoption is significantly enhanced compared with TAM. But there are still some limitations (Venkatesh & Davis, 2000):

1. The low sample size (less than 50) of each sample group reduces the power of significance tests.

2. The data analysis does not use structural equation modeling (SEM). Several of the constructs (subjective norm, job relevance, and output quality) are measured with only two items, which would result in instability of parameter estimates if using SEM.

3. The longitudinal study does not include experimental manipulation of theoretical constructs. Experimental replication of these findings would enhance causal interpretations of key relationships.

4. Self-report is still used to measure IT actual usage, which is subjective and easily influenced by survey pressure.

5. Using variance theory approach in longitudinal study would bring in additional insights.

2.1.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) formulated a unified model that integrates elements across eight models. Table 2.1 provides a brief overview of models and theories unified by UTAUT.

UTAUT has four exogenous variables: performance expectancy, effort expectancy, social influence and facilitating conditions. The first three variables indirectly influence use behavior via intention, and facilitating conditions directly influence usage. UATUT also has four moderator variables: gender, age, experience and voluntariness of use. Figure 2.3 presents the research model. The definitions and roots of four core constructs are shown in Table 2.2.

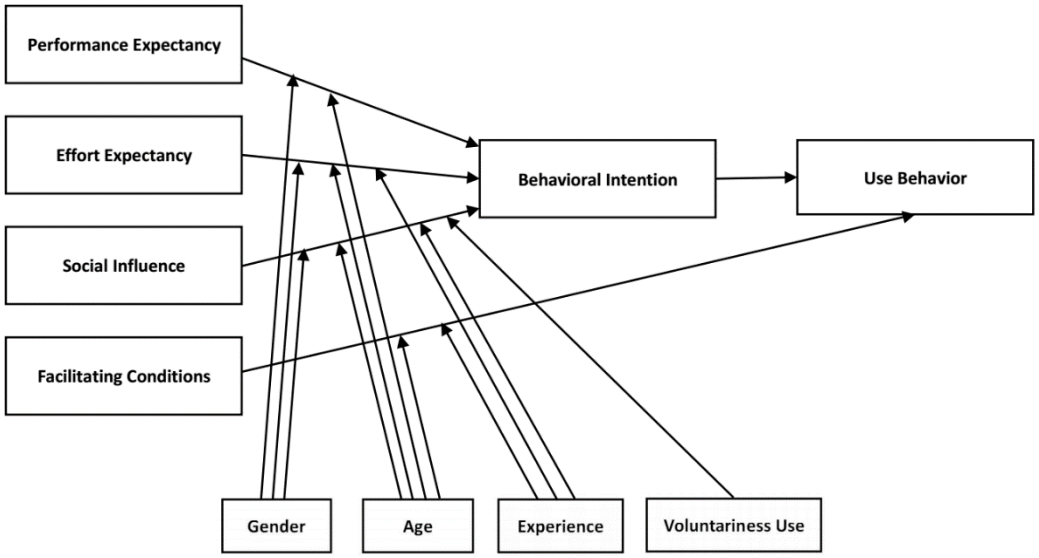

Figure 2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)
Source: Venkatesh et al. (2003)

Venkatesh et al. (2003) identified five common limitations of prior model tests and comparisons:

1. Past studies focus on relatively simple individual-oriented IT, rather than more

complex organizational IT in management.

2. Most model comparison studies are conducted using data collected from students in academic settings.

3. Most tests of eight models are conducted after the users have made the acceptance of rejection decision, rather than during the active adoption decision-making process.

4. Even previous studies involved examining experience typically employ cross-sectional and/or between subjects comparisons.

5. Most model tests and all model comparisons are conducted in voluntary usage settings.

In view of the above limitations, Venkatesh et al. (2003) made improvements in their empirical study. A total of 215 subjects were selected from 4 firms being introduced a new IT. The first two firms were in voluntary context, and the last two were in mandatory context. Their pretested questionnaire containing items measuring constructs from all eight models was administrated at three points of time: post-training (T1), one month after implementation (T2), and three months after implementation (T3). To reduce the subjective effect of self-report, final actual usage behavior was measured over the six-month post-training period.

The results show that after improving the research methods and introducing gender, age and other moderator variables, except MM and SCT, the predictive validity of previous six models increased. But in general, old models still explained only 36% to 53% of the variables of behavioral intention. Using the same data, the variance explained by UTAUT reached 69%.

To further prove the superiority of UTAUT, Venkatesh et al. (2003) selected two more groups of subjects. Statistical analysis results show that UTAUT explained 70% variance of intentions and 50% variance of actual usage. The relationships between the

four core constructs (with four moderator variables) and behavioral intention are shown in Table 2.3.

Overall, as pointed out by Venkatesh et al. (2003) at the end of their empirical study, the explanatory power of UTAUT to users' IT adoption intention and actual usage is much higher than that of prior IT adoption models. It can be considered that UTAUT is a mature model in the field of IT adoption research. In fact, as of November 15 2017, it has been cited in Google scholar for 18,905 times.

Table 2.1 Models and Theories Unified by UTAUT

Model and Theory / Author	Brief Introduction	Core Constructs
Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975)	TRA, originating in social psychology, is one of the basic and most influential human behavior theories and is widely used to explain different kinds of behaviors (Sheppard et al., 1988). TRA holds that human actual behavior is determined by behavioral intention and that the intention is directly affected by the two variables of individual attitude and subjective norm.	Attitude toward Behavior Subjective Norm
Technology Acceptance Model (TAM) (Davis et al., 1989) (Venkatesh & Davis, 1996)	Davis et al. (1989) applied TRA to predict IT acceptance and usage on the job and formed TAM. Original TAM believes that actual usage is determined by behavioral intention, the intention is affected by perceived usefulness and attitude, and perceived usefulness and perceived ease of use jointly determine attitude. To better explain IT adoption, Venkatesh and Davis (1996) modified the final TAM. In final TAM, attitude that cannot effectively convey the effect of perceived usefulness and perceived ease of use on intention is removed.	Perceived Usefulness Perceived Ease of Use
Extension Technology Acceptance Model（TAM2) (Venkatesh & Davis, 2000)	Venkatesh and Davis proposed TAM2 in 2000. TAM2 incorporates two additional theoretical constructs: social influence processes and cognitive instrumental processes. Venkatesh et al. (2003) pointed out that TAM2 extends TAM mainly by introducing subjective norm as an additional predictor of intention in mandatory settings.	Perceived Usefulness Perceived Ease of Use Subjective Norm
Model of PC Utilization（MPCU) (Thompson et al., 1991)	MPCU is derived from human behavior theory found by Triandis (1977). Thompson et al. (1991) applied Triandis' model to predict PC utilization. According to MPCU, job-fit, complexity, long-term consequence, affect towards use, social factors, and facilitating conditions have impacts on computer use behavior.	Job-fit Complexity Long-term Consequence Affect towards use Social Factors Facilitating Conditions

Model and Theory / Author	Brief Introduction	Core Constructs
Motivational Model (MM) **(Davis et al., 1992)** **(Venkatesh & Speier, 1999)**	MM is an important theory in psychology to explain behavior. Davis et al. (1992) and Venkatesh and Speier (1999) examined MM and adapted it to understand new IT adoption. MM believes that actual usage is determined by both extrinsic motivation and intrinsic motivation.	Extrinsic Motivation Intrinsic Motivation
Theory of Planned Behavior（TPB) **(Mathieson, 1991)** **(Taylor & Todd, 1995b)**	TPB extends TRA by including the core construct perceived behavior control, which is a determinant of intention and behavior. TPB has been successfully applied to the studies on individual IT acceptance and usage, such as those by Mathieson (1991), and Taylor and Todd (1995b). According to TPB, human behavior is influenced by both intention and perceived behavior control. Perceived behavior control, subjective norm and attitude are the key direct factors of intention.	Attitude Toward Behavior Subjective Norm Perceived Behavior Control
Innovation Diffusion Theory（IDT) **(Rogers, 1995)** **(Moore & Benbasat, 1991)**	IDT is grounded in sociology and is proposed by Rogers in 1962. It has been used since the 1960s to study innovations in many fields, ranging from agricultural tools to organizational innovations. IDT holds that the characteristics influencing innovation diffusion include relative advantage, compatibility, complexity, observability and trialability (Rogers, 1995). In IT domain, Moore and Benbasat (1991) refined a set of constructs that could be applied to study individual IT adoption.	Relative Advantage Ease of Use Image Visibility Compatibility Result Demonstrability Voluntariness of Use

Model and Theory / Author	Brief Introduction	Core Constructs
Combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995a)	Taylor and Todd (1995a) formed an augmented version of TAM that combines the predictor of TPB with perceived usefulness from TAM.	Attitude towards Behavior Subjective Norm Perceived Behavior Control Perceived Usefulness
Social Cognitive Theory（SCT) (Compeau & Higgins, 1995)	SCT is one of the most powerful human behavior theories. Compeau and Higgins (1995) extended SCT to the field of computer adoption, and extracted factors that could have impact on user behavior, such as outcome expectations-performance, outcome expectations-personal, self-efficacy, affect, and anxiety.	Outcome Expectations-Performance Outcome Expectations-Personal Self-efficacy Affect Anxiety

Source: Venkatesh et al. (2003)

Table 2.2 Core Constructs and its Roots in UTAUT

Core Construct	Root Construct
Performance Expectancy **"The degree to which an individual believes that using the system will help him or her to attain gains in job performance." (Venkatesh et al. 2003)**	**Perceived Usefulness (TAM)** "The degree to which a person believes that using a particular system would enhance his or her job performance." (Davis et al. 1989) **Extrinsic Motivation (MM)** "The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from activity itself, such as improved job performance, pay or promotions." (Davis et al. 1992) **Job-fit (MPCU)** "How the capabilities of a system enhance an individual's job performance." (Thompson et al.1991) **Relative Advantage (IDT)** "The degree to which using an innovation is perceived as being better than using its precursor."(Moore and Benbasat, 1991) **Outcome Expectations (SCT)** "Outcome expectations relate to consequence of the behavior."(Compeau and Higgins, 1995)
Effort Expectancy **"The degree of ease associated with the use of the system." (Venkatesh et al. 2003)**	**Perceived Ease of Use (TAM)** "The degree to which a person believes that using a system would be free of effort." (Davis et al. 1989) **Complexity (MPCU)** "The degree to which a system is perceived as relatively difficult to understand and use." (Thompson et al.1991) **Ease of Use (IDT)** "The degree to which using an innovations is perceived as being difficult to use." (Moore and Benbasat, 1991)
Social Influence **"The degree to which an individual perceives that important others believe he or she should use the new system." (Venkatesh et al. 2003)**	**Subjective Norm (TRA)** "The person's perception that most people who are important to him think he should or should not perform the behavior in question." (Ajzen and Fishbein, 1975) **Social Factors (MPCU)** "The individual's internalization of the reference group's subjective culture, and specific interpersonal agreements of that individual." (Thompson et al.1991) **Image (IDT)** "The degree to which use of an innovation is perceived to enhance one's image or status in one's social system." (Moore and Benbasat, 1991)

Core Construct	Root Construct
Facilitating Conditions **"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."** **(Venkatesh et al. 2003)**	**Perceived Behavioral Control (TPB)** "Reflects perceptions of internal and external constrains on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions." (Ajzen and Fishbein, 1975) **Facilitating Conditions (MPCU)** "Objective factors in the environment that observers agree make an act easy to do, including the provision of computer support." (Thompson et al.1991) **Compatibility (IDT)** "The degree to which an innovation is perceived as being consist of existing values, needs, and experience of potential adopters." (Moore and Benbasat, 1991)

Source: Venkatesh et al. (2003)

Table 2.3 Summary of Relationships between Constructs in UTAUT

DV	IV	Moderator	Explanation
Behavioral Intention	Performance Expectancy	Gender Age	Consists of previous model tests, PE is the strongest predictor of BI, no matter in which use setting, in which study stage. For young male employees, the effect is stronger.
	Effort Expectancy	Gender Age Experience	The effect is stronger for women, older workers and those with limited experience.
	Social Influence	Gender Age Voluntariness Experience	The effect is stronger for women, older workers, under conditions of mandatory use, and with limited experience.
	Facilitating Conditions	None	Because the influence of FC on BI is replaced by the mediating effect of PE and EE, it has no significant effect on BI
Actual Usage	Facilitating Conditions	Age Experience	FC has direct effect on actual usage. The effect is stronger for older and experienced employees.

Source: Venkatesh et al. (2003)

2.1.4 Extension Unified Theory of Acceptance and Use of Technology (UTAUT2)

UTAUT is mainly used to predict behavioral intention and IT actual usage in organizational settings. Venkatesh et al. (2012) continued to extend the UTAUT, and applied it to non-organizational context (consumer using context). They formed UTAUT2 by introducing three new core constructs: hedonic motivation, price value and habit. The new model construct is shown in Figure 2.4.

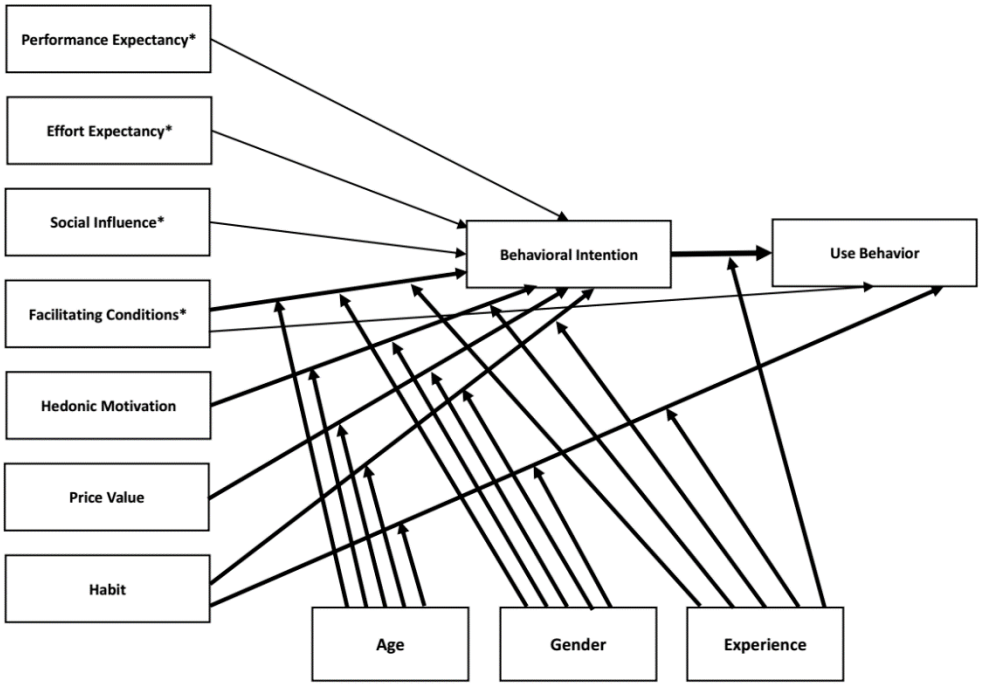

Figure 2.4 Extension UTAUT (UTAUT2)
Note: The bold lines are the new relationships found in UTAUT2. The constructs marked * have been confirmed in UTAUT. Adapted from Venkatesh et al. (2012).

The newly added core constructs are defined as follows (Venkatesh et al., 2012):

1. Hedonic motivation is defined as the fun or pleasure derived from using a technology. It has been proved by Brown and Venkatesh (2005) to play an important role in determining the IT usage.

2. Price value is defined as consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them (Dodds et al., 1991). In no-organizational context, the user has the dual identity of the actual payer of direct IT. And in marketing research, the monetary value of a product or service is often conceptualized with its quality to determine the perceived value of product and service (Zeithaml, 1988).

3. Habit has been defined as the extent to which people tend to perform behaviors automatically because of learning (Limayem et al., 2007).

To validate the UTAUT2, Venkatesh et al. (2012) took the use of mobile internet information technology in Hong Kong, China as research background and adopted online questionnaire survey. The survey was divided into two stages; the second stage was set four months later. Finally, the research yielded 1,512 valid reports.

Statistical analysis results show that using the same survey data, compared with UTAUT, the ability of UTAUT2 to explain consumer IT acceptance and actual usage has significantly increased. The model explanatory power to intention increased from 56% to 74%, to actual usage from 40% to 52%. Table 2.4 presents the summary of new relationships between constructs in UTAUT2.

In general, UTAUT2 is a successful attempt to apply UTAUT construct to non-organizational context. By adding three new constructs, UTAUT2 enhances model explanatory power for the special group. In the subsequent construction of Pharmacy-UTAUT, “hedonic motivation” and “price value” were abandoned in this study. It is based on the following considerations:

1. Venkatesh et al. (2012) believed that “hedonic motivation” was introduced for two reasons. First, in some IS researches, “hedonic motivation” has been shown to have significant impact on actual usage. Second, in consumer context, this relationship has also been confirmed.

However, the study of Brown and Venkatesh (2005), as its key citation, was aimed at households in non-organizational background. Van der Heijden (2004) pointed out that pleasure-oriented information system is different from productivity-oriented information system. For users, the former emphasizes self-fulfillment while the latter emphasizes instrumental value. Hence, for pleasure-oriented information system, “hedonic motivation” is an important variable to predict intention.

Chinese retail pharmacy information system is not pleasure-oriented. At the same time, in the literature review of the empirical research in the field of medical care, no study is found to include similar constructs of “hedonic motivation” into the

interpretation model. In conclusion, “hedonic motivation” is abandoned by Pharmacy-UTAUT.

2. Venkatesh et al. (2012) pointed out that individual consumers often have to pay for the actual cost of IT, but organizational employees usually do not. Therefore, for individual consumers, “price value” is an important variable to predict the intention. But even if this study set a questionnaire survey of Chinese retail pharmacy managers, because of the complexity of the Chinese retail pharmacy class, a pharmacy manager is not necessarily the direct payer of the actual information technology cost.

Venkatesh et al. (2012) also pointed that another important reason why UTAUT2 introduced the variable “price value” is that short message service cost is lower than the price of its alternatives (other mobile network applications). In mandatory context, Chinese retail pharmacy has no substitute for pharmacy IT. Moreover, in the literature review of empirical research in the field of medical care, no study is found to include similar constructs of “price value” into the interpretation model. In conclusion, “price value” is abandoned by Pharmacy-UTAUT.

Table 2.4 Summary of New Relationships between Constructs in UTAUT2

DV	IV	Moderator	Explanation
Behavioral Intention	Hedonic Motivation	Age Gender Experience	HM is the strongest predictor of BI. For young male consumers, and those with limited experience, the effect is stronger.
	Price Value	Age Gender	The effect is stronger for older female consumers.
	Facilitating Conditions	Age Gender	The effect is stronger for older female consumers.
	Habit	Age Gender Experience	The effect is stronger for older male employees, and those with limited experience.
Use Behavior	Habit	Age Gender Experience	The effect is stronger for older male employees, and those with limited experience.
	Behavioral Intention	Experience	In contrast to UTAUT, this relationship is moderated by experience.

Source: Venkatesh et al. (2012)

2.2 Empirical Research based on UTAUT

Venkatesh et al. (2012) pointed out that scholars' extension of UTAUT can be divided into three types. The first type is to test UTAUT in a new context, such as a new technology, new specific user group on new cultural setting. The second type is to add new constructs to expand the scope of the endogenous theoretical mechanisms outlined in UTAUT. Finally, the third type is to include the exogenous predictors of the UTAUT variables.

In this study, the researcher searched Science-direct database by using “UTAUT” as the key word. There are 662 original research papers on UTAUT, and the number of studies has increased with each passing year. Among the 662 papers, 30 studies are in the field of medical informatics, which is closely related to this study. There are 11 research studied in the context of non-organization (e.g., the old, mobile health, Hoque & Sorwar, 2017), 19 of them are in organizational context (e.g., Thailand community health center, Kijsanayotin et al., 2009).

He (2011) further proposed that two characteristics of Chinese scholars’ extension of UTAUT. First, they pay more attention to mobile IT. Second, they have fewer research in organization. In this study, the researcher searched CNKI database by using “UTAUT” as the key word, finding 252 papers on UTAUT. Taking “medicine” and “medical treatment” were used as the key words to further narrow the search scope. Finally, 6 empirical studies were found, all of which were in the non-organizational setting (e.g., Lu, 2014; Wang, 2017).

Combining the above contents, two points can be found. First, the predictive ability of UTAUT has been tested in many empirical studies. Second, in the international field, there is still a lack of empirical research on IT adoption in retail pharmacy.

2.3 Formulation of the Research Model Pharmacy-UTAUT

Research on IT adoption has a history of more than 30 years, and the explanatory power on intention and actual usage is constantly improving. UTAUT is one of the best IT adoption theories. Figure 2.5 shows basic concepts underlying UTAUT. Behavioral intention is the key predictor of actual usage. Human responses to the use of IT are summarized as various core variables, either directly affecting the actual use of behavior, or indirectly influencing the use of behavior through behavioral intention.

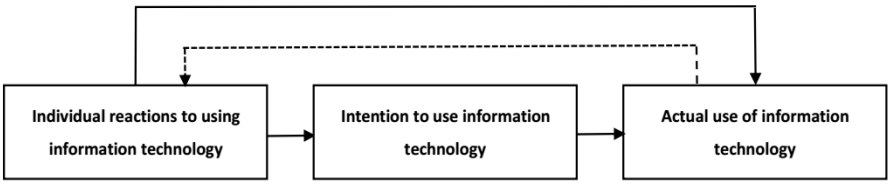

Figure 2.5 Basic Concept Underlying UTAUT
Source: Venkatesh et al. (2003)

Based on UTAUT, this study constructed Pharmacy-UTAUT for empirical research on IT adoption in Chinese retail pharmacy. Pharmacy-UTAUT introduces two new constructs: attitude and habit. Figure 2.6 presents the research model.

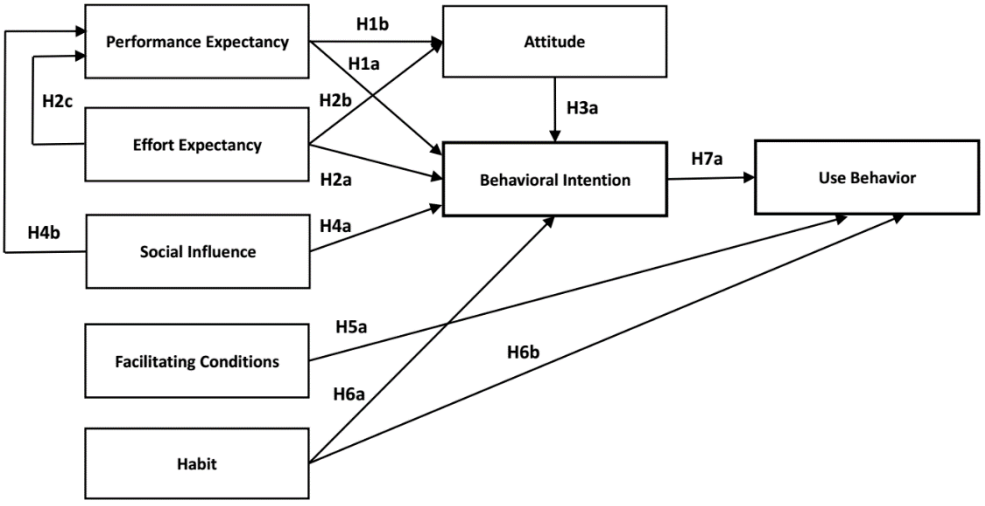

Figure 2.6 Research Model Pharmacy-UTAUT

2.4 Variables Definition and Research Hypotheses

2.4.1 Core Variables

2.4.1.1 Performance Expectancy

Performance Expectancy is defined as the degree to which an individual believes that using the system will help him or her attain gains in job performance (Venkatesh et

al., 2003). It combines the strongest and approximate predictors in previous studies, namely, perceived usefulness (TAM/TAM2), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT), and outcome expectations (SCT).

Chinese retail pharmacy is the subdivision of enterprise organization which belongs to business context. However, Chinese retail pharmacy also belongs to healthcare context because it is mainly engaged in medicine retail selling and its operation requires qualified pharmacy professional staff (Appendix B).

Supported by many IT adoption studies, in business context, performance expectancy is an important predictor of behavioral intention (e.g., Davis et al. 1989; Moore and Benbasat, 1991; Thompson et al. 1991; Davis et al. 1992; Compeau and Higgins, 1995; Venkatesh and Davis, 2000; Venkatesh et al. 2003). In healthcare context, performance expectancy still has significant impact on intentions (e.g., Adenuga et al., 2017; Aggelidis & Chatzoglou, 2009; Beglaryan et al., 2017; Chau & Hu, 2002a; Chismar & Wiley-Patton, 2003; Esmaeilzadeh et al., 2015; Hadji et al., 2016; Hung et al., 2012; Kijsanayotin et al., 2009; Maillet et al., 2015; Pynoo et al., 2012; Schaper & Pervan, 2007). Individuals hoping to gain promotion and reward by improving their job performance is common in the two contexts.

In addition, several researches (e.g., Chau & Hu, 2002b; Schaper & Pervan, 2007) pointed out that in healthcare context, performance expectancy will indirectly affect behavioral intention through attitude. That is performance expectancy has a direct impact on attitude, which is also an important theoretical path in TAM. Based on the literature reviewed, the following hypotheses were proposed:

H1a: Performance expectancy will have a significant positive influence on behavioral intention.

H1b: Performance expectancy will have a significant positive influence on actual usage.

2.4.1.2 Effort Expectancy

Effort Expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al. 2003). It is similar to the definition of these constructs: perceived ease of use (TAM), complexity (MPCU) and ease of use (IDT) and is one of the most important variables to predict behavioral intention.

In the context of health, most IT adoption studies have shown that effort expectancy has a significant impact on intentions (e.g., Adenuga et al., 2017; Aggelidis & Chatzoglou, 2009; Beglaryan et al., 2017; Hung et al., 2012; Kijsanayotin et al., 2009; Pynoo et al., 2012; Schaper & Pervan, 2007). Few studies, such as the empirical study by Chau and Hu (2002a) shows that due to the professional background, a group of doctors has a high ability and awareness of using IT, which leads to effort expectancy having no significant effect on intention. Chismar and Wiley-Patton (2003) also pointed out that doctors are more concerned with performance gain by using IT, even if this IT is difficult to learn. With a high level of competence and awareness of relevant professional background, doctors reduce the impact of effort expectancy on their IT use. But for Chinese retail pharmacy IT users, they do not have a strong professional background like doctors, and effort expectancy may still be a key factor of intention.

Besides, several studies have proposed that in healthcare context, effort expectancy will indirectly affect intention through attitude and performance expectancy (e.g., Aggelidis & Chatzoglou, 2009; Chau & Hu, 2002b; Hung et al., 2012), which is also an important theoretical path in TAM. Based on the literature reviewed and the logic discussed above, the following hypotheses were proposed:

H2a: Effort expectancy will have a significant positive effect on intention.

H2b: Effort expectancy will have a significant positive effect on attitude.

H2c: Effort expectancy will have a significant positive effect on performance expectancy.

2.4.1.3 Attitude

Attitude is defined as an individual's overall affective reaction to using a system (Venkatesh et al. 2003). In other IT adoption models, concepts similar to attitude are: attitude toward behavior (TRA), intrinsic motivation (MM), affect toward use (MPCU) and affect (SCT).

Venkatesh et al. (2003) found that using the same survey data, in some models (TRA, TPB and MM) attitude has a significant direct influence on behavioral intention in all research stages. But in others (C-TAM-TPB, MPCU and SCT), attitude loses its significance. Venkatesh et al. (2003) analyzed this contraction and pointed out that when there are performance expectancy and effort expectancy in a model, attitude will have no significant influence on behavioral intention. That is, the effect of attitude on behavioral intention is captured by performance expectancy and effort expectancy.

In the original TAM, Davis et al. (1989) introduced attitude to explain behavioral intention. In follow-up study, Venkatesh and Davis (1996) found that attitude cannot effectively convey the influence of perceived usefulness (performance expectancy) and perceived ease of use (effort expectancy) on behavioral intention. In UTAUT, Venkatesh et al. (2003) suggested that spurious relationship between attitude and intention would reduce the effect of performance expectancy and effort expectancy on intention. Based on this logic, they hypothesized that attitude has no significant impact on behavioral intention, and later empirical study results have proved it well.

However, in healthcare context, some studies have found that attitude is an important predictor of behavioral intention (e.g., Aggelidis & Chatzoglou, 2009; Chau & Hu, 2002a; Hung et al., 2012; Schaper & Pervan, 2007) proposed the characteristics of professionals in health background are different from these in previous empirical research subjects (enterprise managers, students, etc.); their attitude towards the IT using will be more consistent. Chau and Hu (2002a) also found that for doctors, attitude is an important predictor of intention. Chinese retail pharmacy IT users have a degree of

professional background support (Appendix B), so their attitude towards IT use may be one of the most important predictor variables to IT adoption. In conclusion, the hypothesis is as follows:

H3a: Attitude will have a significant positive effect on behavioral intention.

2.4.1.4 Social Influence

Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al. 2003). It comes from the conceptual integration of subjective norm (TRA), social factors (MPCU) and image (IDT).

Compared with original TAM, TAM2 and UTAUT introduced subjective norm, which enhances the explanatory power to intention and actual usage. Legris et al. (2003) pointed out that in actual IT using environment, users will face a lot of social pressure, and the impact of subjective norm should be included to improve model forecast capability. Venkatesh et al. (2003) further found that in the context of voluntary use, social influence has no significant effect on intention, but in the context of mandatory use, the impact of social influence on intention becomes significant (also see in Venkatesh & Davis, 2000).

The above studies are all in business backgrounds. In health backgrounds, most studies have also confirmed that social influence is the determining factor of behavioral intention (e.g., Aggelidis & Chatzoglou, 2009; Hung et al., 2012; Kijsanayotin et al., 2009; Pynoo et al., 2012; Schaper & Pervan, 2007). However, several studies, such as empirical study by Chau and Hu (2002a) found that doctors, due to their professional support, tend to make independent judgments in IT use, and are less influenced by outside pressure (also see in Chismar & Wiley-Patton, 2003). At present, Chinese retail pharmacy is in mandatory use context. Moreover, in terms of professional support,

pharmacy IT user is weaker than in doctors and nurses. Based on this logic, social influence can still be a key factor in behavioral intention.

In addition, some researches (e.g., Aggelidis & Chatzoglou, 2009; Handayani et al., 2017; Maillet et al., 2015; Xue et al., 2012) found that in healthcare context, social influence also indirectly affects behavioral intention through performance, which is also an important theoretical path in TAM2.

H4a: Social influence has a significant positive effect on behavioral intention.

H4b: Social influence has a significant positive effect on performance expectancy.

2.4.1.5 Facilitating Conditions

Facilitating conditions is defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al. 2003). It is a conceptual integration of perceptual behavior control (TPB/DTPB, C-TAM-TPB), contributing factors (MPCU) and compatibility (IDT).

In UTAUT, Venkatesh et al. (2003) pointed out when the IT adoption model has performance expectancy and effort expectancy, facilitating conditions loses its significance in predicting intention because of the mediating effect of these two core variables. While facilitating conditions has no significant effect on intention, it, together with intention, becomes key predictor of use behavior. In healthcare context, most studies involving facilitating conditions also proved that facilitating conditions is the key predictor of use behavior (e.g., Adenuga et al., 2017; Aggelidis & Chatzoglou, 2009; Beglaryan et al., 2017; Hadji et al., 2016; Handayani et al., 2017; Kijsanayotin et al., 2009; Maillet et al., 2015; Schaper & Pervan, 2007).

H5a: Facilitating conditions will have a significant positive effect actual usage.

2.4.1.6 Habit

Habit is defined as defined as the extent to which people tend to perform behaviors automatically because of learning (Limayem et al., 2007). In UTAUT2, Venkatesh et al. (2012) proposed habit will both affect intention and actual usage. Their empirical research in China confirmed the opinion.

Habit requires a stable environment (Ajzen, 2002; Wood et al., 2002). In healthcare context, no studies involving habit have been found. But Chinese retail pharmacy IT users have a relatively constant working environment, so habit can be one of the most important predictors of intention and usage.

H6a: Habit will have a significant positive effect on behavioral intention.

H6b: Habit will have a significant positive effect on use behavior.

2.4.1.7 Behavioral Intention

Behavioral Intention is defined as the strength to measure the individual's intention to take a particular action (Ajzen & Fishbein, 1975). It comes from TRA in social psychology. Consistent with all of the intention models discussed in this paper, intention will have a significant positive influence on IT usage.

H7a: Behavioral intention will have a significant positive effect on actual usage.

2.4.2 Moderators

Based on the synthesis of previous studies, UTAUT selected gender, age, experience, and voluntariness as its moderators. In subsequent studies based on UTAUT, most chose to discard the moderators (Venkatesh et al. 2012). But the role of moderating effect on IT adoption has been increasingly received (Schaper & Pervan, 2007).

This study abandoned moderator experience and voluntariness for the following two reasons:

1. The empirical study of the UTAUT is a longitudinal study divided into three survey phases. This study is a horizontal study and cannot effectively measure the value of subject experience.

2. Chinese retail pharmacy is in the context of mandatory use; voluntariness is not a continuous variable.

In summary, this study selected gender and age as the moderators of Pharmacy-UTAUT, and added pharmacy type and pharmacy professional level as new moderators. As pointed out earlier, Chinese retail pharmacy has both business context and healthcare context, which makes pharmacy IT adoption more complex. Also, this study first applied IT adoption theory into unique population, so the hypotheses were not formulated for the above four moderators.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter will elaborate on the important steps of the empirical research process, including the operationalization of core independent variables, sampling of research objects, questionnaire compilation and testing, and research data collection and processing. It should also be noted that the researcher used professional statistical software SPSS 20 and AMOS 23 to test and analyze the statistical data.

3.1 Variables Operationalization

In the Pharmacy-UTAUT empirical research model, the definition, assumption and operationalization scale of core independent variables affecting the IT adoption are summarized in this paper, as shown in the table 3.1. It should be noted that considering the original measurement scale of the core independent variables is in English, to ensure the equality of the measurement content before and after translation, this research adopted the reverse translation method proposed by Brislin (1970). To put into practice, first, the author translated the English measurement scale into a Chinese version of measurement scale by himself, then a bilingual linguistics professor from Huai'an Institute of Technology was asked to translate the Chinese version back into English by himself. Finally, the author and the professor compared the two versions of the English measurement scale, analyzed if the second version of the English measurement scale expressed the same content as the original English version and correct the Chinese version accordingly.

This study used Likert Scale of 7 levels to quantify the extent to which a subject agreed on a particular question, among which 1 stands for “Strongly Disagree”, 2 for “Quite Disagree”, 3 for “Slightly Disagree”, 4 for “Neither Agree nor Disagree”, 5 for “Slightly Agree”, 6 for “Quite Agree”, 7 for “Strongly Agree”.

The measurement of the actual use of the retail pharmacies’ IT is an indispensable process in the follow-up empirical research. In the literature review (Section 2.1) of the four major IT adoption models, two issues were found. First, TAM, TAM2 and UTAUT2 use the self-reporting form for the measurement of actual usage behavior. For instance, the actual use was defined by Venkatesh et al. (2012) as a comprehensive variable comprising type and frequency and designed as a question in a questionnaire. Meanwhile, to reduce the influence of Common Method Variance (CMV), the measurement of the actual use behavior was carried out 4 months later than the first measurement of the behavior-affecting predictor. Second, UTAUT uses the form of System Log. In the empirical research on the adoption of IT in the context of medical health, the behavior measurement methods are divided into the above two categories as well. The first category is self-reporting, for instance, in the research of the IT adoption of CHC institutions staff members in Thailand, Kijsanayotin et al. (2009) divided the actual use behavior into four observation variables, namely frequency of use, care and reporting use, administrative use and communication use. The second category is system logs. For instance, Schaper and Pervan (2007) measured the actual usage behavior of IT using the track usage software Visual Time Analyzer (VTA).

In spite of the drawbacks of self-reporting, it is still an effective measurement of a variable given the limited investigation conditions. This study adopted the self-reporting form to measure the actual use behavior of Chinese retail pharmacies, based on the characteristics of Chinese retail pharmacies’ IT. The “actual use behavior” variable was measured by an observable variable, namely “the frequency of IT usage”.

“The frequency of IT usage” was measured using a 5-point scale. 1 means “use less than once a week”, 2 means “use once a week”, 3 means “use twice a week or more”, 4 means “use once a day” and 5 means “use twice or more a day”.

It should be noted that the measurement of the “actual use behavior” of the final variable in this study was not arranged a few months after then measurement of the core independent variable as it is in UTAUT, but was surveyed in the same time as the core independent variable in the same questionnaire. In fact, both interval and simultaneous measurements have their drawbacks. Simultaneous measurement can adopt the “visit concealment method”, “item meaning concealment method” and “reverse item design” to reduce the impact of CMV (Peng et al., 2006). In this study, to investigate the actual use behavior, questions concerning “the frequency of IT usage” were put forward in the basic information part of the surveyed subject as the first part of the questionnaire, and the respondents were required to answer in order. By designing the structure of questionnaire in this the impact of CMV can be reduced.

Table 3.1 Pharmacy-UTAUT: Core Constructs, Definitions, and Scales

Core Constructs / Definitions	Scales	Source
Performance Expectancy **"The degree to which an individual believes that using the system will help him or her to attain gains in job performance." (Venkatesh et al., 2003)**	PE1: I find pharmacy IT useful in my job. PE2: Using pharmacy IT enables me to accomplish tasks more quickly. PE3: Using pharmacy IT increases my productivity. PE4: Using pharmacy IT increases my chances of getting a raise.	Venkatesh et al. (2003)
Effort Expectancy **"The degree of ease associated with the use of the system." (Venkatesh et al., 2003)**	EE1: My interaction with pharmacy IT is clear and understandable. EE2: It is easy for me to become skillful at using pharmacy IT. EE3: Learning how to use pharmacy IT is easy for me. EE4: I find pharmacy IT easy to use.	Venkatesh et al. (2003)
Attitude **"An individual's overall affective reaction to using a system." (Venkatesh et al., 2003)**	A1: People in the industry who are important to me think that I should use pharmacy IT. A2: People in the industry who influence my behavior think that I should use pharmacy IT. A3: The senior health administration has been helpful in the use of pharmacy IT. A4: In general, the industry has supported the use of pharmacy IT.	Venkatesh et al. (2003)
Social Influence **"The degree to which an individual perceives that important others believe he or she should use the new system." (Venkatesh et al., 2003)**	SI1: People in the industry who are important to me think that I should use pharmacy IT. SI2: People in the industry who influence my behavior think that I should use pharmacy IT. SI3: The senior health administration has been helpful in the use of pharmacy IT. SI4: In general, the industry has supported the use of pharmacy IT.	Venkatesh et al. (2003) Kijsanayotin et al. (2009)

Core Constructs / Definitions	Scales	Source
Facilitating Conditions **"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system." (Venkatesh et al., 2003)**	FC1: I have the resources (e.g. fund, hardware facility) necessary to use pharmacy IT. FC2: I have the knowledge (e.g. basic computer use) necessary to use pharmacy IT. FC3: Pharmacy IT is compatible with other systems I use. FC4: I can get help from others when I have difficulties using pharmacy IT.	Venkatesh et al. (2003)
Habit **"The extent to which people tend to perform behaviors automatically because of learning." (Limayem et al., 2007)**	HA1: The use of pharmacy IT has become a habit for me. HA2: I am addicted to using pharmacy IT. HA3: I must use pharmacy IT.	Venkatesh et al. (2012)
Behavioral Intention **"The strength to measure individual's intention to take a particular action." (Ajzen & Fishbein, 1975)**	BI1: I intend to use pharmacy IT in future work. BI2: I predict I would use pharmacy IT in future work. BI3: I plan to use pharmacy IT in future work.	Venkatesh et al. (2003)

3.2 Respondents and Sampling Procedures

3.2.1 Research Location

The researcher selected Huai'an, Jiangsu Province, China as the research location based on the following three reasons. First, Jiangsu Province is the first batch of pilot areas in the opening of national retail pharmacies. Located in the northeastern area of Jiangsu Province, the city of Huai'an is one of the first pilot cities in Jiangsu Province. The retail pharmacies in Huai'an have a long history and great development. Second, Jiangsu Province is located in the economically developed regions on the eastern coast of China while Huai'an is an important central city in the north of Jiangsu Province. The IT development of Huai'an retail pharmacies enjoys great economic environment and policy. Third, the local information system developer of Huai'an has cooperated with the retail pharmacy information system developed by Huai'an Food and Drug Administration since 2012. It covers all seven counties and districts in Huai'an. The selection and extraction of samples in the empirical research section and the issuance of questionnaires of this study was assisted by the company.

3.2.2 Sample Size

The sample size required by the study was based on the following two considerations. First, statistician Taro Yamane gave a simplified sample size calculation formula n=N/(1+N*e^2) in his monograph "Elementary Sampling Theory" (1967). In this formula, "n" represents the number of samples, "N" represents the total number of respondents, and "e" represents an acceptable level of error. In this research, "N" equals 1,878, the error level "e" is set at 0.05, and the number of samples is calculated as 330. (The latest statistics from Huai'an Food and Drug Administration show that as of the end of 2016, there were 1,878 retail pharmacies in Huai'an, including 1,007 individually operated pharmacies (53.6%) and 871 chain pharmacies

(46.4%) including Guangji, Tianyi, Guoda, Yipintang, Wancaotang, Jisheng, Jianshengyuan, Yifeng, Shuntai, Xianshengkang and other pharmacy chain enterprises.) Second, considering that the Structural Equation Model (SEM) used in the subsequent research is a large sample analysis technique, SEM generally requires that a reasonable sample size is between 10 and 15 times the measured variable, and the model fit is higher when the number of samples is between 200 and 400 (Hair et al., 2009). According to calculation, 330 valid samples meet the requirements of constructing SEM. In conclusion, this study set the sample size at 330.

3.2.3 Sampling Method

Taking various factors into account, this research used the Multistage Sampling method to determine the specific sampling targets for the survey (Feng, 2013). Huai'an is divided into 7 administrative areas, and 3 administrative areas were randomly selected. In each administrative area, 110 retail pharmacies were selected as effective samples. The survey was conducted by handing out questionnaires in the field. Trained investigators were dispatched to deliver a questionnaire to the manager of each retail pharmacy, asking them or the staff member responsible for information management to fill in the survey questions on site and collect the questionnaires. Considering the questionnaire recovery rate and incomplete rate, the questionnaire sent is tentatively set at 420. The survey time is set from the beginning of November 2017 to the end of January 2018 for a period of three months.

3.3 Designing and Testing of the Questionnaire

3.3.1 Questionnaire Design

Social researcher Feng proposed in his monograph "Social Research Methods (Fourth Edition)" (2013) that the questionnaire design is divided into four continuous

steps, namely “exploratory work”, “designing the first draft of the questionnaire”, “trial”, and “modifying the final draft and print”.

Focusing on the topic “China’s retail pharmacies’ adoption of IT”, the author made unstructured interviews and in-depth communication with a local government drug regulatory bureau executive, a chain pharmacy business owner, and two individually operated pharmacy business owners, asked questions about the measurement scale (Table 3.1). Subsequently, the author made appropriate changes to items that could potentially yield ambiguous answers without changing their original intentions for better understanding.

Based on the results of the exploratory work, a preliminary questionnaire was drafted. The questionnaire was divided into “Cover Letter”, “Instructions”, “Question”, and “Coding” (Postcoding is used herein). The core of the questionnaire was “Question” consisting of two parts: (1) basic information of the respondent (age, gender, region, pharmacy category, licensed pharmacist certificate status, frequency of use, scope of use); (2) 7 latent variables affecting the adoption of IT (Table 3.1), a total of 26 questions in the Likert Scale of 7 levels. The order of the questions was designed according to the principles of “easy before difficult”, “familiar before unfamiliar”, “objective before subjective” and “concerns in the end” (Feng, 2013). A trial of the questionnaire was conducted before the formal investigation. The subjective evaluation method was used by sending the questionnaire to two professors with similar empirical research experience and three typical respondents (retail pharmacy business owners). They were asked to read, analyze and comment on the questionnaire based on their own experience and knowledge. Finally, after repeated examination of the questionnaire questions and revision, a final questionnaire was formed (Appendix A).

3.3.2 Testing the Reliability and Validity of the Questionnaire

The reliability and validity of the recovered questionnaire were tested. This study used Cronbach's alpha coefficient to test the Internal Consistency Reliability (ICR, a.k.a Intrinsic Reliability) of the questionnaire. The Cronbach's alpha coefficient value is between 0 and 1. The larger the alpha value is, the better the correlations between the questionnaire items will be and the higher the ICR will be. Nunnally (1978) believes that in practical applications, the alpha value should be at least greater than 0.5, preferably greater than 0.7. In this study, the measurement reliability of the latent variables and of the whole questionnaire were tested by the Reliability Analysis module in SPSS.

In addition, this study used the KMO (Kaiser-Meyer-Olkin) and Bartlett's spherical test to test the Construct Validity (a.k.a Contemporary Validity) of the questionnaire. The KMO value is between 0 and 1. The larger the value is, the better the validity of the questionnaire structure will be and the better the follow-up factor analysis effect will be. In general, the validity is ideal when KMO is greater than 0.7. When the KMO is less than 0.5, the validity of the questionnaire structure is poor and follow-up factor analysis is not suitable. Meanwhile, Bartlett's spherical test requires that the significance level (P value) of the questionnaire data should meet the significance requirement of the two-tailed test. In this study, the validity of the questionnaire was tested by the Factor Analysis module of SPSS.

It should be noted that the Face Validity (a.k.a. Logical Validity) of the questionnaire was tested by the subjective evaluation in the questionnaire design section (Section 3.3.1).

3.4 Statistical Treatment of Data

In this study uses SPSS was used to perform descriptive statistical analysis on the questionnaire data collected from all variables in the research hypothesis, including the

description of the basic situation of the respondents, the mean value of the observed variables of the questionnaire, the standard deviation, and the description of the frequency.

SEM is the core and focus of the subsequent analysis of this paper. By using AMOS statistical software, the reliability, validity and fitness of the measurement model were tested and analyzed according to the survey data. On this basis, the structural model analysis of the theoretical hypothesis was carried out to test the path relations between various latent variables in the theoretical model, and to verify the hypothesis of this study.

CHAPTER 4

RESULTS AND DISSCUSSION

The analytical results to the empirical data are reported and discussed in this chapter, which includes eight sections: (1) Section 1 describes the selection of the effective questionnaire ; (2) Section 2 carries out descriptive statistical analysis for basic information on the data obtained from the survey and latent variables in the attitude scale; (3) Section 3 presents an initial analysis of validity and reliability of the questionnaire; (4) Section 4 in this study mainly evaluates and corrects the Pharmacy-UTAUT, during which CFA has been used to test the model-fitting degree together with latent variables reliability, convergent validity and differential validity, and then the Pharmacy-UTAUT final model with good degree of fitting were obtained and contents were corrected and supported by better theories through three corrections: CFA correction, correction of modification indices and theoretical correction; (5) Concerning the final model, Section 5 discusses the test on the theoretical assumptions, devoting the preceding paragraphs on path analysis; (6) Section 6 features test moderation effects of moderators (gender, age, pharmacy type, pharmacy professional level) against the theoretical route of the final model; (7) The final model was mainly evaluated by comparing the final model with both TAM and UTAUT in Section 7; and (8) Based on the results of the empirical analysis mentioned above, an in-depth discussion of four issues was put forward devoting from the Introduction to Section 8.

4.1 Questionnaire Recovery and Date Cleaning

As planned, the questionnaires were distributed in Qingjiangpu District, Huai'an District and Hongze District, Huai'an City, Jiangsu Province of China. A total of 420 questionnaires were distributed with each district being given 140 questionnaires, and the duration of distribution was three months from the beginning of November 2017 to the end of January 2018. Totally, 377 questionnaires were actually recovered with the recovery rate of 89.8%. No questionnaires with blanks were received when the data was entered as the questionnaires were actually dispatched on the spot by survey assistants.

A total of 377 questionnaires were recovered and the completed entry of data was cleaned up in the way of "clean-up within the effective scope", "clean-up of logical consistency" and "random test on the data quality" (Feng, 2013). First of all, the function of "frequency description" in SPSS20 was adopted to conduct "clean-up within the effective scope", after which no variables exceeding the required scope of assignment were found. Secondly, "IF" statements in the function of "case selection" of SPSS20 were adopted to conduct "clean-up of logical consistency" in both Question 6 and Question 7. If the scope covered by IT of the retail pharmacy is greater than two, the frequency for using the IT in its work will be at least twice a week or more, and no questionnaires with unreasonable and illogical answers were found. Finally, 5% of the 377 questionnaires were randomly selected, that is, totally 19 questionnaires were conducted for "random test of data quality". No variables with inconsistent entry were found.

Apart from this process, with the use of data screening function of SPSS20, the sample data without different answers in the attitude scale of Part II was eliminated in the questionnaires and totally 3 samples were deleted at the same time. Finally, a total number of 374 effective questionnaires were recovered with the effective sample rate of

99.2%. The effective sample size met the requirements for the minimum number of follow-up analysis summarized in the preceding paragraphs in the thesis.

4.2 Descriptive Statistics Analysis

4.2.1 Description of Basic Information

Part I of the questionnaire in the study contains basic information of the respondents, including: gender, age, the jurisdiction where the retail pharmacies are located, pharmacy type, registration of individual pharmacist certification, IT use frequency in the work of retail pharmacies, as well as item scope that has been covered by IT of retail pharmacies.

After analyzing the frequency referred above and the percentage of total quantities, the statistical results of basic information of 374 valid samples are shown and summarized in Table 4.1 as follows:

1. From the gender structure, there were 184 male respondents and 190 female respondents in this study, accounting for 49.2% and 50.8% of the total respondents respectively. It is obvious that the proportions of the two are similar, and the number of female respondents is slightly higher than that of male respondents.

2. From the age structure, the mean age of respondents is 40.2 and the standard deviation is 9.225. The youngest respondent is 23 years old and the oldest respondent is 66 years old. The frequency distribution of the respondents' age is shown in Figure 4.1, which included five age groups, that is, 30 years old and younger, 30 to 40 years old, 40 to 50 years old, 50 to 60 years old, and 60 years old and above. Based on the data, the respondents are aged between 30 to 40 years old (35.3%), and 40 to 50 years old (34%), which account for 69.3% of the total number of respondents.

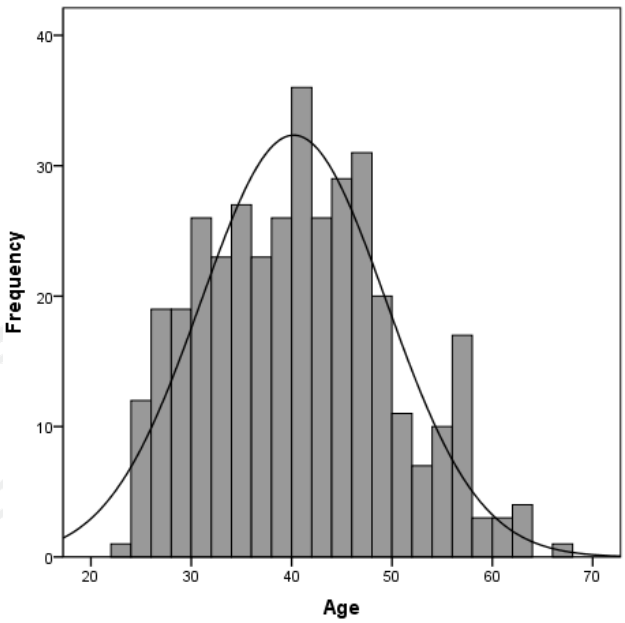

Figure 4.1 Age of Respondents

3. From the jurisdiction of retail pharmacies, among three administrative regions in Huai'an to which the questionnaires were distributed, the number of retail pharmacies in Qingjiangpu District who were interviewed is the highest totaling 137, accounting for 36.6% of the total number of retail pharmacies, followed by Huai'an District, totaling 127 retail pharmacies and accounting for 34%. However, the interviewed retail pharmacies in Hongze District were the least and amounted to 110, accounting for 29.4% of the total number of retail pharmacies.

4. From the pharmacy type, there were 191 chain pharmacies (51.1%) and 183 individually operated pharmacies (48.9%). Although the ratios of the two are similar, the number of individually operated pharmacies is slightly higher than that of the chain pharmacies.

5. From the registration of individual pharmacist certification, only 106 respondents were qualified as licensed pharmacists, accounting for 28.3% of the total. There were 268 respondents who did not qualify as licensed pharmacists, accounting

for 71.7% of the total respondents. It is obvious that most retail pharmacy managers or IT management personnel fail to have a high degree of professional pharmacy knowledge.

6. From the IT use frequency of retail pharmacy: “several times each day” are the most, they were totally 100 retail pharmacies that accounted for 26.7%. Only 3 retail pharmacies “using less than once a week”, which is the least among the retail pharmacies, accounting for 0.8% of the total respondents. The IT usage of equal or more than once a week accounts for 99.2%.

7. From the item scope covered by IT use of retail pharmacies: there were 348 interviewed retail pharmacies covering five basic items of pharmacy management in the questionnaire, which is the most and accounting for 93% of the total number of retail pharmacies. However, no interviewed retail pharmacy whose IT use covers only one basic item. In other words, the IT use of all interviewed retail pharmacies covers at least two or more basic items.

Table 4.1 Descriptive Date on Respondents Demographic Characteristics

Items	Group	Frequency	Percent
Gender	Male	184	49.2%
	Female	190	50.8%
Age	<30	66	17.6%
	30-40	132	35.3%
	40-50	127	34%
	50-60	42	11.2%
	>60	7	1.9%
Region	Qingjiangpu District	137	36.6%
	Huaian District	127	34%
	Hongze District	110	29.4%
Pharmacy Type	Chain	191	51.1%
	individually operated	183	48.9%
Certificate for Pharmacist	Have	106	28.3%
	Not have	268	71.7%
Frequency of IT use	Use < Once a week	3	0.8%
	Once each week	95	25.4%
	Several times each week	82	21.9%
	About once a day	94	25.1%
	Several times each day	100	26.7%
Projects covered by IT	1 project	0	0
	2 projects	1	0.3%
	3 projects	3	0.8%
	4 projects	22	5.9%
	5 projects	348	93%

4.2.2 Description of Model Latent Variables

The Pharmacy-UTAUT created herein contains seven core latent variables which can be measured by 26 questions in Likert's Seven-Point Scale as referred to in Part II of the questionnaire. The statistical results are shown in Table 4.2 in which the core latent variables are arranged in descending order of their overall mean values. The seven core latent variables are shown in the table:

1. The overall average of performance expectancy is the greatest reaching 6.54 whose modes of corresponding four measurement items are 7 with the average of more than 6. This means that most of the respondents “quite agreed” with the viewpoint that “the use of retail pharmacy IT can improve their work performance and get higher work output”.

2. The overall average of habit is 6.24 whose mean value of three measurement items to the item that “I am addicted to (higher than the degree of habit) using retail pharmacy IT at work” in HA2 is 5.85. This suggests that some respondents believe that the use of retail pharmacy IT has become a habit, but the degree is not very high.

3. The overall average of facilitating conditions is 6.17, and the mean value of four measurement items to the item that “I have got hold of the knowledge necessary to use retail pharmacy IT” in FC2 is 5.75 only. This indicates that the facilitating conditions are important for respondents to use IT, but some respondents lack the knowledge that is necessary to use retail pharmacy IT.

4. The overall average of behavioral intention is 6.04 with the mean value corresponding to four measurement items of more than 6. This means that the respondents have a strong intention to use retail pharmacy IT.

5. The overall average of social influence is 6.03, and the mean value of four measurement items corresponding to the item that “local health administrative agencies have helped me to use retail pharmacy IT” in SI3 is 5.52 only. This indicates that social influence has a relatively low impact on respondents’ use of retail pharmacy IT, and some respondents even believed that local health administrative agencies gave little help in IT use.

6. The overall average of effort expectancy is 5.97 with the mean value corresponding to four measurement items of more than 5. This means that although the respondents have a certain confidence in using retail pharmacy IT, they are not very confident in their ability to learn.

7. The overall average of attitude is the lowest reaching 5.95 with the mean value corresponding to four measurement items of more than 5. This suggests that the respondents believed that the use of retail pharmacy IT can make their work more interesting.

In summary, the overall average of all core latent potentials is greater than 5, that is, the average degree of approval of the respondents for each measurement item is above “partially agree”.

Table 4.2 Descriptive Date on Measurement Model Items

	Strongly Disagree			%		Strongly agree		Mean	SD
	1	2	3	4	5	6	7		
Performance Expectancy								**6.54**	**0.555**
PE1	0	0	0	0	0.5	32.1	67.4	6.67	0.483
PE2	0	0	0	0.3	1.1	34.8	63.9	6.62	0.523
PE3	0	0	0	0.3	1.3	35.8	62.6	6.61	0.531
PE4	0	0.3	1.1	5.9	10.4	31.6	50.8	6.24	0.964
Habit								**6.24**	**0.532**
HA1	0	0	0.3	0.5	0.3	40.4	58.6	6.56	0.562
HA2	0	0.3	0.3	2.7	26.7	51.1	19.0	5.85	0.781
HA3	0	0	0.3	0.3	3.7	58.8	36.9	6.32	0.584
Facilitating Conditions								**6.17**	**0.474**
FC1	0	0	0.3	0.8	0.5	51.9	46.5	6.44	0.581
FC2	0	0	0.3	0.5	33.2	56.1	9.9	5.75	0.643
FC3	0	0	0	0.3	15.0	43.0	41.7	6.26	0.714
FC4	0	0	0	0.3	14.2	46.8	39.0	6.25	0.693
Behavioral Intention								**6.04**	**0.537**
BI1	0	0.3	0.3	0.3	9.4	74.3	15.5	6.04	0.571
BI2	0	0	0.3	0.3	8.8	74.9	15.8	6.06	0.528
BI3	0	0	0.3	0.5	12.0	71.7	15.5	6.02	0.567
Social Influence								**6.03**	**0.519**
SI1	0	0.3	0.8	0.3	2.9	61.5	34.2	6.27	0.651
SI2	0	0	0.5	0.3	12.0	58.8	28.3	6.14	0.667
SI3	0	0	0.8	6.4	35.8	53.5	3.5	5.52	0.705
SI4	0	0.3	0.8	0.3	10.4	57.0	31.3	6.17	0.718
Effort Expectancy								**5.97**	**0.543**
EE1	0	0	0	0.8	2.7	78.3	18.2	6.14	0.471
EE2	0	0	0.3	0.5	16.3	68.2	14.7	5.97	0.596
EE3	0	0.3	0	0.3	20.9	64.7	13.9	5.91	0.628
EE4	0	0.3	1.1	0.3	21.4	63.6	13.4	5.87	0.694
Attitude								**5.95**	**0.584**
A1	0	0	0.3	0.5	9.6	66.8	22.7	6.11	0.598
A2	0	0	0.3	1.3	26.7	58.8	12.8	5.83	0.667
A3	0	0	0.3	0.8	19.8	63.9	15.2	5.93	0.635
A4	0	0	0.5	0.3	21.1	62.3	15.8	5.93	0.651

4.3 Validity and Reliability Test of Questionnaire

In the construction of the Pharmacy-UTAUT, the measurement scale for the core latent variables is the maturity scales used by Venkatesh et al. (2003) in the United States and Venkatesh et al. (2012) in Hong Kong, China, both of which were slightly modified in terms of scenario. Zhang et al. (2018) further pointed out that these maturity scales are based on the UTAUT model and also have higher validity and reliability in the study in terms of the use of medical and health information in mainland China. But given that there is little study to apply UTAUT to retail pharmacies, which is the segment of enterprise organization, it is necessary to conduct a preliminary validity and reliability test on the questionnaire before SEM analysis.

4.3.1 Validity Test

Validity is the degree to which a test can measure the psychological or behavioral traits that it desires to measure (designed by the researchers) (Wu, 2003). Generally, the validity can be divided into Content Validity, Criterion-related Validity and Construct Validity. In the follow-up SEM verification analysis in this study, the construct validity of measurement model is has to be analyzed. In the statistics, however, the most common method of testing construct validity is factor analysis. In this study, the "KMO and Bartlett Spherical Test" in SPSS20 was used to test the construct validity of the questionnaire to find out whether it satisfies the preconditions of subsequent confirmatory factor analysis for the construct validity of measurement model.

KMO is a sampling fitness measurement for Kaiser-Meyer-Olkin. The greater the value of KMO is, the more common factors among the variables will be, and the more suitable it is for factor analysis. In the eyes of Kaiser (1974), if KMO value is less than 0.5, it is not suitable for factor analysis; but if KMO is greater than 0.70, the effect of factor analysis is ideal. It can be seen from Table 4.3 that the overall KMO value of this

study is 0.879, and the KMO of core latent variables is above 0.65. Besides, the overall Bartlett Spherical Test has a significant chi-square value (which is 9698.677) with the degree of freedom of 325, which indicates that there is a common factor among the matrices of the parent population. What we can think of is that the questionnaire in this study has acceptable structural validity and is suitable for factor analysis afterwards.

Table 4.3 Validity Test of Questionnaire

	KMO	Bartlett	df	Sig.
Overall	0.879	9698.677	325	0.000
Performance Expectancy	0.816	1348.225	6	0.000
Effort Expectancy	0.828	1311.195	5	0.000
Social Influence	0.662	976.936	6	0.000
Facilitating Conditions	0.654	679.614	6	0.000
Habit	0.657	328.011	3	0.000
Attitude	0.852	1392.828	6	0.000
Behavioral Intention	0.768	1371.555	3	0.000

4.3.2 Reliability Test

Reliability refers to an indicator that reflects the consistency or stability of results from multiple measurements or estimates the number of measurement errors to actually reflect the extent of true measure (Wu, 2003). In the Likert Scale, “Cronbach’s Alpha” and “Split-half Reliability” are the methods for reliability test that are commonly used. Given that, Crocker and Algina (1986) pointed out that the Alpha coefficient is better than the Split-half Reliability when the internal consistency coefficient is estimated. Therefore, Alpha coefficient was used in this study to test the Internal Consistency Reliability of the questionnaire.

Both (Nunnally, 1978) and DeVellis (1991) pointed out that the Alpha coefficient would be minimally acceptable reliability if it was greater than 0.70. Wu (2003) further pointed out that it would be a qualified questionnaire or scale with good reliability

coefficient if the reliability coefficient of the total scale is preferably above 0.80 (0.70 to 0.80 is acceptable) and the reliability coefficient of the subscale is preferably above 0.70 (0.60 to 0.70 is acceptable). As shown in Table 4.4 and Table 4.5, the reliability coefficient of the questionnaire for this study is 0.926. Although the subscale reliability coefficients of social influence (0.751) and the facilitating conditions (0.686) are lower, the reliability coefficients of the subscales of other latent variables are greater than 0.755. The questionnaire in this study can be considered to have acceptable internal consistency reliability.

After analyzing the SI3 indicator in social influence, it was found that the FC2 indicator in facilitating conditions and the correlation coefficient of respective levels were lower, all of which could therefore be deleted after consideration. It is also necessary to consider the analysis of confirmatory factors of latent variables in the subsequent SEM. This is to see whether such deletion is conducive to the improvement of construct validity of factors. If so deleted, the Alpha coefficient of the social influence subscale can rise to 0.917, the same as in both social influence subscale and the overall questionnaire which can rise to 0.874 and 0.928, respectively.

Table 4.4 Overall Reliability Test of Questionnaire

	Cronbach's Alpha	**Alpha based on standardized items**	**N of items**
Before Correction	0.926	0.930	26
After Correction	0.928	0.931	24

Table 4.5 Components Reliability Test of Questionnaire

	Corrected Item Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Is Deleted	Cronbach's Alpha
Performance Expectancy				
PE1	0.761	0.695	0.835	0.868
PE2	0.875	0.855	0.797	
PE3	0.882	0.861	0.786	
PE4	0.666	0.478	0.943	
Effort Expectancy				
EE1	0.691	0.486	0.942	0.923
EE2	0.866	0.760	0.884	
EE3	0.896	0.834	0.873	
EE4	0.872	0.799	0.885	
Social Influence				
SI1	0.750	0.852	0.580	0.751
SI2	0.686	0.568	0.615	
SI3	0.094	0.095	0.917	
SI4	0.797	0.835	0.536	
Facilitating Conditions				
FC1	0.751	0.586	0.454	0.686
FC2	-0.003	0.194	0.874	
FC3	0.751	0.676	0.405	
FC4	0.541	0.642	0.572	
Habit				
HA1	0.580	0.412	0.687	0.755
HA2	0.534	0.306	0.777	
HA3	0.689	0.499	0.588	
Attitude				
A1	0.742	0.552	0.948	0.936
A2	0.877	0.784	0.907	
A3	0.875	0.794	0.907	
A4	0.903	0.835	0.898	
Behavioral Intention				
BI1	0.918	0.854	0.952	0.964
BI2	0.945	0.893	0.934	
BI3	0.912	0.840	0.956	

4.4 Testing and Modifying of the Research Model

4.4.1 Normality Test of Model Variables

Maximum Likelihood, internally defined by AMOS 22, was used in this study to estimate the model. It is necessary to test the normality of each index variable if the Maximum Likelihood is used; according to the function of AMOS22's "tests for normality and outliers". The skewness coefficient of each index variable and output of kurtosis coefficient are shown in Table 4.6. Kline (2005) upheld that if the skewness coefficient of the variable is greater than 3 and the kurtosis coefficient is greater than 8, the data may not conform to the normality assumption. In particular, the variable may have to be removed from the model or converted when its kurtosis coefficient is greater than 20. In this study's model, the skewness absolute values of all index variable are lower than 3; meanwhile, only the absolute values of kurtosis coefficients of the SI1 variable and the BI1 variable slightly exceed 8 and the rest are below 8. As a result, it can be said that the index variables in the model is under normal distribution, which satisfies the premise of using the Maximum Likelihood.

Table 4.6 Kurtosis and Skewness of Measurement Model Items

Item	Min	Max	Skew	C.R.	Kurtosis	C.R.
PE1	5	7	-0.858	-6.777	-0.894	-3.531
PE2	4	7	-1.012	-7.989	0.588	2.321
PE3	4	7	-0.971	-7.670	0.489	1.932
PE4	2	7	-1.364	-10.768	1.600	6.318
EE1	4	7	-0.039	-0.310	3.393	13.395
EE2	3	7	-0.446	-3.518	1.750	6.909
EE3	2	7	-0.649	-5.123	3.467	13.687
EE4	2	7	-1.122	-8.861	4.358	17.202
SI1	2	7	-1.682	-13.278	8.510	33.595
SI2	3	7	-0.658	-5.194	1.779	7.023
SI3	3	7	-0.683	-5.396	0.631	2.492
SI4	2	7	-1.261	-9.956	4.631	18.281
FC1	3	7	-1.021	-8.063	3.555	14.035
FC2	3	7	-0.077	-0.610	0.237	0.937
FC3	4	7	-0.474	-3.741	-0.777	-3.069
FC4	4	7	-0.418	-3.301	-0.691	-2.729
HA1	3	7	-1.386	-10.941	4.446	17.550
HA2	2	7	-0.543	-4.291	1.183	4.668
HA3	3	7	-0.599	-4.730	2.194	8.659
A1	3	7	-0.496	-3.913	2.086	8.234
A2	3	7	-0.278	-2.193	0.505	1.994
A3	3	7	-0.384	-3.032	1.070	4.223
A4	3	7	-0.452	-3.569	1.452	5.731
BI1	2	7	-1.295	-10.225	8.618	34.021
BI2	3	7	-0.485	-3.833	3.697	14.592
BI3	3	7	-0.527	-4.160	2.674	10.555
Actual Usage	1	5	-0.091	-0.716	-1.337	-5.277
Multivariate					635.173	155.204

4.4.2 Common Method Variance and Multicollinearity Test

Cognate variance, also known as Common Method Variance (CMV), refers to the systematic error caused by the same measurement method (single questionnaire and the

same respondents) in the data collection of both independent and dependent variables, causing a reduction or expansion of true correlation coefficient between the independent variable and the dependent variable (Podsakoff et al., 2003). The Harman's Single Factor Test was used in this study to assess the effect of cognate variance on data analysis. The 26 measured index variables of the 7 potential dimensions were subjected to an unrotated exploratory factor analysis. The results show that the number of extractable factors is 6, while the variance contribution of the first factor is 38.350%—half of the total contribution of the variance of extractable factors (79.412%). Therefore, it is safe to say that although this study has the effect of cognate variance, it is not very serious. Accordingly, relevant variables can be subjected to afterwards SEM analysis.

Multicollinearity refers to the coefficient distortion of model estimation caused by the high correlation among independent variables in the regression model. The Variance Inflation Factor (VIF) was used in this study to evaluate the impact of multicollinearity on data analysis. Taking actual use as the dependent variable, the collinearity diagnosis of SPSS20 shows that among the seven independent variables, the VIF value of attitude variable is up to 4.605, which is not only lower than 5 upheld by Rogerson (2001) but also smaller than 10 recommended by Hair et al. (2009). Therefore, multicollinearity can be considered to be not very serious in this study, nor does it affect the SEM analysis of subsequent correlated variables.

4.4.3 Confirmatory Factor Analysis

In the eyes of Kline (2005), the situation that makes the measurement model correctly reflect the dimension proposed in this study should be analyzed first before the formal evaluation of the structural model. In the SEM, the measurement model is the so-called Confirmatory Factor Analysis (CFA) through which the reliability and validity index variable and latent variable, and the significance level of estimated

parameter, etc., can be evaluated and measured. At the same time, the Convergent Validity of latent variables in the model and Discriminant Validity among latent variables can be further tested accordingly. The problems that were found in the CFA process in this study are also important aspects of model correction.

AMOS22 was used in this study to perform CFA testing on the data of measurement model. The initial measurement model containing only the covariant relationship without causality was drawn initially (as shown in Figure 4.2).

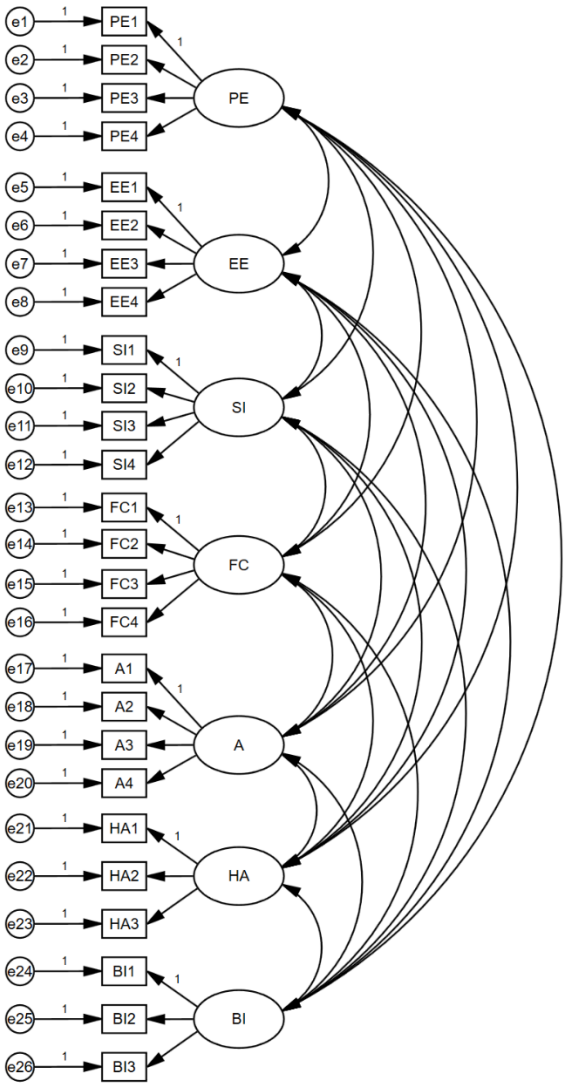

Figure 4.2 Initial CFA Model

4.4.3.1 Test of Goodness for Fit

According to CFA estimation results, the initial measurement model is capable of identifying the convergence. There is no negative error term variance in the non-normalized estimation value, and there is no index variable violating the rules of model identification exists. Nevertheless, the overall fitness index of the model is not good, and most of the fitness indicators are under the empirical standard (see Table 4.7). This indicates that in the measurement model, there is a problem that should be corrected.

Table 4.7 Model Fit Indices of Initial CFA Model

Index	Recommended Value	Observed Value	Judgement
Absolute Fit Indices			
X^2	**P>0.05**	**1584.541（P=0.000）**	**NA**
RMSEA	**<0.08 is good, >0.1 is not acceptable**	**0.112**	**NA**
GFI	**>0.90 is good，>0.80 is acceptable**	**0.745**	**NA**
AGFI	**>0.90 is good，>0.80 is acceptable**	**0.678**	**NA**
Incremental Fit Indices			
NFI	**>0.90**	**0.841**	**NA**
RFI	**>0.90**	**0.814**	**NA**
IFI	**>0.90**	**0.865**	**NA**
TLI（NNFI）	**>0.90**	**0.841**	**NA**
CFI	**>0.90**	**0.864**	**NA**
Parsimonious Fit Indices			
NC	**From 1 to 3 is good, >5 is not acceptance**	**5.700**	**NA**
PNFI	**>0.50**	**0.719**	**NA**
PCFI	**>0.50**	**0.739**	**NA**
PGFI	**>0.50**	**0.590**	**NA**

Note: The recommended value refers to Wu (2009).

According to the statistical output report of AMOS22, this study summarized factor loading, standard error, critical ratio, and significance of each dimension measurement index (as shown in Table 4.8). Both Bagozzi and Yi (1988) upheld that the adaption criteria of CFA basic adaptation specify that “standardized factor loading of measurement index variable is above 0.5”. The larger the factor loading of measurement index variable is, the more it is likely to reflect the trait of the potential dimension to be measured. The study found that the standardized factor loading of the measurement index variable SI3 in the social influence was only 0.059, and the critical ratio was lower than 1.96 (1.124); therefore, it did not pass the significance test at a level of 0.05. The standardized factor loading of the measurement index variable FC2 in the facilitating conditions was only 0.025 and the critical ratio was lower than 1.96 (0.464), which failed to pass the significance test at a level of 0.05 as well. This indicates that the information that the measurement index variables SI3 and FC2 may provide can be deleted as the case may be as they cannot effectively reflect the information that the dimension wants to measure.

The CFA content discussed above is the test and analysis of the external fitness index of the model (also called the overall fitness index) and the basic fitness index. This study continued to use CFA to test and analyze the internal structural fitness index, namely, the “reliability” and “validity” of each latent variable are measured.

Table 4.8 Item Loadings, SMC, CR, and AVEs

Items	UNSTD.	STD.	S.E.	C.R. (t-value)	P-value	SMC	C.R.	AVE
PE1	1.000	0.849				0.721	0.925	0.758
PE2	1.216	0.953	0.046	26.663	***	0.908		
PE3	1.244	0.959	0.046	26.929	***	0.920		
PE4	1.635	0.694	0.105	15.629	***	0.482		
EE1	1.000	0.700				0.490	0.927	0.762
EE2	1.613	0.892	0.098	16.497	***	0.796		
EE3	1.817	0.954	0.104	17.474	***	0.910		
EE4	1.941	0.922	0.114	17.005	***	0.850		
SI1	1.000	0.970				0.941	0.823	0.601
SI2	0.809	0.767	0.039	20.623	***	0.588	**After deleting SI3**	
SI3	0.066	0.059	0.059	1.124	0.261	0.003		
SI4	1.060	0.933	0.033	32.142	***	0.870	0.922	0.800
FC1	1.000	0.787				0.619	0.776	0.532
FC2	0.035	0.025	0.076	0.464	0.642	0.001	**After deleting FC2**	
FC3	1.454	0.931	0.082	17.646	***	0.867		
FC4	1.215	0.801	0.073	16.600	***	0.642	0.879	0.710
HA1	1.000	0.698				0.513	0.786	0.558
HA2	1.192	0.599	0.114	10.445	***	0.641		
HA3	1.353	0.910	0.131	10.326	***	0.172		
A1	1.000	0.760				0.578	0.937	0.789
A2	1.337	0.911	0.069	19.367	***	0.830		
A3	1.283	0.918	0.066	19.557	***	0.843		
A4	1.364	0.952	0.067	20.381	***	0.906		
BI1	1.000	0.940				0.884	0.965	0.903
BI2	0.961	0.977	0.023	42.701	***	0.955		
BI3	0.985	0.932	0.028	35.548	***	0.869		

4.4.3.2 Reliability Test

In the CFA, the degree of internal consistency of the measurement indexes of latent variables in the model is generally measured by using Composite Reliability (hereinafter referred to as “CR”). Such reliability is also known as Construct Reliability whose value can be obtained by using index factor loading and the error variation in the standardized estimate report (Wu, 2009).

Kline (2005) believed that the higher the CR value is, the better the reliability of the model's intrinsic fitness index will be; the CR value will be (1) perfect if it is above 0.90, (2) good if it is about 0.80, (3) suitable if it is about 0.70, and (4) the minimum acceptable scope if it is greater than 0.50. As shown in Table 12, the CR value of each latent variable in this study is between 0.776 and 0.965 after formula calculation, that is, the reliability of the fitness index in the measurement model is between perfect and good. Among them, social influence reduced SI3 measurement index variable, after which the CR value increased from 0.823 to 0.922. After the facilitating conditions have deleted FC2, the measurement index variable, the CR value increases from 0.776 to 0.879. This means that the deletion or reduction of the measurement index variables SI3 and FC2 can effectively improve the intrinsic reliability of the dimension.

4.4.3.3 Convergence Validity Test

Convergence Validity means that the measurement index measuring the same latent variable in the measurement model will be at the same latent factor level. When there is a higher factor loading at the factor level, the correlation among these observations will be higher; The greater the homogeneity is, the better the validity of the latent variables jointly reflected will be (Wu, 2013). In SEM, the composite reliability and the Average Variance Extracted (AVE) are generally used to measure the convergence validity of measurement model. The numerical value of AVE is the extent that the latent variable dimension can explain the index variables after comparing with the magnitude of measurement error variation (Wu, 2009).

According to Hair et al. (2009), the significant criteria that “AVE value is greater than 0.50” and “CR value is greater than 0.60” is used to determine whether the various dimensions of CFA have reached convergence validity. As shown in Table 11, AVE value of each latent variable in this study is between 0.558 and 0.903 with all CR values exceeding 0.60, that is, the convergence validity of the intrinsic fitness index of the

measurement model was tested. Among others, AVE value rises from 0.601 to 0.800 after social influence dimension has deleted the measurement index variable SI3; but the AVE value rises from 0.532 to 0.710 after facilitating conditions deleted the measurement index variable FC2. This indicates that the construct validity of the dimension to which they belong can be effectively improved by the deleted measurement index variables SI3 and FC2. In combination with the positive impact of the deleted measurement index variables SI3 and FC2 in the preceding paragraph on validity improvement, in this study it was decided to delete the measurement index variables SI3 and FC2 in an attempt to better carry out the subsequent Discriminant Validity Test of latent variables of CFA.

4.4.3.4 Discriminant Validity Test

Discriminant Validity refers to the low or significant difference between the characteristics of the constructed latent variables and other latent variables (Wu, 2013). There are significant differences in the latent traits reflected by the index variables of the factor construct and the latent construct. If designed with reasonable theoretical models, the discriminant validity will be good.

The more rigorous “AVE Comparison Method” concluded by Hair et al. (2009) was used in this study to test the discriminant validity of latent variables. The correlation coefficient between the AVE square root of the latent construct and the latent construct was compared. If the correlation coefficient of the two dimensions is smaller than the AVE square root of the two latent constructs, it means that the amount of variation explained by its measurement index variables in this dimension is greater than that explained by another latent construct. This means a good discriminant validity can be discovered between the two dimensions.

Table 4.9 shows the correlation coefficient matrix of latent variables. This study found that the correlation coefficients of such latent constructs as habit, attitude and

behavioral intention are relatively high. Among others, the correlation coefficient between habit and attitude is 0.824, which is lower than the AVE square root value of attitude (0.888) but higher than the AVE square root value of habit (0.747). This indicates that the lack of discriminant validity in habit and attitude is highly collinear. According to the research hypothesis in Chapter II and relevant contents of the measurement scale, this study upholds that: (1) the maturity scale for habit and attitude used in original UTAUT and UTAUT2 cannot distinguish the two latent constructs in IT use of Chinese retail pharmacies in the context of mandatory use; (2) based on the influence relationship between the latent construct constructed by the Pharmacy-UTAUT herein, it is also impossible to simply consolidate habit and attitude; and (3) In the literature review, relevant studies on the impact of the use of habit in the health care field on IT use have not yet been established. Combined with the perspectives above, this study decided to delete habit from the initial Pharmacy-UTAUT.

Table 4.9 Correlation of Constructs and Square Roots of AVE

Variable	PE	EE	SI	FC	HA	A	BI
PE	**0.871**						
EE	0.305	**0.873**					
SI	0.461	0.401	**0.894**				
FC	0.342	-0.076*	0.353	**0.843**			
HA	0.462	0.434	0.359	0.250	**0.747**		
A	0.349	0.357	0.355	0.221	0.824	**0.888**	
BI	0.328	0.273	0.361	0.280	0.702	0.867	**0.950**

Note: The square root of AVE is denoted in bold. * no significance.

The “AVE Comparison Method” has been used to verify the discriminant validity among the latent constructs other than the habit. For the sake of prudence; however, this

study, after deleting habit, also used the “Bootstrap Distribution of Effects” to carry out a second test on the discriminant validity of each latent construct. Ping Jr (2004) pointed out that if the confidence interval of each latent construct does not contain 1 (complete correlation), it indicates that there is a discriminant validity among the latent variables. The Bootstrap function in AMOS22 was used in this study to resample for 1,000 times with a confidence interval setting to 95%. The data output results of the two confidence interval estimation methods (Bias-corrected Percentile Method and Percentile Method) are shown in Table 4.10. It is obvious that the confidence intervals of all standardized correlation coefficient do not contain 1. Therefore, each latent variable has a discriminant validity. According to the combination of the two discriminant validity test methods above, it can be concluded that there is a discriminant validity among the dimensions herein.

Table 4.10 Confidence Interval of Discriminant Validity

Parameter	Estimate	Bias-corrected		Percentile	
		Lower	Upper	Lower	Upper
PE<-->EE	0.305	0.209	0.414	0.201	0.408
PE<-->SI	0.462	0.360	0.569	0.360	0.569
PE<-->A	0.348	0.234	0.440	0.239	0.447
PE<-->BI	0.328	0.213	0.424	0.219	0.428
PE<-->FC	0.342	0.238	0.451	0.224	0.444
EE<-->SI	0.399	0.254	0.569	0.234	0.551
EE<-->A	0.356	0.233	0.472	0.235	0.479
EE<-->FC	-0.076*	-0.191	0.047	-0.197	0.033
EE<-->BI	0.273	0.137	0.407	0.138	0.412
SI<-->A	0.354	0.239	0.474	0.232	0.465
SI<-->BI	0.362	0.248	0.483	0.238	0.474
SI<-->FC	0.393	0.312	0.486	0.297	0.473
FC<-->BI	0.280	0.191	0.365	0.187	0.360
FC<-->A	0.221	0.127	0.318	0.117	0.315
BI<-->A	0.867	0.823	0.912	0.809	0.901

Note: * no significance.

4.4.4 Initial Model Correction

4.4.4.1 Initial Correction

In response to the initial model, the study proposed two initial corrections in the CFA: (1) such deletion cannot effectively reflect the measurement index variable in the dimension to which it belongs. The measurement index variables SI3 and FC2 are deleted from the dimension; (2) the deletion cannot establish a latent construct for effective discriminant validity. Habit was deleted from the model, after which the chi-square value of CFA was reduced from 1584.541 to 889.429. At this moment, the values of three fitness indexes (GFI value, IFI value, CFI value) were tested from failure of passing the test, and the remaining fitness indexes were significantly though they had not passed the test.

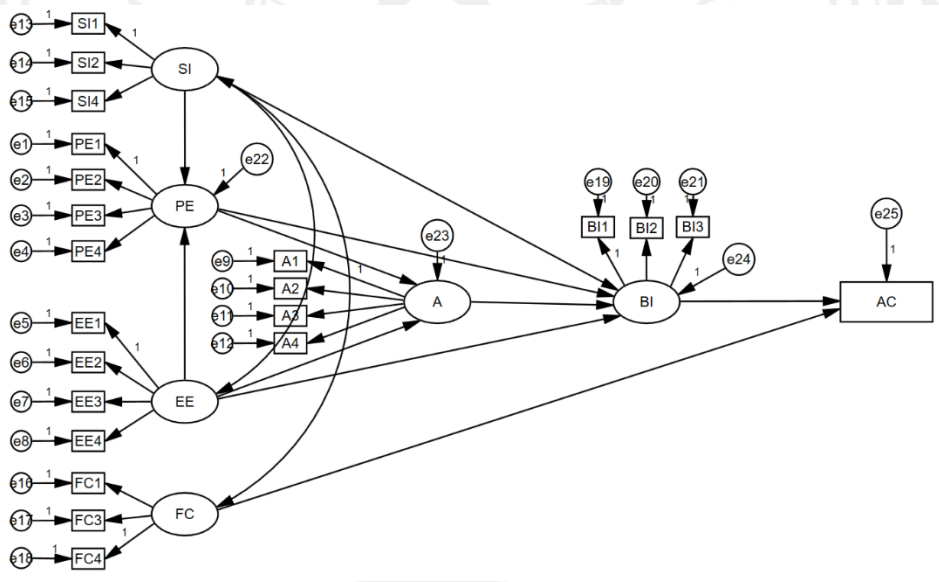

Figure 4.3 First Modified Construct Model

Accordingly, this study attempted to construct an Initially Corrected Construct Model as shown in Figure 4.3. The estimation results show that the model can identify convergence, but most of the fitness indexes are under the empirical criteria. In addition,

the overall fitness index of the model is not satisfactory, and the model cannot be supported as shown in Table 4.11.

Table 4.11 Model Fit Indices of First Modified Construct Model

Index	Recommended Value	Observed Value	Judgement
Absolute Fit Indices			
X^2	**P>0.05**	**1031.602（P=0.000）**	**NA**
RMSEA	**<0.08 is good, >0.1 is not acceptable**	**0.106**	**NA**
GFI	**>0.90 is good，>0.80 is acceptable**	**0.807**	**Acceptable**
AGFI	**>0.90 is good，>0.80 is acceptable**	**0.753**	**NA**
Incremental Fit Indices			
NFI	**>0.90**	**0.883**	**NA**
RFI	**>0.90**	**0.863**	**NA**
IFI	**>0.90**	**0.903**	**Acceptable**
TLI（NNFI）	**>0.90**	**0.887**	**NA**
CFI	**>0.90**	**0.903**	**是**
Parsimonious Fit Indices			
NC	**From 1 to 3 is good, >5 is not acceptable**	**5.210**	**NA**
PNFI	**>0.50**	**0.757**	**Acceptable**
PCFI	**>0.50**	**0.774**	**Acceptable**
PGFI	**>0.50**	**0.632**	**Acceptable**

Note: The recommended value refers to Wu (2009).

4.4.4.2 Second Correction

AMOS22 will provide Modification Indices when it is assumed that the model and the sample cannot be effectively adapted. Such Modification Indices can be used as a reference for the hypothesis model correction based on the modification indexes and the expected parameter change value of the corrected index summary sheet.

In this study, the Covariances method and the Regression Weights method, which are most commonly used in the correction procedure, were used to select a modification index with the chi-square value difference greater than 15 and attempted to carry out a second correction against the construct model.

1. Attempting to use Covariances. MacCallum (1995), Diamantopoulos and Siguaw (2000) indicated that in SEM, a strong theoretical basis is needed to carry out data-driven residual-related corrections; otherwise, it will be inappropriate as SEM assumes that there is no correlation among the error terms for all observed variables (Residual Independence Principle). This study did not find relevant theoretical basis in the initial research of IT adoption. Even if this standard is relaxed, the error terms of observed variables for the same latent variable are allowed to have covariation relationship; however, there is no such modification indexes according to the table of modification indexes.

2. Attempting to use Regression Weights. The addition of a substantial modified path is to add a direct path influencing the potential variables of the construct model (Wu, 2013). As shown in Table 4.12, if it is the positive causal relationship that effort expectancy is added to the use frequency, the model chi-square value can be reduced by 26.673, and the path coefficient of the parameter change is 0.868. If it is the positive causal relationship that facilitating conditions are newly added to the performance expectancy, the model chi-square value can be reduced by 15.140, and the path coefficient of the parameter change is 0.142.

Table 4.12 Modification Indices of Path Coefficient

Path	M.I.	Par Chang
EE --> AU	**26.673**	**0.868**
FC --> PE	**15.140**	**0.142**

After the two direct paths were added, the degree of fitting of the construct model is shown in Table 4.13. The estimation results show that although the overall degree of fitting of the quadratic modified construct model was slightly improved compared with the initial correction (Table 4.11) and the chi-square degree of freedom became acceptable, most of the fitness indexes are still under the empirical standard. Moreover, data-driven incremental path coefficients also required a robust theoretical foundation, otherwise it is not appropriate (Wu, 2013).

Table 4.13 Model Fit Indices of Second Modified Construct Model

Index	Recommended Value	Observed Value	Judgement
Absolute Fit Indices			
X^2	**P>0.05**	**978.651（P=0.000）**	**NA**
RMSEA	**<0.08 is good, >0.1 is not acceptable**	**0.103**	**NA**
GFI	**>0.90 is good，>0.80 is acceptable**	**0.814**	**Acceptable**
AGFI	**>0.90 is good，>0.80 is acceptable**	**0.760**	**NA**
Incremental Fit Indices			
NFI	**>0.90**	**0.889**	**NA**
RFI	**>0.90**	**0.869**	**NA**
IFI	**>0.90**	**0.909**	**Acceptable**
TLI（NNFI）	**>0.90**	**0.893**	**NA**
CFI	**>0.90**	**0.909**	**Acceptable**
Parsimonious Fit Indices			
NC	**From 1 to 3 is good, >5 is not acceptable**	**4.993**	**Acceptable**
PNFI	**>0.50**	**0.754**	**Acceptable**
PCFI	**>0.50**	**0.771**	**Acceptable**
PGFI	**>0.50**	**0.631**	**Acceptable**

Note: The recommended value refers to Wu (2009).

In conclusion, not only can the quadratic correction construct model using AMOS22 modification index not be adapted to the sample data, but the related correction contents lack a robust theoretical basis. Therefore, the second correction should not be retained and extended to the third correction.

4.4.4.3 Third Correction

The results of the second correction show that the correction of construct model still needs to be corrected from the theoretical level. In fact, the original studies on IT adoption (TAM, TAM2, UTAUT, UTAUT2) are a kind of longitudinal study which conducts a repeated follow-up survey against the same batch of respondents over a longer period. The final measurement of actual behaviors was carried out several months after the respondents used IT to reduce the impact of common method variance caused by social expectation, etc. In addition, the original study of the UTAUT used the system log to objectively record actual behaviors to ensure the credibility of actual behavioral data (Venkatesh et al. 2003).

Subject to investigation conditions, this study is only a kind of cross-sectional study of IT adoption intention and behavior of Chinese retail pharmacies. Moreover, the data on actual use behavior is more subjective as they were collected in the form of self-reporting. Since IT use in Chinese retail pharmacies is in the context of mandatory use under government policy, social expectation will affect the authenticity of actual behavior data to a certain extent. Furthermore, there may be problems such as incomplete information description if only the actual behavior measurement is taken from the single dimension of “IT use frequency”.

Considering the difficulties of actual behavior measurement and the SEM model fitting degree caused by common method variance, many scholars deleted actual behavior in the theoretical model design and used the intention as the final outcome variable in the subsequent IT adoption study of UTAUT-based medical health field

(e.g., Adenuga et al., 2017; Aggelidis & Chatzoglou, 2009; Alaiad & Zhou, 2014; Bawack & Kala Kamdjoug, 2018; Beglaryan et al., 2017; Cimperman et al., 2016; Dünnebeil et al., 2012; Esmaeilzadeh et al., 2015; Hung et al., 2012; Lee et al., 2017; Xue et al., 2012; Zhang et al., 2017).

Based on the contents above, this study carried out three corrections against the construct model, as follows:

1. Taking the intention of retail pharmacy IT use as the final result variable, actual behavior is removed from construct model to simplify the original model structure.

2. Facilitating conditions is removed. Venkatesh et al. (2012) pointed out that in the use of organizational IT, the facilitating conditions are fairly provided and are not easy to change, which is different from the individual consumer background. Therefore, the facilitating conditions only have a direct causal relationship with actual use behaviors. Given that Chinese retail pharmacy IT is used in an organizational environment, the facilitating conditions that have a direct causal relationship with actual use behavior should also be removed.

3. This study also found that "social influence", one of the latent constructs, retained three measurement index variables which can be further named as "Industry Support" based on the contents to be measured, that is, "an individual perceives the extent to which the persons in the industry who are important to him or her should use IT as he (she) may think. Meanwhile measurement index variable SI3 (local health administrative agencies have helped the author to use retail pharmacy IT) that was deleted from reliability and validity with extreme low correlation coefficient in the dimension of "Industry Support". It can be further called "Government Policy", which means "an individual perceives the extent to which local health administration's desire to promote their IT use through government policies". Accordingly, H4a and H4b in original theoretical assumptions can be divided as follows:

H4a1：Government Policy will have a significant positive impact on the BI.

H4a2: Industry Support will have a significant positive impact on PE.

H4b1: Government Policy will have a significant positive impact on BI.

H4b2: Industry Support will have a significant positive impact on PE.

Please refer to Figure 4.4 for the construct models of three corrections. The estimation results show that the model can identify convergence, but most of the fitness indexes are above the empirical criteria. In addition, the overall fitness index of the model is satisfactory; thus, the model is supported (as shown in Table 4.14). Although the RMSEA value and the chi-square free ratio exceeded the reasonable fitted value in the fitting index, they are acceptable, that is, the model is commonly fitted. Besides, the chi-square value in the absolute fit indices is very sensitive to the size of data sample. The larger the sample size is, the greater the chi-square value will be, and the easier it will be to reject the null hypothesis. The chi-square value usually does little to help when the sample size is relatively large (Rigdon, 1995). Hair et al. (2009) further pointed out that the chi-square value should be significant when the sample size exceeds 250 and the observable variable exceeds 30 ($P>0.05$). As a result, the chi-square value should be tested in combination with other testing indices. It can be considered that the fitting degree of the third corrected construct model conforms to the standard, and the test of overall fitness degree qualifies, and the subsequent SEM hypothesis test can be performed, to the extent that the other fitness degree meets the standard.

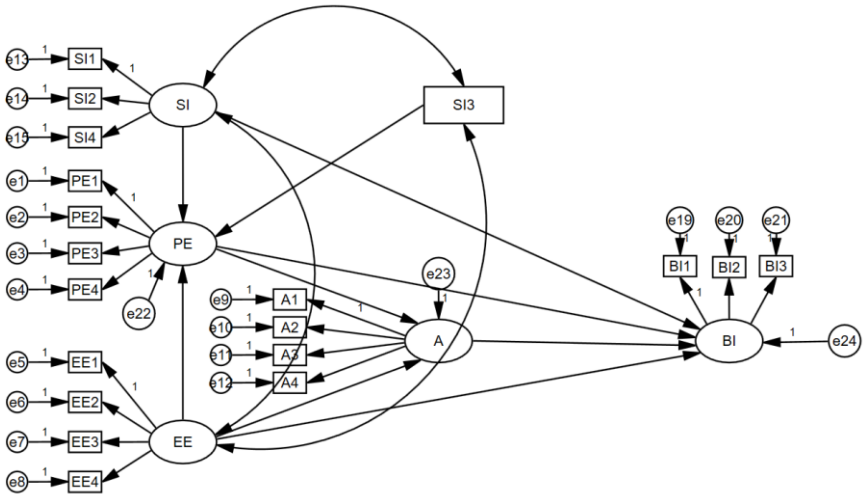

Figure 4.4 Third Modified Construct Model

Table 4.14 Model Fit Indices of Third Modified Construct Model

Index	Recommended Value	Observed Value	Judgement
Absolute Fit Indices			
X^2 值	**P>0.05**	**600.192（P=0.000）**	**NA**
RMSEA	**<0.08 is good, >0.1 is not acceptable**	**0.094**	**Acceptable**
GFI	**>0.90 is good，>0.80 is acceptable**	**0.854**	**Acceptable**
AGFI	**>0.90 is good，>0.80 is acceptable**	**0.802**	**Acceptable**
Incremental Fit Indices			
NFI	**>0.90**	**0.921**	**Acceptable**
RFI	**>0.90**	**0.904**	**Acceptable**
IFI	**>0.90**	**0.939**	**Acceptable**
TLI（NNFI）	**>0.90**	**0.925**	**Acceptable**
CFI	**>0.90**	**0.938**	**Acceptable**
Parsimonious Fit Indices			
NC	**From 1 to 3 is good, >5 is not acceptable**	**4.287**	**Acceptable**
PNFI	**>0.50**	**0.754**	**Acceptable**
PCFI	**>0.50**	**0.768**	**Acceptable**
PGFI	**>0.50**	**0.629**	**Acceptable**

Note: The recommended value refers to Wu (2009).

4.5 Hypothesis Testing

The Pharmacy-UTAUT final theoretical model (see Figure 4.5) was analyzed by fitting the three corrected models tested in this study with the SEM analysis results of AMOS22 as shown in Figure 4.6. By virtue of the path relationships among latent variables, this study examined the theoretical assumptions of the previous paragraph. Table 20 shows the path relationship among the latent variables. Of the ten path relationships of the Pharmacy-UTAUT's final construct model (see Table 4.15), totally, eight path relationships are consistent with the theoretical assumptions. However, the path of performance expectancy to behavioral intention (H1a) failed to pass the significance testing. Although the path of effort expectancy to behavioral intention (H2c) negatively passes the significance testing, the test results are shown below:

1. The model explained the variance of behavioral intention at the level of 75%. Attitude (β=0.860, P=0.000), Industry Support (β=0.085, P=0.016) and Government Policy (β=0.060, P=0.041) are the key positive influencing factors of behavioral intention. Effort Expectancy (β=-0.070, P=0.046) has a critical negative impact on behavioral intention in the empirical research. The impact on behavioral intention in performance expectancy (β=0.009, P=0.798) loses significance in the empirical research.

2. The model explained the variance of attitude at the level of 19%. Effort Expectancy (β=0.278，P=0.000) and Performance Expectancy (β=0.266，P=0.000) are key positive influencing factors for attitude.

3. The model explained the variance of Performance Expectancy at the level of 19%. Industry Support (β=0.393, P=0.000), Effort Expectancy (β=0.141, P=0.009) and Government Policy (β=0.094, P=0.044) are key positive influencing factors for Performance Expectancy.

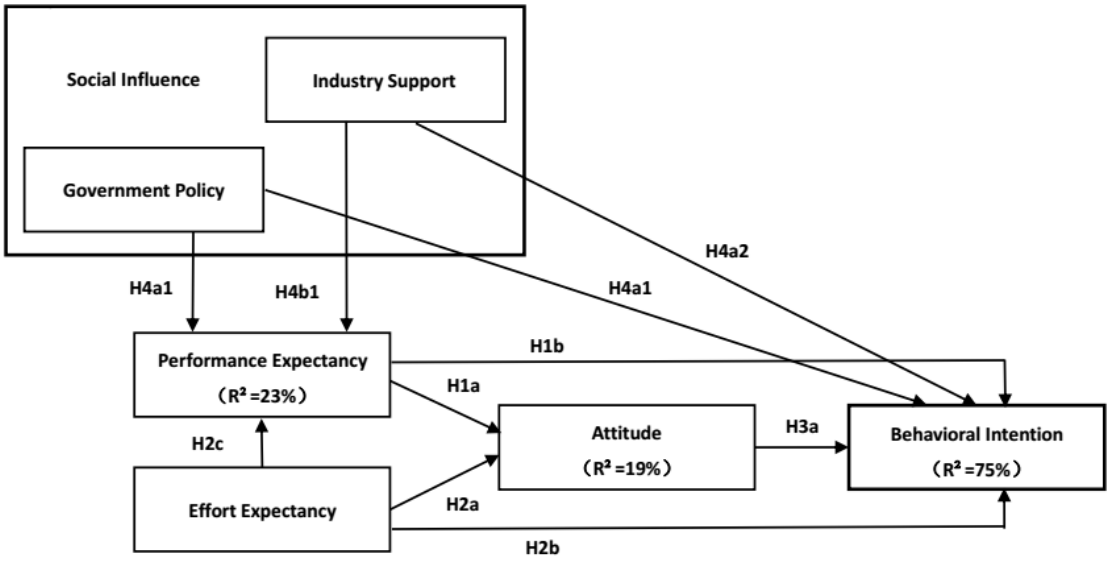

Figure 4.5 Final Construct Model

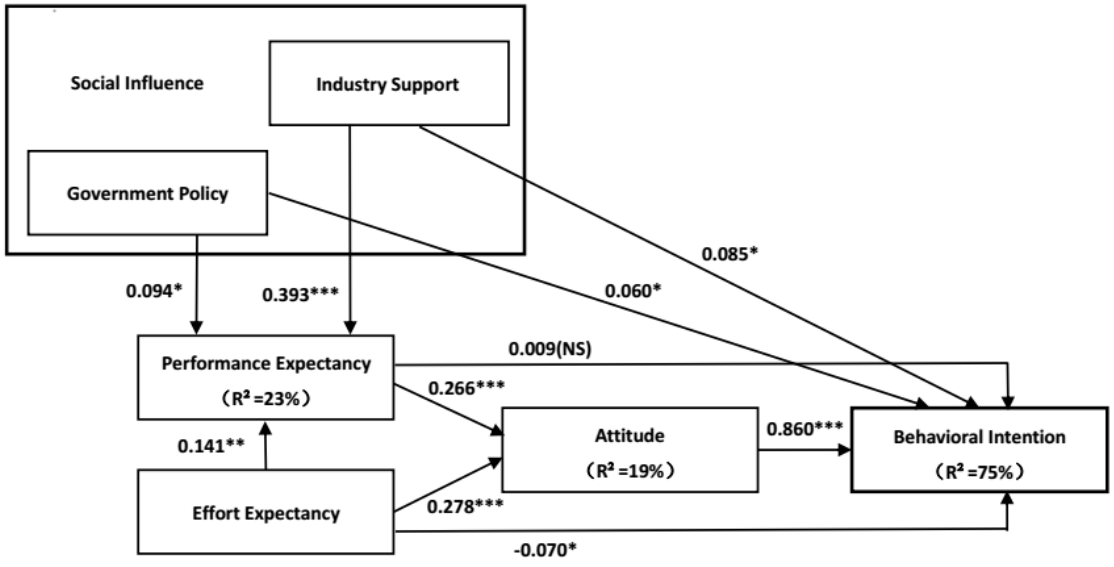

Figure 4.6 Resulting Pharmacy-UTAUT with Standardized Path Estimates
Note: *** P<0.001; ** P<0.01; * P<0.05; NS means no significance.

Table 4.15 Results of Path Analysis

Path			Standardized Path Coefficient	Unstandardized Path Coefficient	SD	C.R. (t-value)	P-value
PE	→	BI	0.009	0.012	0.046	0.256	0.798
EE	→	BI	-0.070	-0.111	0.056	-1.998	0.046
IS	→	BI	0.085	0.072	0.030	2.400	0.016
GP	→	BI	0.060	0.045	0.022	2.048	0.041
A	→	BI	0.860	0.993	0.059	16.825	***
PE	→	A	0.266	0.300	0.060	4.973	***
EE	→	A	0.278	0.384	0.076	5.033	***
EE	→	PE	0.141	0.173	0.066	2.630	0.009
IS	→	PE	0.393	0.256	0.035	7.216	***
GP	→	PE	0.094	0.055	0.027	2.010	0.044

Table 4.16 Summary of Hypotheses Testing

No.	Hypothesis	Result
H1a	PE will have a significant positive effect on BI.	✗
H1b	PE will have a significant positive effect on A.	✓
H2a	EE will have a significant positive effect on BI.	✗
H2b	EE will have a significant positive effect on A.	✓
H2c	EE will have a significant positive effect on PE.	✓
H3a	A will have a significant positive effect on BI.	✓
H4a1	GP will have a significant positive effect on BI.	✓
H4a2	IS will have a significant positive effect on BI.	✓
H4b1	GP will have a significant positive effect on PE.	✓
H4b2	IS will have a significant positive effect on PE.	✓

4.6 Moderation Effects Analysis

In Chapter II, model construction was discussed. It was pointed out that gender and age originally contained in the UTAUT were selected as the moderators of Pharmacy-UTAUT, together with two newly added moderators: pharmacy type and pharmacy professional level. Jöreskog (1971), Jonsson (1998), and Wen et al. (2005) indicated that structural analysis for grouping equations should be done when the regulated variable is a categorical variable. By virtue of the AMOS22's Multiple-Group Analysis, this study examined the moderation effects of gender, age, pharmacy type, and pharmacy professional level on the theoretical paths of the Pharmacy-UTAUT one by one.

4.6.1 Moderation Effect of Gender

First, a total of 374 samples was split into two groups by gender, which included 184 male samples and 190 female samples. Then, unconstrained model and constrained model were constructed, and all parameters of the unconstrained model were freely estimated. At the same time, the ten restriction models were sequentially established according to the original ten theoretical paths and the corresponding paths were set equally in different groups. All model fitting results and identity tests are shown in Table 4.17 as follows:

Table 4.17 Moderator Testing of Gender

	X^2/DF	RMSEA	GFI	AGFI	CFI	NFI	IFI	ΔX^2	P
Recommended Value	**<5**	**<0.1**	**>0.80**	**>0.80**	**>0.90**	**>0.90**	**>0.90**		
Unconstrained Model	**3.026**	**0.074**	**0.812**	**0.745**	**0.926**	**0.894**	**0.926**		
PE→BI Equal Model	**3.020**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.926**	**1.312**	**0.252**
PE→A Equal Model	**3.016**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.051**	**0.821**
EE→BI Equal Model	**3.017**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.439**	**0.508**
EE→A Equal Model	**3.016**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.102**	**0.749**
EE→PE Equal Model	**3.042**	**0.074**	**0.811**	**0.744**	**0.925**	**0.893**	**0.926**	**7.353**	**0.007**
A→BI Equal Model	**3.019**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.926**	**1.034**	**0.309**
GP→BI Equal Model	**3.016**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.182**	**0.670**
GP→PE Equal Model	**3.016**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.017**	**0.897**
IS→BI Equal Model	**3.025**	**0.074**	**0.811**	**0.745**	**0.926**	**0.894**	**0.926**	**2.652**	**0.103**
IS→PE Equal Model	**3.016**	**0.074**	**0.812**	**0.746**	**0.926**	**0.894**	**0.927**	**0.007**	**0.932**

The study found that the degree of fitting of eleven models were generally within acceptable limits. Among the ten constrained models, the chi-square value difference was statistically significant (P<0.05) after comparing only EE→PE equal model with unconstrained model. This indicated that among the male and female groups, the path coefficient from Effort Expectancy to Performance Expectancy changed significantly, that is, gender played a moderator role in the impact of Effort Expectancy to Performance Expectancy.

In the full sample model, the EE→PE path coefficient is 0.141 (P=0.009); in the male group, the EE→PE path coefficient is 0.257 (P=0.000), and in the female group, the EE→PE path coefficient is 0.037 (P= 0.635). It is obvious that the impact of Effort Expectancy to Performance Expectancy is significant in the male group but not significant in the female group.

4.6.2 Moderation Effect of Age

Kelley (1939) and Cureton (1957) indicated that the normal continuous variables are divided into three groups by intervals of 30% and 70% with the largest statistical discrimination, Lower Group (below 30%) and (above 70%). Following this rule, in this study 374 samples were split into two groups by age, including older group (121 samples at the age of 45 or older) and younger group (112 samples at the age of 34.5 or younger). Then, the unconstrained model and the constrained model were constructed, and all parameters of the unconstrained model were freely estimated. At the same time, the ten restriction models were sequentially established according to the original ten theoretical paths and the corresponding paths were set equally in different groups. All model fitting results and identity tests may refer are summarized in Table 4.18 as follows.

Table 4.18 Moderator Testing of Age

	X^2/DF	RMSEA	GFI	AGFI	CFI	NFI	IFI	ΔX^2	P
Recommended Value	**<5**	**<0.1**	**>0.80**	**>0.80**	**>0.90**	**>0.90**	**>0.90**		
Unconstrained Model	**2.038**	**0.067**	**0.799**	**0.727**	**0.941**	**0.892**	**0.942**		
PE→BI Equal Model	**2.031**	**0.067**	**0.799**	**0.728**	**0.941**	**0.892**	**0.942**	**0.001**	**0.982**
PE→A Equal Model	**2.058**	**0.068**	**0.796**	**0.724**	**0.940**	**0.890**	**0.940**	**7.749**	**0.005**
EE→BI Equal Model	**2.041**	**0.067**	**0.797**	**0.726**	**0.941**	**0.891**	**0.941**	**2.796**	**0.095**
EE→A Equal Model	**2.031**	**0.067**	**0.799**	**0.728**	**0.941**	**0.892**	**0.942**	**0.013**	**0.910**
EE→PE Equal Model	**2.033**	**0.067**	**0.799**	**0.728**	**0.941**	**0.892**	**0.942**	**0.602**	**0.438**
A→BI Equal Model	**2.043**	**0.067**	**0.798**	**0.726**	**0.941**	**0.891**	**0.941**	**3.401**	**0.065**
GP→BI Equal Model	**2.033**	**0.067**	**0.799**	**0.728**	**0.941**	**0.892**	**0.942**	**0.638**	**0.425**
GP→PE Equal Model	**2.034**	**0.067**	**0.799**	**0.728**	**0.941**	**0.892**	**0.942**	**0.794**	**0.373**
IS→BI Equal Model	**2.041**	**0.067**	**0.799**	**0.728**	**0.941**	**0.891**	**0.941**	**2.764**	**0.096**
IS→PE Equal Model	**2.037**	**0.067**	**0.798**	**0.727**	**0.941**	**0.892**	**0.942**	**1.841**	**0.175**

The study found that the degree of fitting of eleven models were generally within acceptable limits. Among the ten constrained models, the chi-square value difference was statistically significant (P<0.05) after comparing only PE→A equal model with unconstrained model, which indicated that among the older and younger groups, the path coefficient from Performance Expectancy to attitude changed significantly, that is, age played a moderator role in the impact of Performance Expectancy on attitude.

In the full sample model, the PE→A path coefficient is 0.266 (P=0.000); in the younger group, the PE→A path coefficient is 0.098 (P=0.321), and in the older group, the PE→A path coefficient is 0.380 (P=0.000). It is obvious that the impact of Performance Expectancy on attitude is not significant in the younger group but significant in the older group.

4.6.3 Moderation Effect of Pharmacy Type

First, a total of 374 samples was divided into two groups by pharmacy type, including 191 chain pharmacies and 183 individually operated pharmacies. Then, the unconstrained model and the constrained model were constructed, and all parameters of the unconstrained model were freely estimated. At the same time, the ten restriction models are sequentially established according to the original ten theoretical paths and the corresponding paths were set equally in different groups. All model fitting results and identity tests are shown in Table 4.19.

Table 4.19 Moderator Testing of Pharmacy Type

	X^2/DF	RMSEA	GFI	AGFI	CFI	NFI	IFI	ΔX^2	P
Recommended Value	**<5**	**<0.1**	**>0.80**	**>0.80**	**>0.90**	**>0.90**	**>0.90**		
Unconstrained Model	**3.176**	**0.076**	**0.796**	**0.724**	**0.927**	**0.898**	**0.928**		
PE→BI Equal Model	**3.176**	**0.076**	**0.796**	**0.724**	**0.927**	**0.897**	**0.927**	**3.103**	**0.078**
PE→A Equal Model	**3.182**	**0.077**	**0.795**	**0.723**	**0.927**	**0.897**	**0.927**	**4.820**	**0.028**
EE→BI Equal Model	**3.169**	**0.076**	**0.796**	**0.724**	**0.927**	**0.897**	**0.927**	**1.185**	**0.276**
EE→A Equal Model	**3.184**	**0.077**	**0.796**	**0.724**	**0.926**	**0.897**	**0.927**	**5.246**	**0.022**
EE→PE Equal Model	**3.165**	**0.076**	**0.796**	**0.725**	**0.927**	**0.898**	**0.928**	**0.045**	**0.833**
A→BI Equal Model	**3.165**	**0.076**	**0.796**	**0.725**	**0.927**	**0.898**	**0.928**	**0.008**	**0.929**
GP→BI Equal Model	**3.169**	**0.076**	**0.797**	**0.725**	**0.927**	**0.897**	**0.927**	**1.147**	**0.284**
GP→PE Equal Model	**3.165**	**0.076**	**0.796**	**0.725**	**0.927**	**0.898**	**0.928**	**0.000**	**0.997**
IS→BI Equal Model	**3.168**	**0.076**	**0.796**	**0.724**	**0.927**	**0.898**	**0.928**	**0.777**	**0.378**
IS→PE Equal Model	**3.176**	**0.076**	**0.796**	**0.724**	**0.927**	**0.897**	**0.927**	**3.001**	**0.083**

The study found that the degree of fitting of eleven models were generally within acceptable limits. Among the ten constrained models, the chi-square value difference was statistically significant (P<0.05) after comparing only PE→A equal model and EE→A equal model with unconstrained model, which indicated that among the groups of chain pharmacies and individually operated pharmacies, the path coefficients from Performance Expectancy to attitude, from Effort Expectancy to attitude, changed

significantly, that is, pharmacy type played a moderator role in the impact of Performance Expectancy to attitude and Effort Expectancy to attitude.

In the full sample model, the PE→A path coefficient is 0.266 (P=0.000) and the EE→A path coefficient is 0.278 (P=0.000). In the chain pharmacy group, PE→A path coefficient is 0.205 (P=0.007) and EE→A path coefficient is 0.166 (P=0.030). In the individually operated pharmacy group, PE→A path coefficient is 0.296 (P=0.000) and EE→A path coefficient is 0.278 (P=0.000). Compared with the chain pharmacies, the impact of both Performance Expectancy and Effort Expectancy of individually operated pharmacies to attitude are significantly increased.

4.6.4 Moderation Effect of Pharmacy Professional Level

This study took the pharmacist qualification certificate as a measurement index to evaluate the professionalism of the respondents. A total of 374 samples was divided into two groups by pharmacy professional level: 106 samples with high pharmacy professional level and 268 samples with low pharmacy professional level. Then, the unconstrained model and the constrained model were constructed, and all parameters of the unconstrained model were freely estimated. At the same time, the ten restriction models were sequentially established according to the original ten theoretical paths and the corresponding paths were set equally in different groups. All model fitting results and identity tests are summarized in Table 4.20.

Table 4.20 Moderator Testing of Pharmacy Professional Level

	X^2/DF	RMSEA	GFI	AGFI	CFI	NFI	IFI	ΔX^2	P
Recommended Value	**<5**	**<0.1**	**>0.80**	**>0.80**	**>0.90**	**>0.90**	**>0.90**		
Unconstrained Model	**3.249**	**0.078**	**0.794**	**0.721**	**0.917**	**0.885**	**0.917**		
PE→BI Equal Model	**3.250**	**0.078**	**0.793**	**0.720**	**0.916**	**0.885**	**0.917**	**3.614**	**0.057**
PE→A Equal Model	**3.257**	**0.078**	**0.793**	**0.720**	**0.916**	**0.884**	**0.917**	**5.427**	**0.020**
EE→BI Equal Model	**3.238**	**0.078**	**0.794**	**0.722**	**0.917**	**0.885**	**0.918**	**0.150**	**0.699**
EE→A Equal Model	**3.260**	**0.078**	**0.794**	**0.721**	**0.916**	**0.884**	**0.917**	**6.427**	**0.011**
EE→PE Equal Model	**3.238**	**0.078**	**0.794**	**0.722**	**0.917**	**0.885**	**0.918**	**0.047**	**0.828**
A→BI Equal Model	**3.244**	**0.078**	**0.794**	**0.722**	**0.917**	**0.885**	**0.917**	**1.901**	**0.168**
GP→BI Equal Model	**3.240**	**0.078**	**0.795**	**0.722**	**0.917**	**0.885**	**0.918**	**0.728**	**0.393**
GP→PE Equal Model	**3.243**	**0.078**	**0.794**	**0.721**	**0.917**	**0.885**	**0.917**	**1.488**	**0.222**
IS→BI Equal Model	**3.244**	**0.078**	**0.793**	**0.720**	**0.917**	**0.885**	**0.917**	**1.866**	**0.172**
IS→PE Equal Model	**3.238**	**0.078**	**0.794**	**0.722**	**0.917**	**0.885**	**0.918**	**0.103**	**0.748**

The study found that the degree of fitting of eleven models were generally within acceptable limits. Among the ten constrained models, the chi-square value difference was statistically significant (P<0.05) after comparing only PE→A equal model and EE→A equal model with unconstrained model. This indicated that among groups of both high and low pharmacy professional level, the path coefficients from Performance Expectancy to attitude, from Effort Expectancy to attitude, changed significantly, that

is, pharmacy professional level played a moderator role in the impact of Performance Expectancy on attitude and Effort Expectancy on attitude.

In the full sample model, the PE→A path coefficient is 0.266 (P=0.000) and the EE→A path coefficient is 0.278 (P=0.000). In the group with high pharmacy professional level, PE→A path coefficient is 0.077 (P=0.460) and EE→A path coefficient is 0.145 (P=0.174). In the individually operated pharmacy group, PE→A path coefficient is 0.296 (P=0.000) and EE→A path coefficient is 0.296 (P=0.000). The impact of both Performance Expectancy and Effort Expectancy are not significant in the group with high pharmacy professional level but significant in the one with lower degree.

4.7 Model Comparison

In this study, empirical data was placed in the original TAM and UTAUT with behavioral intention as the final variables and compared with the final Pharmacy-UTAUT for degree of fitting and variable explanation.

Table 4.21 Comparison of Model Fit Indices

	Absolute Fit Indices			**Incremental Fit Indices**			**Parsimonious Fit Indices**		
Index	**X^2/DF**	**RMSEA**	**GFI**	**NFI**	**IFI**	**CFI**	**PNFI**	**PCFI**	**PGFI**
Recommended	**<5**	**<0.1**	**>0.80**	**>0.90**	**>0.90**	**>0.90**	**>0.50**	**>0.50**	**>0.50**
TAM	**4.248**	**0.093**	**0.887**	**0.943**	**0.956**	**0.956**	**0.810**	**0.774**	**0.628**
UTAUT	**4.575**	**0.098**	**0.891**	**0.941**	**0.953**	**0.953**	**0.734**	**0.744**	**0.603**
Pharmacy-UTAUT	**4.139**	**0.092**	**0.867**	**0.931**	**0.947**	**0.947**	**0.767**	**0.780**	**0.639**

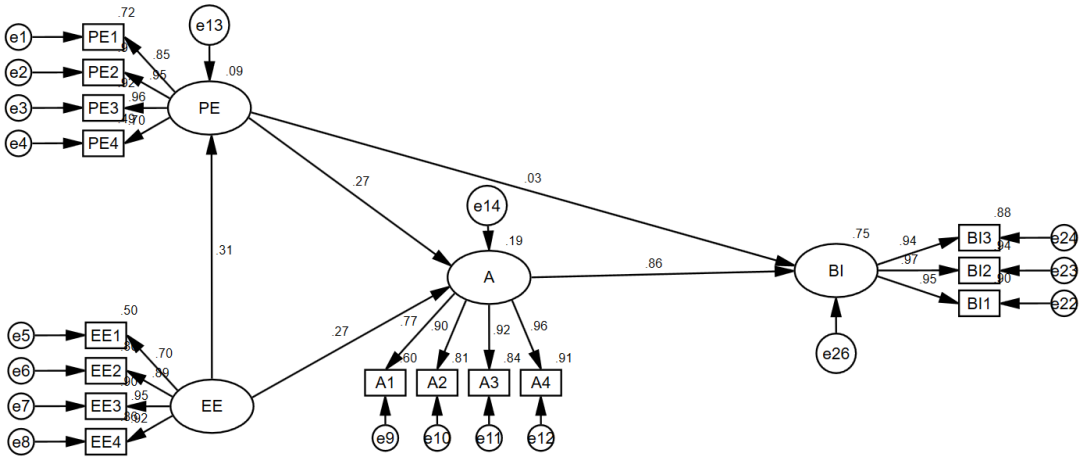

Figure 4.7 Resulting TAM with Standardized Path Estimates

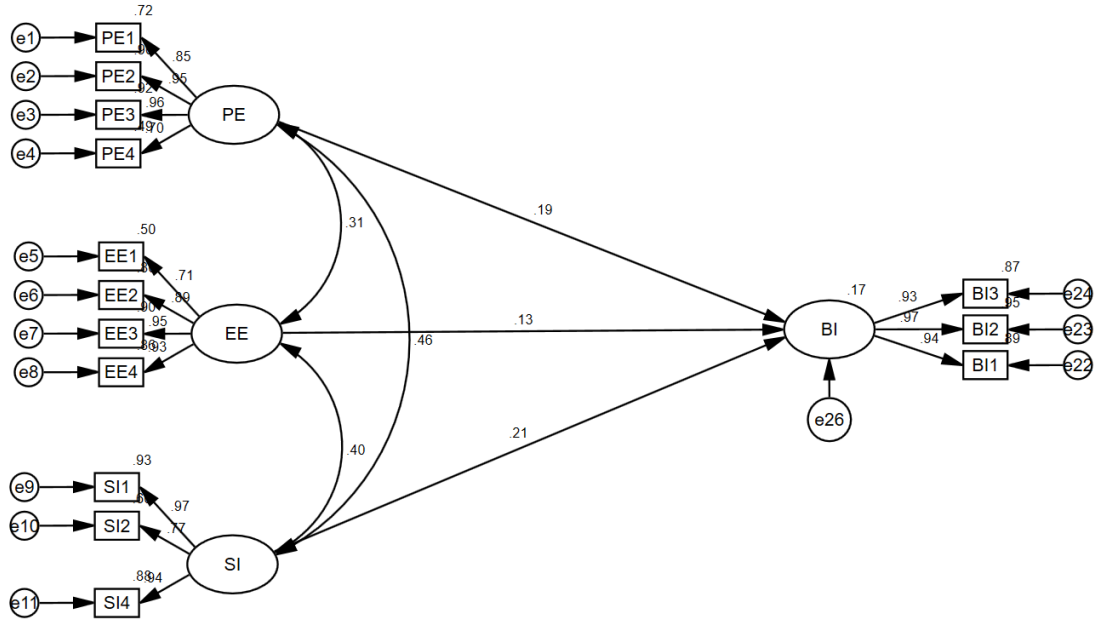

Figure 4.8 Resulting UTAUT with Standardized Path Estimates

Table 4.22 Direct and Indirect Effects on Behavioral Intention

	TAM	UTAUT	Pharmacy-UTAUT
Direct Effect			
Performance Expectancy	**NS**	**0.187**	**NS**
Effort Expectancy	**0**	**0.129**	**−0.069**
Social Influence	**—**	**0.213**	**0.089 (IS)** **0.060 (GP)**
Attitude	**0.866**	**—**	**0.862**
Indirect Effect			
Performance Expectancy	**0.233**	**0**	**0.230**
Effort Expectancy	**0.304**	**0**	**0.271**
Social Influence	**—**	**0**	**0.091 (IS)** **0.022 (GP)**
Attitude	**0**	**—**	**0**
Total Effect			
Performance Expectancy	**0.233**	**0.187**	**0.230**
Effort Expectancy	**0.304**	**0.129**	**0.203**
Social Influence	**—**	**0.213**	**0.179 (IS)** **0.082(GP)**
Attitude	**0.866**	**—**	**0.862**

Note: — no variable; NS means no significance.

Table 4.21 presents the comparison of degree of fitting. Based on the result, it can be considered that the matching degree of the three models with the sample data is acceptable with little difference in terms of goodness of fit index. The standardized path relationship between the TAM and the UTAUT is shown in Figure 4.7 and Figure 4.8, respectively. The effect of the kernel variables of three models on behavioral intention has been summarized in Table 4.22. It was found that in three models, the variance explanation of final Pharmacy-UTAUT to behavioral intention is the highest of all (as

high as 75%) after comparison. Moreover, the new significant impact path has been expanded, and the model's ability to explain relevant data on IT use intention and its influencing factors on Chinese retail pharmacies has been enhanced because of the repositioning of attitude (although the direct effect of both Performance Expectancy and Effort Expectancy were lowered) and because social influence has been divided into Government Policy and Industry Support.

4.8 Discussion of Results

According to SEM model evaluation, we have found that the goodness of fit index of initial Pharmacy-UTAUT is not satisfactory with various issues. However, just as what has been pointed out by Darden (1981) that in fact, if an index value with poor fitness is capable of providing more information for researchers, it makes it better to come to a conclusion instead because its information notifies researchers that such theoretical model cannot be supported by sample data.

Accordingly, this study, driven by the sample data, combined the theoretical support that the empirical research of previous IT adoption could provide to conduct rigorous three model corrections in terms of relevant issues. The first correction was based on reliability and validity, the second correction was based on the corrected index value, and the third correction was theory-based. The core corrections are summarized as follows: (1) “habit” that cannot establish an effective discriminant validity with “attitude” is deleted; (2) “actual behavior” whose measurement methods are not satisfactory is deleted, and “facilitating conditions” having direct causal link with “actual behavior” is also deleted; and (3) “social influence” construct is divided into two sub-dimensions, namely “industry support” and “government policy”.

The results of SEM model evaluation show that the goodness of fit index of final Pharmacy-UTAUT is satisfactory after three corrections with effective sample data; at

this moment, it has become the new model applicable for explaining the intention of IT use in Chinese retail pharmacies.

Based on the final Pharmacy-UTAUT: (1) The test results of theoretical hypothesis show that performance expectancy, effort expectancy, attitude and social influence (industry support and government policy) are the core factors affecting the intention of IT use in Chinese retail pharmacies; (2) The results of moderation effect analysis show that age, gender, pharmacy type, and pharmacy professional level are the moderators affecting the relationship among some variables in the Pharmacy-UTAUT; (3) The results of the model comparison show that the Pharmacy-UTAUT is superior to the original TAM and the UTAUT in explaining the intention of IT use in Chinese retail pharmacies.

The above statement is the result of an empirical study of the first three research questions presented in the introduction. This section will further discuss the results of these empirical studies. In addition, the answer to the fourth research question will be elaborated in this section.

4.8.1 Analysis of Core Influencing Factors

The test results of theoretical hypothesis of final Pharmacy-UTAUT indicated that performance expectancy, effort expectancy, attitude, social influence (industry support and government policy) and their relationship significantly affect the intention of Chinese retail pharmacies to use IT:

1. Performance expectancy has a significant positive impact on attitude (Hypothesis H1a is supported), but its impact on behavioral intention is not significant (Hypothesis H1b is rejected), which means that performance expectancy, for Chinese retail pharmacy, performance can affect the intention of IT use only through attitude.

Contrary to UTAUT's empirical results, performance expectancy does not have a significant direct impact on behavioral intention in this study. In fact, Venkatesh et al.

(2003) found in an empirical study on UTAUT theory that attitude reduced the impact of performance expectancy and effort expectancy on behavioral intention, but its impact on behavioral intention was not significant. However, attitude is the key predictive variable for the intention of IT use in this study. The final Pharmacy-UTAUT's explanation ability towards the intention of Chinese retail pharmacies to use IT is superior to the original UTAUT. Hence, this study considers that the insignificant direct impact of performance expectancy on behavioral intention can be acceptable. For the overall model, the improvement of performance expectancy (more IT use can help individuals to improve their performance) can effectively increase their behavioral intention (the stronger the intention to use retail pharmacy IT will be). The overall effect of performance expectancy to behavioral intention ranks the third place among the five influencing factors.

2. Effort expectancy has a significant positive impact on both attitude (Hypothesis H2a is supported) and performance expectancy (Hypothesis H2c is supported), and has a significant negative impact on behavioral intention (Hypothesis H2b is rejected), which indicates that in terms of Chinese retail pharmacy, effort expectancy not only directly affects the intention of IT use, but also indirectly affects the intention of IT use through performance expectancy and attitude.

Contrary to UTAUT's empirical results, the direct effect of effort expectancy on behavioral intention is positive in this study. Based on further analysis; however, it was found that although the direct effect of effort expectancy on behavioral intention reduced its overall effect on the behavioral intention, the overall effect remained positive. That is to say, for the overall model, the improvement of effort expectancy (the more IT can be used) can effectively increase behavioral intention (the stronger the intention to use retail pharmacy IT will be). The overall effect of effort expectancy to behavioral intention ranks the third place among the five influencing factors.

3. Attitude has a significant positive impact on behavioral intention (Hypothesis H3a is supported), which indicates that for Chinese retail pharmacies, attitude affects the intention of IT use in a direct manner.

In this study, the overall effect of attitude on behavioral intention ranked first among five influencing factors; that is to say, for the overall model, attitude improvement (the more positive an individual's feelings about IT use) can effectively increase the behavioral intention (the stronger the intention to use retail pharmacy IT will be). Unlike UTAUT, attitude replaces performance expectancy and becomes the most critical factor influencing the intention of IT use in Chinese retail pharmacies. This study believes that this may be based on the three reasons as follows:

Firstly, attitude reduced the impact of performance expectancy and effort expectancy to behavioral intention when there exists attitude, performance expectancy and effort expectancy in the model (Venkatesh et al. 2003). The results of model comparison in the last section of Chapter IV herein are consistent with the findings of Venkatesh et al.

Secondly, the mandatory use of IT not only lowers the degree of emphasis of Chinese retail pharmacy towards performance expectancy (the extent to which IT can help the individuals to improve work performance) but also reduces the impact of performance expectancy on behavioral intention.

Finally, the characteristics of professional personnel in the context of medical health are different from the objects of previous empirical research in IT adoption models (IT end users, business managers, students, etc.). Compared with the amount of work output (performance expectancy) and ease of use (effort expectancy), such a higher professional background of medical health makes the degree of IT enjoyment and pleasure (attitude) to be more likely to affect its intention to use IT in IT adoption research involving attitude. For instance, in Schaper's and Pervan's (2009) study on IT adoption by Australian occupational therapists, attitude ranks second in terms of overall

effect of behavioral intention, ranking between performance expectancy and effort expectancy. In respect of the study made by Hung et al. (2012) pertaining to IT adoption by Taiwan medical institutions in China, attitude ranks the first place in terms of overall effect of behavioral intention, followed by performance expectancy and effort expectancy.

Characteristics of Chinese retail pharmacy practitioners who provide the purchase service of basic drugs for profit and some licensed drugs are similar to medical health professionals. Although pharmacy professional level is not as good as that of medical health professionals, they are supported by pharmacy knowledge that matches their services. Similarly, compared with the amount of work output (performance expectancy) and ease of use (effort expectancy), the degree of IT enjoyment and pleasure (attitude) is more likely to affect the intention to use IT.

4. Social influence refers to the extent to which an individual perceives that an important person around him or her believes that he or she should use the IT system (Venkatesh et al. 2003). According to the results of validity and reliability testing and CFA analysis, the item that states “local health administrative agencies have helped me to use retail pharmacy IT” in SI3 is extremely related to the dimension to which it belongs. Therefore, this study tried to divide social influence into Industry Support (an individual perceives the extent to which the persons in the industry who are important to him or her should use IT as he (she) may think) and government policy (an individual perceives the extent to which local health administrations desire to promote their IT use through government policies) according to specific measurements. The results of the model analysis exactly support this correction.

According to empirical data, industry support and government policy have significant positive effect on both behavioral intention (Hypotheses H4a1 and H4a2 are supported) and performance expectancy (Hypotheses H4b1 and H4b2 are supported). This means that for Chinese retail pharmacies, industry support and government policy

not only directly affect the intention of IT use, but also indirectly affect the intention of IT use through performance expectancy. For the overall model, improvement of industry support (an individual perceives the extent to which the persons in the industry who are important to him or her should use IT as he (she) may think) and government policy (an individual perceives the extent to which local health administrations desire to promote their IT use through government policies) can increase behavioral intention in an effective manner (the stronger the intention to use retail pharmacy IT will be). Among the five influencing factors, the overall effect of industry support and government policy on behavioral intention ranked fourth and fifth respectively.

4.8.2 Analysis of Moderators

Gender, age, pharmacy type, and pharmacy professional level, were selected in this study as moderators to final Pharmacy-UTAUT for SEM analysis. According to the results of the moderation factor analysis, the three theoretical paths are significantly regulated by the moderators below:

1. The effect of performance expectancy on attitude is significantly regulated by age, pharmacy type, and pharmacy professional level. After comparing with the younger group, the chain pharmacy, the group with high pharmacy professional level, The impact of perception of the extent to which IT improves work output (performance expectancy) to the extent to which IT use makes the respondents feel enjoyment and pleasure (attitude) was significantly enhanced, in terms of the older group, the individually operated pharmacies, the group with low pharmacy professional level.

Venkatesh et al. (2003) indicated that young workers are more concerned with extrinsic incentives. Compared with older workers, the extent to which IT improves work output (expectancy performance) has a stronger impact on the young workers. But in this study, the older group is more focused on the extent of work output (performance expectancy) than the younger group. In fact, Venkatesh et al. (2003) also

pointed out that it is more difficult for older workers to learn an IT than younger workers. In the context of the mandatory use of Chinese retail pharmacy's IT, the higher the cost of learning an IT for an older worker, the more attention it pays to the benefits of IT. Therefore, for the older group, the impact of performance expectancy on attitude will be significantly enhanced.

In the context of IT mandatory use, individually operated pharmacies are subject to costs and will pay more attention to the extent to which IT improves work output (performance expectancy). The higher the level of IT output is, the more aggressive the attitude of individually operated pharmacies will be. Accordingly, the impact of performance expectancy on attitude is significantly enhanced for individually operated pharmacies.

Subject to the background of lower professional level pharmacy, the groups with low pharmacy professional level will pay more attention to the direct benefits arising from using IT rather than the potential benefits that may be obtained by such factors as industry support. As a result, the impact of performance expectancy on attitude is significantly enhanced for the group with low pharmacy professional level.

2. The impact of effort expectancy on attitude is significantly regulated by both pharmacy type and pharmacy professional level. Compared with the chain pharmacies and group with high pharmacy professional level, the impact of perception to the ease of IT use (effort expectancy) is significantly enhanced by that of the extent to which IT use makes the respondents feel enjoyment and pleasure (attitude), in terms of the individually operated pharmacies, and the group with low pharmacy professional level.

Similar to the reason that the impact of performance expectancy has significantly enhanced in attitude on individually operated pharmacies, individually operated pharmacies will pay more attention to the ease of IT (effort expectancy) subject to the cost in the context of IT mandatory use. The easier it is to use IT, the more positive the attitude of individually operated pharmacies in using IT will be. Therefore, the impact

of effort expectancy on attitude will be significantly enhanced for individually operated pharmacies.

Chau and Hu (2002a), Chismar and Wiley-Patton (2003) indicated that doctors are of high ability and awareness to use IT as a result of background, which may significantly reduce the impact of effort expectancy in IT adoption. In this study, the group with low pharmacy professional level was more focused on perceiving the ease of IT use (effort expectancy) because of its lower pharmacy professional level. Therefore, the impact of effort expectancy on attitude is significantly enhanced for the group with low pharmacy professional level.

3. The impact of the effort expectancy on performance expectancy is significantly regulated by gender. For male respondents, the impact of perception to ease of IT use (effort expectancy) is significantly enhanced by that of the extent to which IT improves work output (performance expectancy) after comparing with female respondents.

Venkatesh et al. (2003) upheld that male respondents had the distinct characteristic of more task-oriented than women according to previous gender studies. In this study, as male respondents pay more attention to the output of IT (performance expectancy), the degree of IT use that has a direct positive impact on IT output is the bigger concern of male respondents. Therefore, the impact of effort expectancy on performance expectancy will be significantly enhanced for male respondents.

4.8.3 Comparative Analysis of Pharmacy-UTAUT's Explanatory Power

According to the results of model comparison, we found that in three models, the variance explanation of final Pharmacy-UTAUT to behavioral intention is as high as 75% after comparison, which is superior to original TAM and UTAUT and applicable for the new model explaining the intention of IT use in Chinese retail pharmacy. This study indicated that the following two reasons dominated:

1. Compared with the TAM, the final Pharmacy-UTAUT adds social influence. The testing results of theoretical hypothesis show that social influence is the core influencing factor to the intention of IT use in Chinese retail pharmacy. In addition, for Chinese retail pharmacies, social influence can be further subdivided into industry support and government policy based on the results of both reliability and validity tests. Therefore, this study adopts this correction—the informational connotation to further expand social influence.

2. Compared with the UTAUT model, the final Pharmacy-UTAUT is re-introduced with attitude. According to the testing results of theoretical hypothesis, attitude is the core influencing factor to the intention of IT use in Chinese retail pharmacy, and ranks first in terms of the overall effect among the four core influencing factors. There is no doubt that attitude is the most important explanatory factor to the intention of IT use in Chinese retail pharmacy.

4.8.4 Practical Significance and Management Recommendations

The results of empirical research herein have practical and guiding significance for improving the intention of IT use in Chinese retail pharmacy and furthering the informatization construction of retail pharmacies in China to some extent, which is mainly reflected in the following three aspects:

1. The determination of the significant influencing factors of the intention to use IT in retail pharmacies will help retail pharmacy managers, IT enterprises and governments to take the initiative to further IT usage strategies of retail pharmacy.

This study found that performance expectancy, effort expectancy, social influence (industry support and government policy), and attitude, are the significant factors affecting the intention of Chinese retail pharmacies to use IT. All of them influence behavioral intention in a direct or in direct form, or in both direct or indirect form.

With respect to the significant impact of the extent individuals perceived which IT improves work output (performance expectancy), retail pharmacy managers should pay attention to IT training for their employees so that the employees would understand the benefits of IT to their work. IT companies should integrate their IT with the working procedures of retail pharmacies, in an attempt to satisfy the actual work demand of retail pharmacies. Besides, local governments should strengthen IT promotion and propaganda, so that retail pharmacies can further understand the potential long-term benefits of using IT for enterprise development.

With respect to the significant impact of the extent individuals perceived which IT can be easily used (effort expectancy), retail pharmacy managers should select retail pharmacy IT that is consistent with enterprise IT learning ability and use ability from the perspective of enterprise resources. Under the premise that system safety and stability are guaranteed, IT enterprises should simplify IT operation processes and reduce operations. Meanwhile, it is required to improve IT adaptability to different preferred retail pharmacies through intelligent design. What is more, local government should, before licensing franchise to retail pharmacies, (1) organize retail pharmacies to conduct training on the use of basic IT, (2) pay attention to specific requirements of informational GSP supervision and management, and (3) reduce IT entry barriers for retail pharmacies.

With respect to the significant impact of the degree of IT enjoyment and pleasure (attitude), retail pharmacy managers should pay attention to cultivating a cultural and management environment for a positive attitude forward corporate IT use and enhancing the sense of identity and responsibility for IT use. IT enterprises should make their IT more user-friendly and interesting in terms of interaction with users. Local governments should emphasize on informational GSP supervision and management and strengthen the propaganda of support policies to provide a fair and orderly development environment for IT use in retail pharmacies.

With respect to the significant impact of the extent to which an individual perceives that an important person around him or her believes that he or she should use the IT system, retail pharmacy managers should strengthen their attention to industry trends related to the use of information technology and government policies so that enterprises will be in an active position in IT competition. IT enterprises should build an industrial IT platform to allow retail pharmacies to interact through problem communication and evaluation and feedback. Local governments should enact relevant support policies to facilitate IT use in retail pharmacies in terms of finance, taxation and credit, etc.

Given that the influencing factors are of causal association, the three parties to the IT construction of chain pharmacies should enhance mutual communications and utilize their advantages to construct a systematic and scientific pharmacy IT use ecosphere. Finally, the impact of various factors on the intention of IT adoption will be enhanced maximally.

2. The effect of the significant influencing factors of the intention to use IT in retail pharmacies not only helps the government, IT enterprises and retail pharmacy managers selectively balance existing resources, but also enhance the total benefits of promotion strategy.

This study found that the five influencing factors were divided into attitude, performance expectancy, effort expectancy, industry support, and government policies according to their overall effect on behavioral intention. In practice, the three parties to the IT construction of chain pharmacies should pay attention to the significant impact of (a) attitude, (b) performance expectancy and effort expectancy, and (c) industry support and government policy.

3. The identification of significant moderators for IT use in Chinese retail pharmacies helps governments, IT enterprises, and retail pharmacy managers to selectively adopt strategies based on different characteristics of retail pharmacies.

Having a moderation effect on part of theoretical paths, gender, age, pharmacy type, and pharmacy professional level are significant moderators to the intention of IT use in Chinese retail pharmacies. The impact of perception of the extent to which IT improves work output (performance expectancy) to the extent to which IT use makes the respondents feel enjoyment and pleasure (attitude) was significantly enhanced in the older group, individually operated pharmacies and the group with lower pharmacy professional level. Therefore, more attention should be paid to the use of promotion strategies of performance expectancy when demand promotion influences attitude in the retail pharmacies with the characteristics above. So, it is also required to pay attention to the use of promotion strategies of effort expectation when demand promotion influences attitude in the individually operated retail pharmacy and those with low pharmacy professional level. Among the retail pharmacies which are dominated by female workers, more attention should be paid to the use of promotion strategies of effort expectancy when demand promotion influences attitude.

CHAPTER 5

CONCLUSIONS AND PROSPECTS

This chapter comprises three parts: The first part starts from the research question and elaborates on the research conclusion based on the whole research process. The second part points out that the research has limitations with respect to “number and category of survey objects”, “influence factors expansion”, and “actual use behavior measurement”. The third part gives an outlook for empirical research on the adoption of retail pharmacy IT based on the shortcomings of this research.

5.1 Research Conclusion

Research on IT adoption in the field of management information systems has been conducted for nearly 40 years, and has formed a series of relatively complete theoretical models and research methods. The UTAUT proposed by Venkatesh et al. (2003) were cited and developed by many scholars because of its high explanatory power and wide application.

In 2013, the Chinese Food and Drug Administration issued a new version of GSP to set the development and use of management information systems as a threshold for retail pharmacies to obtain business qualifications (Appendix B). In this new context, this paper took Chinese retail pharmacies as the research subjects, built Pharmacy-UTAUT based on UTAUT, made empirical investigation and data analysis, explored the core influencing factors, moderators and the explanatory power of the Pharmacy-UTAUT of Chinese retail pharmacies IT adoption in the background of mandatory use, and provided management suggestions that would benefit the

information construction of Chinese retail pharmacies. The research mainly drew the following four conclusions.

1. The results of the theoretical hypothesis test show that performance expectancy, effort expectancy, attitude, social influence (industry support, government policies) and their relationship significantly affect the willingness of Chinese retail pharmacies to use IT (the actual behavior is removed in the model fix due to poor measurement methods).

Attitude ranks the first in the core influencing factors of behavioral intention, which directly affects the intention to use IT. In other words, the higher the degree of pleasure that IT makes people feel (attitude), the stronger the intention to use IT in Chinese retail pharmacies. In contrary with the empirical conclusion of UTAUT, in this research, attitude replaces performance expectancy and becomes the most critical factor of the intention to use IT in Chinese retail pharmacies.

Performance expectancy ranks the second in the core influencing factors of behavioral intention, which indirectly influences the intention through attitude to use IT. In other words, the more IT can help individuals to improve their performance (performance expectancy), the stronger the intention to use IT in Chinese retail pharmacies. Unlike the empirical conclusions from UTAUT, in this research, performance expectancy does not have a significant direct influence on behavioral intention.

Effort expectancy ranks the third in the core influencing factors of behavioral intention. Effort expectancy not only directly affects the intention to use IT, but also indirectly affects the intention through performance expectancy and attitude. In other words, the easier it is to use IT (effort expectancy), the stronger the intention to use IT in Chinese retail pharmacies. Unlike the UTAUT empirical conclusions, in this research, effort expectancy has a negative direct effect on behavioral intention, but the overall effect is positive.

Industry support and government policies rank the fourth and fifth in the core influencing factors of behavioral intention respectively. Industry support and government policies not only directly affect the intention to use IT, but also indirectly affect the intention to use IT through performance expectancy. In other words, the more the industry attaches importance to the use of IT (industry support) and the more local health administrative agencies attach importance to the use of IT promotion policies (government policies), the stronger the intention to use IT in Chinese retail pharmacies. In contrary with the empirical conclusions of UTAUT, in this research, social influence can be further subdivided into two sub-constructs of industry support and government policy.

2. The results of moderator analysis show that age, gender, pharmacy type and pharmacy professional level have significant regulatory effects on the relationship between some variables in the Pharmacy-UTAUT.

The influence of performance expectancy on attitude is significantly regulated by age, pharmacy type and pharmacy professional level. For high-age group, individually operated pharmacies and low pharmacy professional level group, the degree of perceiving work output improved by IT (performance expectancy) has significantly enhanced influence on the degree of perceiving the pleasure to use IT (attitude).

The influence of effort expectancy on attitude is significantly regulated by pharmacy type and pharmacy professional level. For the individually operated pharmacy and low pharmacy professional level groups, the degree of perceiving the ease of IT use (effort expectancy) has significantly enhanced influence on the degree of perceiving the pleasure to use IT (attitude).

The influence of effort expectancy on performance expectancy is significantly regulated by gender. For men, the degree of perceiving the ease of IT use (effort expectancy) has significantly enhanced influence on the degree of perceiving work output improved by IT (performance expectancy).

3. The results of the model comparison show that the Pharmacy-UTAUT final model has an explanatory power of 75% for the behavior intention, which is superior to the original TAM and UTAUT. This is because the attitude construct is introduced and the social influence construct is subdivided into government policies and industry support, the new significant influence path is expanded and the explanatory power of the model is enhanced.

4. Government, IT service enterprises and retail pharmacy managers are the three important parties in the information construction of Chinese retail pharmacies. By clarifying the significant influencing factors of the intention to use IT in retail pharmacies, it is helpful to actively promote the strategy of IT in retail pharmacies. By prioritizing the effects of the influencing factors, it is helpful to selectively distribute existing resources and increase the total benefit of the promotion strategy. By clarifying the significant regulatory factors of the intention to use IT, it is helpful to select the promotion strategies based on different characteristics of retail pharmacies.

5.2 Limitations of the Research

This research endeavors to meet the logic and rigor of scientific research in the process design and methods adoption, and has obtained some valuable research conclusions on the intention to use IT in Chinese retail pharmacies. However, due to the constraints of subjective and objective conditions such as personal knowledge, research funding and time, this study has the following three shortcomings.

1. It is necessary to expand the number and categories of respondents. The conclusion of this research is based on the analysis of the sample data received from store managers or information management personnel of 374 retail pharmacies in Huai’an, Jiangsu Province, China. The generality of the research conclusions has limitations, which means the external validity of the conclusion is questionable.

Chinese retail pharmacies are in the context of mandatory use of IT, therefore the research conclusions may not be applicable to retail pharmacies of non-compulsory use of IT in other countries and regions. The retail pharmacy practitioners in Huai'an have the characteristics of gender balance, youthfulness and low pharmacy professional level. Therefore, the research conclusions may not be applicable to other parts of China with unbalanced gender ratio, higher average age and higher professional level. The external validity of the research conclusions needs to be tested and improved by adding sample size.

In addition, the research selected retail pharmacy managers or information management personnel as the direct respondents of the questionnaire, who could represent the overall retail pharmacy to a certain extent, but it is likely to have personal bias and fails to reflect the real intention to use IT. There are other categories of retail pharmacy practitioners in the actual use of IT in retail pharmacies. It is necessary to test and improve the external validity of the research conclusion by expanding the categories of the respondents.

2. It is necessary to expand new influencing factors. The Pharmacy-UTAUT final model introduced the attitude construct and divided the social influence construct into two sub-constructs of industry support and government policy, by which rose the explanatory power of the intention to use IT in Chinese retail pharmacies from 17% to 75% compared to UTAUT. However, as for the attitude construct of the highest correlation with behavioral willingness ($\beta = 0.860$), UTAUT's original influencing factors was still adopted to explain the analysis, and new influencing factors were nor included (the habitual constructs of Pharmacy-UTAUT initial model expansion were removed from the final model due to insufficient discriminant validity with the attitude construct). This led to an explanatory power of 17% on the attitude construct. It can summarize how to increase the intention to use IT in Chinese retail pharmacies through attitude only by the new theoretical path of the UTAUT original construct. In fact,

Venkatesh et al. (2003) also suggested that in the IT adoption research aiming for different backgrounds and different populations, follow-up scholars should expand the theoretical mechanism of UTAUT by adding new constructs to improve the adaptability of the model.

3. It is necessary to improve the measurement of actual use behavior. In contrary with the empirical research of UTAUT, this study was limited by objective conditions. The collection of actual behavior data used “self-report” of “single dimension” and “same time”. The results of SEM analysis show that the Pharmacy-UTAUT quadratic correction model with use behavior has poor fit, while the model fit of Pharmacy-UTAUT final model without the use behavior passes the test. The poor measurement of actual use behavior in this study was an important reason to modify the Pharmacy-UTAUT.

“Single dimension” means that this research only describes and collects actual use behavior from the single latitude of “frequency of IT use” and cannot fully reflect all the information of actual use behavior. In the study of IT adoption by CHC institutions in Thailand, Kijsanayotin et al. (2009) divided the actual use behavior into four observed variables (frequency of use, care and report use, administrative use and communication use), and better research results were achieved. In fact, Venkatesh et al. (2012) also pointed out in the discussion of UTAUT2 that more latitude indicators should be added in the actual use of measurements.

“Same time” means that the research uses the same questionnaire to collect all the information of the independent variables and the dependent variable (use behavior) at the same time, which will cause a certain degree of CMV, and reduce or expand the actual correlation coefficient of the independent and dependent variables (Podsakoff et al. 2003). Although the study designed the questionnaire to reduce the impact of CMV, and the Harman single-factor test results shows that the impact of CMV is not very serious, the impact of CMV is objective and cannot be ignored. Peng et al. (2006)

pointed out that time interval measurement, which means measuring independent and dependent variables separately in a long interval, is an effective scientific method to reduce the influence of CMV and is superior to the structure design of the questionnaire.

"Self-reporting" means that the research only allows respondents to report on the actual use of IT by filling questionnaires. The actual behavior information collected by this method is subjective and authenticity cannot be guaranteed. In the empirical study of the UTAUT model, Venkatesh et al. (2003) collected actual use information of the full sample in the form of a system log to ensure authenticity. However, the cost of this method is high and not easy to copy. In an empirical study on the adoption of IT in occupational therapists in Australia, Schaper and Pervan (2007) pointed out that by using system software to collect actual use information in a case study rather than in full samples, although the external validity of actual use behavior research is not as good as full sample collection, it is an effective solution to measure and study actual behavior under the constraints of objective conditions.

5.3 Future Research Directions

Based on the shortcomings of the research, three suggestions are proposed for future research on the adoption of IT for retail pharmacies. First, future research should select retail pharmacies in the context of non-compulsory use of IT in other countries and regions, or select retail pharmacies with different characteristics in other parts of China as research subjects, and expand the categories of research pharmacies to test the external validity of the Pharmacy-UTAUT final model. Second, future research should expand new, theoretically-based influencing factors with the intention to use IT. In fact, Griebel et al. (2013) identified 10 additional influencing factors outside UTAUT influencing factors by searching 75 medical health IT use studies in

the Medline database. Follow-up scholars can examine the effects of these additional influencing factors on behavioral intention and actual behavior through empirical research. Third, future research should use more scientific methods to measure actual usage behavior, such as using multi-dimensional measurements, time interval measurements and system reporting measurements. When constrained by objective research conditions, measuring actual behavior in a case study instead of full sample as a solution could be considered.

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APPENDIX A

Questionnaire

No._____

Pharmacy IT Adoption Questionnaire

Hello! You are being asked to participate in a research study conducted by Su Zhang, a master student at National Institute of Development Administration (NIDA). This study is designed to learn more about factors influencing IT adoption in Chinese retail pharmacy. **All responses are anonymous and your personal information will only be treated as statistical data.** This questionnaire will take about 15 minutes of your time. Please fill in seriously.

If you have any questions about this study, please contact Su Zhang at 13861556218 or email at 1198224181@QQ.com.

Thank you.

Note:

1. Unless otherwise stated, you can only fill in or choose one answer per question.

2. Please answer questions in order, and do not discuss with others.

3. Pharmacy IT means pharmacy computer and network information technology, applied to organizational level following the issue of GSP 2013 used for conducting business link management such as GSP supervision, inventory management, and so on.

Part 1: Basic Information

1. What is your gender? _____

a. Male b. Female

2. In what year were you born? _____

3. Which district is your pharmacy located?

a. Qingjiangpu District b. Huaiyin District c. Huaian District d. Hongze District

e. Lianshui District f. Xuyu District f. Jinhu District

4. Which type of pharmacy are you working in? _____

a. Chain pharmacy b. Individually operated pharmacy

5. Have you got the "Certificate for Pharmacist"? _____

a. Yes b. No

6. Which following projects are covered by pharmacy IT? _____ (multiple-choice)

a. GSP supervision b. Inventory management c. HR management and administration d. Financial management e. Customer relationship management

7. How often do you use pharmacy IT? _____

a. Use < Once a week b. Once each week c. Several times each week d. About once a day e. Several times each day

Part 2: Attitude-Opinion

Please carefully read each of the following statements and respond by ticking ☑ the response box that best reflects your opinion. Please be completely open and honest in your responses.

1 = Strongly Disagree 2 = Quite Disagree 3 = Slightly Disagree 4 = Neutral 5 = Slightly Agree 6 = Agree 7 = Strongly Agree

Question Items	1	2	3	4	5	6	7
1. I find pharmacy IT useful in my job.							
2. Using pharmacy IT enables me to accomplish tasks more quickly.							
3. Using pharmacy IT increases my productivity.							
4. Using pharmacy IT increases my chances of getting a raise.							
5. My interaction with pharmacy IT is clear and understandable.							
6. It is easy for me to become skillful at using pharmacy IT.							
7. Learning how to use pharmacy IT is easy for me.							
8. I find pharmacy IT easy to use.							
9. People in the industry who are important to me think that I should use pharmacy IT.							
10. People in the industry who influence my behaviour think that I should use pharmacy IT.							
11. The senior health administration has been helpful in the use of pharmacy IT.							
12. In general, the industry has supported the use of pharmacy IT.							
13. I have the resources (e.g. fund, hardware facility) necessary to use pharmacy IT.							
14. I have the knowledge (e.g. basic computer use) necessary to use pharmacy IT.							
15. Pharmacy IT is compatible with other systems I use.							
16. I can get help from others when I have difficulties using pharmacy IT.							

17. The use of pharmacy IT has become a habit for me.							
18. I am addicted to using pharmacy IT.							
19. I must use pharmacy IT.							
20. Using pharmacy IT is a good idea.							
21. Pharmacy IT makes work more interesting.							
22. Working with pharmacy IT is fun.							
23. I like working with pharmacy IT.							
24. I intend to use pharmacy IT in future work.							
25. I predict I would use pharmacy IT in future work.							
26. I plan to use pharmacy IT in future work.							

Thank you again for your sincere cooperation!

APPENDIX B

Related Information of Chinese Retail Pharmacy

The following laws and regulations can be researched on the Chinese Food and Drug Administration (CFDA) official website http://www.sda.gov.cn/WS01/CL0001/.

1. "Regulation No.12313, 14101 and 14601."

"In 2014, Chinese Food and Drug Administration issued the revised draft of on-site inspection guidelines for Good Supply Practice (GSP). Some of the guidelines, specifically Regulation No. 12313, 14101 and 14601 (Appendix B), translate the pharmacy IT requirements in GSP into detailed inspection content." (see chap. 1, sect. 1)

The specific contents of the above Regulation are: (1) No. 12313 — Pharmacy quality management department or quality management staff is responsible for the examination and control of computer system operation authority and the maintenance of basic quality management data. (2) No. 14101 — When recording computer system data, pharmacy related posts should login system with authorization and password according to operation rules, to ensure the original data is accurate, safe and traceable. (3) No. 14601 — Pharmacy should establish computer system that meets the requirements of its operation and quality management.

2. "Qualified pharmacy professional staff."

"Chinese retail pharmacy is the subdivision of enterprise organization which

belongs to business context. However, Chinese retail pharmacy also belongs to health context because it is mainly engaged in medicine retail selling and its operation requires qualified pharmacy professional staff (Appendix B).” (see chap. 2, sect. 4.1)

“Chinese retail pharmacy IT users have a degree of professional background support (Appendix B), so their Attitude towards IT use may be one of the important predictor variables to IT adoption.” (see chap. 2, sect. 4.3)

In Chapter 3 of the PRC Law on Pharmaceutical Administration, Article 15 requires that retail pharmacy must have qualified pharmacy professional staff.

In addition, Chapter 3, Article 15, of the Regulation for Implementation of Pharmaceutical Administration Law, states the specific level of pharmacy professional staff and retail pharmacy need according to the type of medicine they sell.

BIOGRAPHY

NAME	Su Zhang
ACADEMIC BACKGROUND	I graduated from Soochow University（China） in 2016 with bachelor degree in Labor and Social Security.
EXPERIENCES	I am now studying in NIDA for master degree in business administration.