An empirical research on the acceptance of sports social APP in China

Master's Thesis
University of Turku
Turku School of Economics

2018
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UNIVERSITY OF TURKU

XIA QIANQIAN: An empirical research on the acceptance of sports social APP in China

Master's Thesis, 68 p., 5 app. p.

May 2018

In modern China, the national economy has been continuously upgraded to promote the exercise participation of all citizens. Meanwhile, the rapid development of mobile Internet technology has spawned a series of sports fitness applications, new forms of social interest continue to emerge, promoting the "sports + social" integration, resulting in a surge in sports social products. With the increasing researches in the field of user behavior, analyzing individuals' psychological and behavioral characteristics when adopting information technology have become one of the hot topic that have attracted much attention in the field of information systems. At present, academic studies in the sports social industry have just started. However, researches which explore key influencing factors of sports social APP and innovations can improve its user experience is limited. This paper reviewed existing research in information technology and information system acceptance, based on previous, selected UTAUT as theoretical basis model, and introduces individual innovation, perceived cost and perceived entertainment as three external variables to build the sports social APP user adoption model concerning its the characteristics.
An online quantitative questionnaire is employed in this paper to collect empirical data, after descriptive statistics of the 290 valid sample are presented, reliability and validity of the scale are tested with SPSS22.0, finally SmartPLS3.0 is used to evaluate the research model and examine the hypotheses put forward. The result indicates that: effort expectancy, social influence, facilitating conditions, individual innovation and perceived entertainment have positive impact on the adoption behavior. This paper analyzes the results of hypothesis concerning the characteristics of sports social APP, and puts forward recommendations for China sports social networking industry development and promotion.

Keywords: adoption behavior, UTAUT, empirical research, sports social

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Chapter 1

Introduction

This dissertation aims to determine the key factors influencing users' adoption of sports social applications in China. This introductory chapter firstly interprets the study motivation including research interest in the flourishing China sports social network industry and in users' adoption behavior research, then research question and organization of the dissertation are presented.

1.1 Study motivation

The motivation for this study drives from two parts: one is interest in China sports social network industry and sports social applications, which are newly sprouted things, another is this paper adds to the literature in users' adoption behavior research of sports social APP in serval ways.

In modern China, the pace of life is fast and work is of high-pressure, which makes people pay more attention to health and exercise, also, the national economy has been continuously upgraded which promoted the sports participation of all citizens. The outdoor sports industry was first developed from Europe and the United States, at present, developed countries have gradually entered the era of leisure economy. As a developing country, China's sports population continues to grow as the economy continues to rise,

according to statistics from the State Sports General Administration. In 2016, the number of people who regularly participate in exercise in China reached 435 million, and it is expected that this population will reach 500 million in 2025. From the perspective of the distribution of sports population, the first-tier cities and the more developed cities on the southeastern coast are more distributed. It can be seen that the economic level is an essential factor in promoting the growth of the sports industry.

China is the world's second-largest economy, the gross national product (GDP) of China reached 82.71 trillion yuan in 2017, three times more than in 2007.moreover, In the coming years, China's gross national product will maintain a steady growth. According to the Maslow's hierarchy of needs theory, national economy improvement makes people step into a well-to-do society after solving the problem of food and clothing. People's basic material needs are guaranteed and they will have more time and economic ability to meet the higher level of demand. On the one hand, it shows a higher concern for health and sports, and on the other hand, it shows an increasing consumption expenditure on entertainment. In addition, the increased participation of the National People's Movement can further stimulate the development of the national sports economy and form a virtuous circle.

From the perspective of technology upgrading, in the context of continuous development of technologies such as mobile Internet, big data, and cloud computing, the tendency to rethink about the market, users, products, the corporate value chain, and the entire business ecosystem stimulate the development of new "Internet traditional industries" business modes, but this is not simply the sum of the two, it means to create a new development ecology, and make deep integration of the Internet and traditional industries under the usage of information communication technologies and the Internet platform. Thus, rapid development of mobile Internet technology has prompted a new series of sports fitness applications.

China Internet Network Information Center(CNNIC) released its newest "China sta-

tistical report on Internet Development" in 2017, which shows that mobile Internet users accounted for 96.3 %, and the dominant of mobile Internet strengthened. The rapid spread of smart phones has accelerated mobile Internet development. The browsing habits of netizens are accustomed to the transfer of PCs to mobile devices. Mobile phones have become an indispensable tool for Internet users. Mobile Internet has become a new battlefield for enterprises to compete for users and expand their business value.

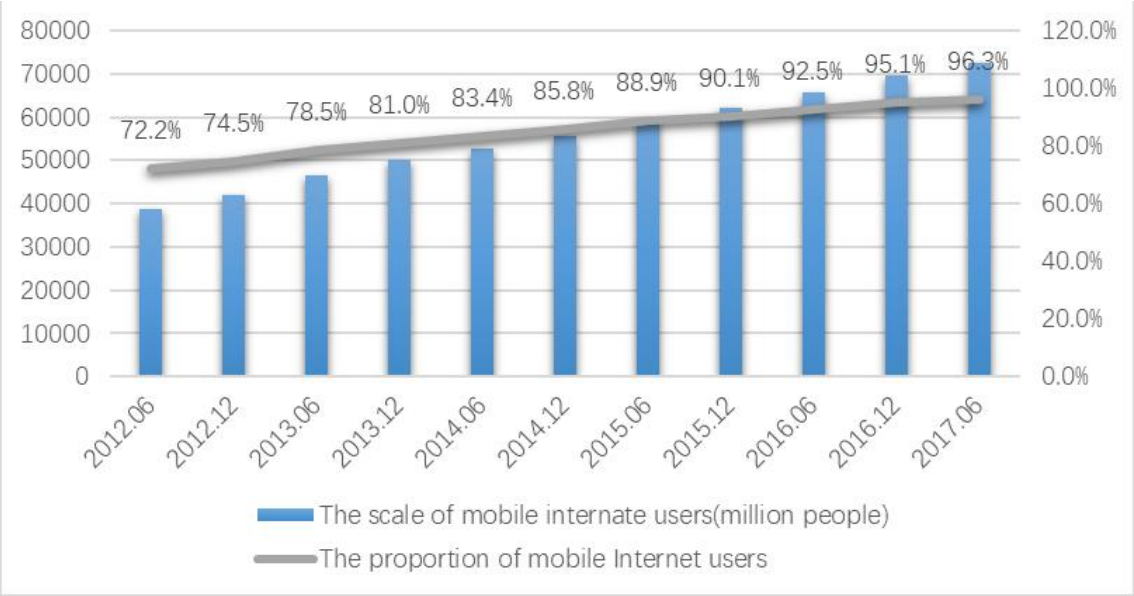

Figure 1.1: Mobile Internet users dominate

Mobile Internet technology drives sports and fitness applications mainly in two aspects: First, the smartphone has a built-in vibration sensor or assisting processor. When a person is walking or running, the sensor and the co-operator can sense this center of gravity and count the number of steps recorded in motion. On the other hand, as the cost of GPS solutions is reduced, the GPS function is almost a standard service for smart phones, so that it can help people to record the trajectory and sports mileage. The information such as the number of steps, trajectory, mileage, etc. is combined with the basic information such as the type of exercise, weight, and age. Through effective calculations, data such as calorie consumption and target progress can be obtained. This helps us formulate more suitable exercise and fitness plans and motivate ourselves to exercise.

According to “2015-2022 China mobile application market special research and investment strategy consultation report”, new forms of social interest continue to emerge, promoting the ”sports + social” integration. Since 2012, sports and fitness mobile applications have gradually entered the public. In 2014, there was an outbreak of sports social products, 12 sports applications have had access to financing, the number of products has increased dramatically, and the financing scale has grown rapidly. However, as a whole, China’s sports social industry currently has a relatively small number of users and is experiencing rapid growth, each company’s primary goal is to accumulate user scales. As a result, the Chinese sports industry is in Rapid development period.

Generally speaking, social behaviors are mainly divided into two categories: one is relationship sociality based on the maintenance of interpersonal relationships, such as acquaintance social app WeChat. and the other is a social relationship inspired by a certain interest. Such as music singing, picture social, short video social, fashion social etc. In recent years it is not difficult to find that social products based on users’ interest. Sports socialism is based on the user’s interest in sports. It incorporates social elements in the product and makes connections between sports people. In addition, unlike the PC side, users can communicate, browse and share anytime and anywhere and share information in a richer format not only text, but also interesting photos, videos, etc. with mobile at anytime and anywhere. Social services have become one of the most indispensable elements for mobile users. Therefore, the development of the mobile Internet provides an important technical driving force for the generation of sports social applications. Data records such as the movement steps, trajectories, and exercise time allow people to have a better understanding of their own movements, and can carry out more targeted exercise plans; The integration of mobile social elements makes people’s movements no longer lonely. Users can share the sports rankings, discuss sports training, and ask people about venues, which increases the interest of sports greatly and enhances the user’s stickiness to the platform.

Since the concept of sports social was put forward, socialized sports and fitness application has made its rapid development in the field of sports industry with its distinctiveness. However, with the rapid expansion of sports social activities, the sports social industry is not systematic formed. In its development process, there are various problems such as serious homogeneity, no regular profit mode, and poor user experience. In addition, there is no systematic and comprehensive understanding of the future development prospects research on the development of sports social industry. Based on this thinking, this study chooses sports social applications in China as the research objective.

On the other hand, research on information technology acceptance behavior from the perspective of individual users is still one of the hot research areas. Some traditional theoretical and research frameworks have been constantly revised and enriched during the process of reflection and criticism. Some new theories and constructs have been introduced into research according to research situations and objects, making this area of research more robust and rejuvenated. There have been some researches on sports social applications, but most of these achievements are research on their profit model, software design, user recommendation and so on, there are few studies on the influencing factors of consumers' willingness to use sports social applications, especially research based on the unified theory of acceptance and use of technology (UTAUT) model[1]. Therefore, this paper's research object is to analysis people's acceptances of social sports APP in the domestic, and tries to put forward the management suggestion for the applications' operators. This study empirically tested and validated the unified theory of acceptance and use of technology (UTAUT) model to investigate individuals' acceptance of sports social APP and thereby advances the understanding of the unified theory of acceptance and use of technology (UTAUT) model's factors in the social media context.

1.2 Research question

To accomplish the objective of this research, the following research question will be answered:

Q: What factors determine individuals' acceptance of social sports applications in China?

In order to answer the research question, firstly, a literature review is conducted to find appropriate models and to lay theoretic foundation to research on the users' adoption behavior of sports social APP, literature review contains the research in the field of information system adoption behavior and information technology acceptance behavior by individuals and in the field of related psychological theory. After model specification and the hypotheses are put forward, the proposed research model is empirically tested with data collected from online questionnaire among a sample of Chinese sports social application users.

The results will help to illustrate users' behavior to use sports social applications and reason of the advent of social behavior when people exercise. Apart from adding to the literature in users' adoption behavior model of sports social APP in social media context. The results can also be useful to give suggestions to Chinese sports social application companies to provide good services to satisfy their users to get more downloads and win larger market share.

1.3 Organization of the dissertation

This dissertation includes seven chapters; the summary of the dissertation content is illustrated as follows.

The first introductory chapter contains a brief interpretation of the study motivation and the research question.

The second chapter presents the research background by conceptualizing sports so-

cial applications. This chapter firstly summarizes the current research of China sports social network industry, and reveals the development status of China sports applications by giving examples.

The third chapter presents literature review. Firstly, it provides with an overview of the current research in information technology and information system acceptance, then lists models and theories related to users' behavior influencing factors, finally illustrated the research status of these models and theories in different fields.

The forth chapter is model specification, including theory foundations, attendants of the research model based on previous studies and theories, and the hypotheses to be tested.

The fifth chapter presents the methodological strategies of this study, including the research method, questionnaire design, data collection and analysis.

The sixth chapter states the results of the research model, including descriptive statistic of the data sample, validity and reliability of the scale and discusses, and empirical answers to the research question put forward in the study.

The seventh chapter discusses the main conclusion, including the summary of influencing factors, recommendations and finding, as well as present shortcomings and prospect.

Chapter 2

RESEARCH BACKGROUND

This chapter mainly discusses China sports social network industry and related research. Firstly, the definitions and concepts related to sports social applications are introduced. Then, there presents an introduction to the development status of China sports social network industry. Finally, some typical sports social applications in China is introduced.

2.1 Definition and concept

Sport plays a significant role in the lives of sports participants and spectators,millions of citizens as well as their educational system, the economy are affected by sports' power and value (Simon, 1985)[2]. In network area, sport fans' information access methods are changed by the introduction of the Internet, Internet sports refers to the phenomena that people achieve sports information, watch sports shows, purchase sports equipment, socializing with sport friends through the Internet.

Also, with the advanced development of wireless technology, the number of people using mobile devices have increased, it meanwhile accelerated the rapid development of mobile service (m-service) conducted with these devices (Wang et al, 2006)[3]. Mobile social networking has become a significant aspect of many people's lives as they commu-

nicate with others who are members of the same social networking application (Finucan, 2011)[4]. Mobile social networking is a kind of web-based social media occurs in virtual communities in mobile terminal, referring to activities people achieve communicative purpose based on the mobile network, such as communication, interaction, content sharing, making friends and other functions.

Sports social refers to the social characteristic of sports. Apart from basic sports data records, it also provides sports-related social interaction, sharing and other services. And sports social applications refer to mobile apps that provide sports social services. The operation pattern of such applications are often O2O, namely online to offline. O2O in a broad sense means that business services can be online or offline, making the Internet as the platform for offline transactions.

2.2 China sports social network industry

As the country's economic level continues to grow and the country develops sports culture vigorously, the number of exercising people continues to grow and the demand for health and sports continues to increase. The development of mobile Internet technology, especially the built-in sensor and GPS functions, has driven the development of sports fitness applications. At the same time, with the continuous emergence of new forms of social interest, sports and social networking have become increasingly integrated.

China's sports social industry is in a period of rapid development. The scale of users has grown rapidly and the scale of investment has continued to increase. In 2014.there was an outbreak of sports social products. During the year, 12 sports and fitness companies obtained financing. In 2014, the monthly active users of sports and fitness applications exceeded 10 million, and in 2015, it is expected to double and exceed 20 million. Within three years, the scale of users will still maintain rapid growth. Representative companies which regards running/walking as the core sport are Codoon (oversea version:

RUNTOPIA), Nike+, Joyrun and so on.

In Figure 2.1, a schematic diagram of user needs distribution of exercise/fitness APP is presented. Apart from some basic, traditional services and functions, social features accounts for the second largest demand of users of sports and fitness applications.

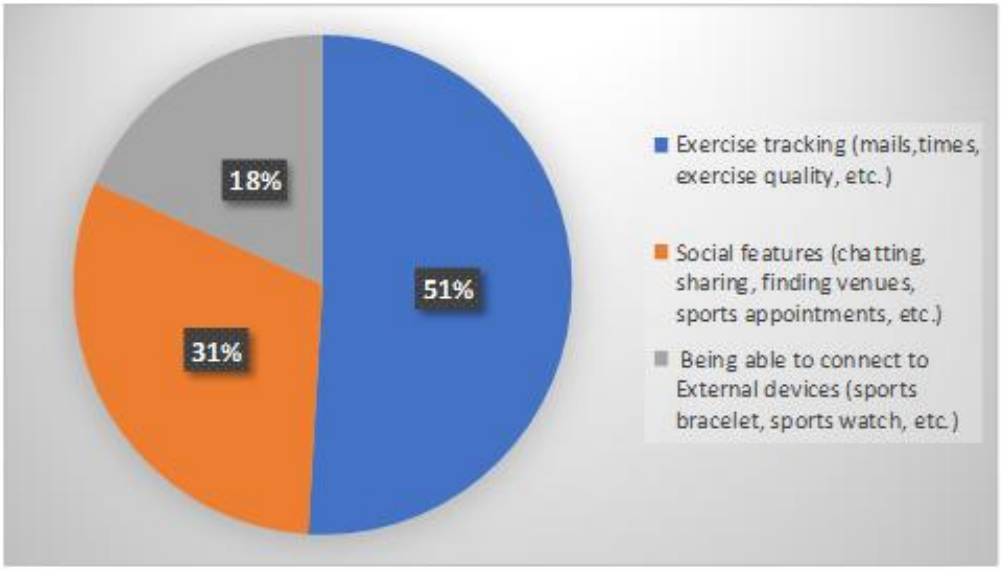

Figure 2.1: User needs distribution of exercise and fitness APP

2.3 Development status of sports social applications in China

Among the variety of sports and fitness applications and software, outdoor sports applications are the most widely used, meanwhile, outdoor sports applications and social elements are more fully integrated. Not only are there socializing interactions based on relationships, but also various content-based interest groups.

Sports apps used to be a tool for recording sports data for most users. However, when doing sports gradually forms a culture, users are more eager to pursue professional sports, any vertical social interaction with people can become a social way, there are no

class differences in most sports, such as table tennis, badminton, and running. Based on interest, people will naturally have opportunities for interpersonal communication. However, if you want to deepen your contacts, social functions cater for users will receive sought after naturally. In addition to the user's demand stimulation, the addition of social elements to the applications is also a prerequisite for enhancing user stickiness and maintaining user activation and retention. Therefore, under the premise of guaranteeing user experience, the integration of social elements will become more and more. when the business model of China's sports social industry is still being explored, which needs to cultivate user groups and lay the foundation for future maturity.

The sports social platforms mainly studied in this article include the following three types. One is the movement function module provided by the social APP represented by "WeChat Campaign", it belongs to the social networking software with sports and exercise elements, the second is the software provided by the smart bracelet matching users' exercise and fitness routine, and the third is professional sports social software. Here I will introduce several typical sports social applications in China.

Codoon (oversea version: RUNTOPIA) is a running app for tracking, analyzing and sharing all the data you need-be it outdoors or indoors and bring runners together one step at a time. Codoon, as a unique brand of Internet sports head in China, is developed by Chengdu Ledongli Information Technology Co., Ltd., As an animateur of smart sports, Codoon had more than 100 million users. It needs to respond to tens of millions of sports needs from 207 countries every day. More than 200,000 sports groups are spread all over the country. Around the country, a total of more than 500 online and offline events have been held. Codoon is committed to building the world's largest and most complete Internet sports industry. According to the "LeEco Sports Research Report", the market share of the industry of Codoon exceeded 50% in 2015, and it is far ahead in sports APP products. In December 2015, Nielsen released the "Report on China's Sports Population" and pointed out that Codoon has become the first choice of sports social software for

sporting people.

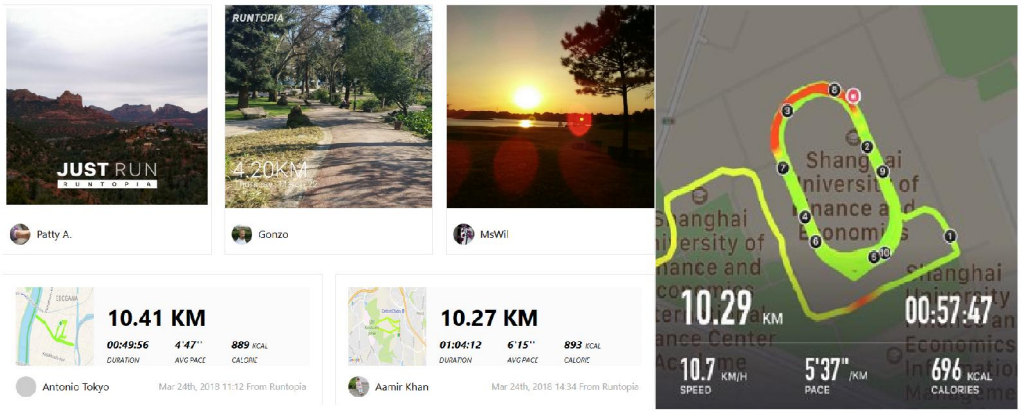

Figure 2.2: Popular posts in sports social applications

Joyrun: Joyrun is a mobile-internet applications developed by an information technology company in Guangzhou, which is a high-tech enterprise specializing in providing all-round service for Chinese runners such as offline running sports events and fitness applications. by the end of February 2017, the total number of Joyrun users reached 30 million, and more than 150 offline activities and competitions were held in more than 60 cities. The company is committed to encouraging the Chinese to live a happy and healthy life and strives to be a pioneer of a new lifestyle.

Nike + Run Club used to be Nike+Running, which is a sports social service targeted at runners under the Nike+ sports community. In 2006, Nike launched the Nike+iPod Sports Kit. Runners can use Nike+ sensors in their shoes to synchronize their sports records with Nike+Sportband or compatible iPod products. Then, the Nike+ sports community was initially established. In 2010, the Nike+GPS which is the predecessor of Nike+Running was launched on the App Store. In 2012, Nike+Running was launched on the Android platform, providing more runners with a new way to enjoy running. In 2013, Nike+Running launched Nike+Coach, Nike+Challenge and photo sharing capabilities. Runners can set marathon courses according to their running level, and challenge distances with friends in the Nike+ community, and encourage each other by sharing pic-

tures. In 2015, Nike established partnerships with companies to allow more runners to connect their favorite devices and fitness equipment with the Nike+ platform.

2.4 Existing research on sports social network

At present, there are a few attentions on sports social network academically, but almost blank about the information technology or system acceptance research on sports social applications. The relevant research is mainly produced in recent years, Hur Claussen (2012)[5] analyses the psychometric properties of Sport Web Acceptance Model (SWAM)[6] and in the research, influencing factors that impact sports fans' acceptance and usage of sports web portals for seeking sport-related information is illustrated. The paper introduces a research model that extends the SWAM by integrating two prominent consumer variables: sport involvement (Shank Beasley, 1998)[7] and psychological commitment to a team (Mahony et al, 2000)[8]. Seol Yeo (2017) investigate relationships between the significant control factors on acceptance intention to user experience (UX) sports smart wearable devices by applying technology readiness (TR) and unified theory of technology (UTAUT)[9].

In terms of domestic, research on sports social applications emerges in recent years, and most of the researches focus on analyzing their development statue, industry statue from the perspective of business innovation or system construction, profit mode and so on, there are also a few articles studying internal motivations of users. Hu (2017) uses literature, case studies, mathematical statistics, and questionnaires to compare the research and user surveys of running sports social software and to gain insights into the underlying causes of sports social development and to explore in-depth of the development prospects of the sports social industry, and put forward specific countermeasures and suggestions[10]. Chen Pan (2016) verified the "online interaction requirements", "Self-performance needs" and "Present a better image in front of acquaintances" as assumptions

that motivate users to use sports social applications for the case of China's largest social sports application Codoon[11]. Zhu Bao (2017) aims at the problems encountered in the social transformation of sports software, and analyzes the advantages of the social design of sports social applications by analyzing the interest spectrum of sports social software Keep, hierarchical architecture, interface design, interaction patterns, and the theory of interest mapping. And propose improvement recommendations to optimize the design of such App products[12]. Liu (2017) uses communication theory to analyze the spread of mobile phone "media", and aims at optimizing the function and enhancing the maximization of mobile phone social APP and sports APP of users' fitness experience, the study found that the mobile social networking APP can promote fitness participants in fitness and sharing[13].

Application Name	***Main Functions***	***Social elements***
Codoon (oversea version: RUNTOPIA)	Sports Tools: Sports data recording and data analysis are the most basic product functions. Codoon use GPS to record running, cycling, etc. Statistics include trajectories, mileage, speed, and calorie consumption which help sports fans to have a better understanding of their own exercise movements.	Codoon Sports Community: Codoon has two social platforms, sports circle and sports interest group. The sports circle mainly focuses on individuals and the interaction between people. It combines the WeChat circle of friends, microblogging social functions and functions of live-broadcasting platform. Sports fans can share dynamic information, check popular sports tags and view popular pictures in the square. additionally, with the LBS location service, users can view the dynamics of nearby sports crowds. Sports interest group focus on the content exchange of different sports interests. The sports skills, sports experience, sports equipment and activities for different sports types are shared and discussed.
	Hardware-data mode: Codoon provides peripheral hardware devices to access sports equipment, such as connecting a third-party smart accessory to a treadmill, make the sports equipment become intelligent. At the same time, third-party smart accessories can also be connected to the Codoon platform to facilitate users' data synchronization. The data level refers to the provision of cloud data management services, all motion data can be uploaded to the cloud platform to help users	O2O activities: Codoon promotes the running group, sports events, races and other online to offline activities.

Table 2.1: Typical sports social applications and their functions (a)

	manage the movement.	
Joyrun	Accurate GPS Recording: Via the GPS chip data of mobile devices, this application can record trajectory data in real time with unique algorithms for even lower data error. Professional analysis of sports data: it can offer a multidimensional data analysis. to help users adjust the pace of running more scientific, and at the same time to provide health training to make a breakthrough. Training program: its scientific program will improve the training effect of users. And that can help defy the limit of oneself	Data anti-cheating system: its anti-cheating system can evaluate data behavior and eliminate malicious data and defend running spirit. Marathon live: people can join live record of marathon race and running with other runners.
Nike + Run Club	My coach: it can provide users with professional guidance no matter they are beginners or not. It provides a new training run plan of 15 kilometers, it also gives beginners more choices, It can also launch advanced training program aiming at different goals, provide people with a tailored, scientific training plan, let you reach your goal even if you delay for a few days. users can also adjust in time, click the edit schedule button, freely drag and drop the training in the week in the order you want.	Challenging with friends: The new version of the Nike+ Run Club App takes a new approach. That is promote competition with friends through the topic tag leaderboard, and let users join the ranks of other runners across the globe. Just add unique hashtag and share with friends. Social sharing: users can concern about the training activities of their friends, so that they also get motivation from it. Way to share content to friends in Facebook, Instagram and any other social networks is simplified.

Table 2.2: Typical sports social applications and their functions (b)

Chapter 3

LITERATURE REVIEW

This chapter is the literature review, which summarized the existing research in information technology or information system acceptance research statue about users' behavior influencing factors. The purpose of this chapter is to establish the theoretical foundation for this study and illustrate the reason why these models and theories is suitable for the case.

3.1 Information technology adoption research

The main content of the adoption of information technology research is to explore the decisive factors and the internal logical relationships in the process of accepting information technology. The adoption of information technology from the perspective of individual users is one of the most mature academic branches in information systems research. the introduction to the technology acceptance model (TAM) has further promoted decades of prosperity in this area. In the recent ten years, new research themes have emerged, such as pre-adoption, post-adoption, user satisfaction, and IS (information system) continuance. Moreover, some traditional theoretical and research frameworks have been constantly revised and enriched during the process of reflection and criticism. Some new theories and constructs have been introduced into research according to research sit-

uations and objects, making this area of research more robust and rejuvenated.

This kind of research started with the technology acceptance model (TAM) proposed by Davis in 1989. Because its characteristics of simple structure and high usability, the model has been widely used in the research on information technology acceptance behavior, and the scope of its application has also expanded from personal computers, network communication systems, management information systems to ERP systems, online banking, and mobile Paying. Its application domain includes the fields of information systems, information management, and economic management. the technology adoption model provides ideas and methods for the solution of many frontier issues[14]. After many foreign scholars have continuously researched and innovated for 25 years, Venkatesh and Davis proposed technology acceptance model 2 (TAM2) in 2000 on the basis of TAM, Venkatesh et al integrated 8 models in total and proposed the unified theory of acceptance and use of technology (UTAUT) in 2003. During this period, the basic theoretical system of the model was continuously improved, and the explanatory power gradually increased from the initial 10% to 60% [1].

In the research field of analyzing influencing factors in the process of an information system or information technology accepted by personal users, the most frequent used theory is the technology acceptance model (TAM) and its derived model unified acceptance and use of technology model (UTAUT), then followed by Innovation diffusion theory (IDT) and information system success model (ISS). From the time dimension, early studies mainly used technology acceptance model (TAM), and the use of unified acceptance and use of technology model (UTAUT) is increased significantly in the later period, and there are more and more studies adapted the classical adoption theory to different research situations and objects. Both TAM and UTAUT explain from user and technical perspective how individual willing and beliefs influence the formation of information technology adoption decisions. In addition, theory of reasoned action (TRA) proposed by Fishbein and Ajzen in 1975 and theory of planned behavior (TPB) proposed by Ajzen in 1985 also

describe user-initiated technology adoption behavior, and TPB supplements considerations of organizational environment of users.

Moreover, according to the difference research situation and the research object, more and more scholars began to refer to classical or emerging theories derived from different disciplines, such as theory of self-presentation and adaptive structuration theory, E-commerce attraction model, commitment-trust theory, etc. to study virtual community (Kim et al,2012)[15], mobile payments and services (Sharma et al,2014)[16], e-commerce systems (Campbell et al,2013)[17], group-buying website (Wang et al,2016)[18]. The introduction of these theories enriched and expanded the research scope of information technology adoption on the one hand, and improved the pertinence and reliability of behavior modelling on the other hand.

3.2 Theories and models

3.2.1 Diffusion of Innovations

The innovation diffusion theory was revised and developed on the basis of Rogers' typical diffusion model. Its key point is to regard innovation process as a process of uncertainty testing and elimination[19]. Rogers believes that diffusion is the process of over time communicating innovation between participants in the social system. In this paper, diffusion of innovations theory seeks to explain how, why, and at what rate new ideas and technology spread[20]. The process mainly depends on the new technology related information that people continuously collect from the social environment[19].From a psychological and behavioral point of view, we will go through a process of understanding, interest, evaluation, trial, and adoption. It points out that the five factors that influence users to adopt new technologies are relative advantage, compatibility, complexity, trialability and observability.

Relative advantage refers to the perceived efficiencies gained by the innovation rel-

ative to current tools or procedures; observability refers to the possibility that new technologies can be implemented under certain conditions; complexity refers to the difficulty level new technologies can be understood and adopted; compatibility refers to the existing values of new technologies and users, and the degree of matching of previous experiences and individual needs.

The distinctive feature of innovation diffusion theory is that it emphasizes the impact of innovative attributes of information technology on adoption, and some of its constructs such as relative advantage and compatibility and has a great similarity in connotation with perceived usefulness, perceived ease of use in technology acceptance model (TAM) (Chong et al,2012)[21].

3.2.2 Theory of Reasoned Action(TRA)

The theory of reasoned action (TRA), which is firstly developed by Martin Fishbein and Icek Ajzen in 1967, was originated from previous research and started as an attitude theory. TRA is designed to explain the relationship between attitude and behavior in human action. And it is used to predict how the expression of individuals' behavior based on their pre-existing attitudes and behavioral intentions. The basis of individuals' decision is the result expected by the individual following the behavior's execution (Gillmore et al., 2002)[22].

This theory has been used in many studies as a framework to illustrate certain types of behaviors, such as communication behaviors, purchase behavior, and health behaviors. Many researchers use this theory to study behaviors associated with high risk, dangerous and deviant behavior. Instead, some studies have applied it to more standards and reasonable types of action. Researchers Davies, Foxall, and Pallister (2010) believe that reasoned action theory can be tested if "behavior is objectively measured without establishing a connection with past intention"[23].

Behavioral intention is a function of attitude and subjective norms to this behavior.

However, subjective attitudes and norms cannot be equally weighted in predicting behavior. Because they depend on individual difference and situation, these factors may have different effects on behavioral intentions, so that weight is associated with each of these factors (Miller, 2005)[24]. Some studies have shown that direct previous experience of certain activities leads to increased weight in the attitude component of the behavioral intention function.

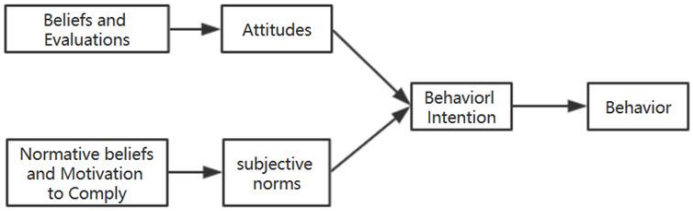

Figure 3.1: Theory of Reasoned Action(TRA)

3.2.3 Theory of Planned Behavior(TPB)

Because the theory of planned behavior (TPB) predicts and interprets individual behavior based on the assumption that the occurrence of behavior is on the control of individual willpower. However, under actual circumstances, individual's control degree over behavior is often affected by time, money, information, and ability such external factors. Therefore, theory of reasoned action (TRA) often fails to give reasonable explanations to behaviors that are not completely controlled by personal will.

The TPB considers that behavior is caused by both behavioral intention and perceived behavioral control. Behavioral intentions are jointly determined by attitudes, subjective norms, and perceived behavioral control, attitudes, subjective norms, and perceived behavioral control influence each other.

Perceived behavioral control is the degree to which an individual perceives the completion of behavior, namely, the degree of abundance of resources and opportunities that

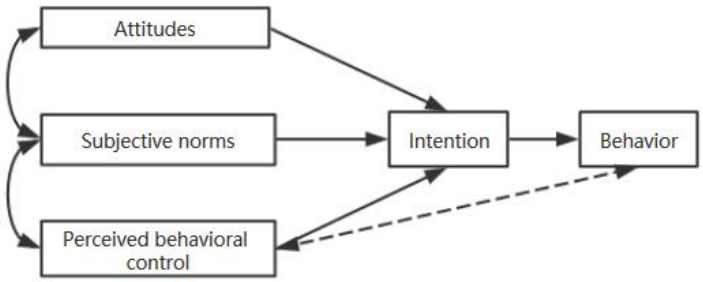

Figure 3.2: Theory of Reasoned Action(TRA)

the individual perceives to complete the behavior[25]. Perceived behavioral control is one of the key factor in the theory of planned behavior. It affects behavioral intentions, and predicts individual behaviors together with behavioral intentions. It's mainly used to explain the attitudes, intentions and behaviors of individuals when they cannot fully control their behavior. TPB has been used as a theoretical framework in many fields. For example, in various health-related fields such as leisure (Ajzen,1992)[25], exercise (Nguyen,1997)[26] and diet(Conner,2003)[27], and the attitudes and intentions of behavior in certain ways are regulated by goals rather than by demands.

3.2.4 Technology Acceptance Model (TAM)

In 1989, Davis proposed technology acceptance model(TAM) aiming at predicting and explaining why users decide to continue use IS, that is to say, there are factors which have an impact on individuals' behavior after using one certain system or application for a certain period of time. meanwhile, he took TRA as the theoretical basis and absorbed the reasonable kernel of expectation theory and self-efficacy theory.After TAM was presented, the model was improved several times by Davis and its collaborator, and the ability of interpretation was also improved.

TAM presents two essential variables: perceived usefulness (PU) and perceived ease of use (PEOU). PU refers to the individual's subjective evaluation of the role and benefits of using information technology. PEOU refers to the individual's expectations of ease of

use of the system[28].

This model replaces many of TRA's attitude measures with two measures:ease of use and usefulness, both TRA and TAM have a strong element of behavior, thinking that when someone forms a behavioral intention, they can act freely without restriction. However, there are many restrictions in the real world, such as limited freedom of act (Bagozzi Warshaw 1992)[29].

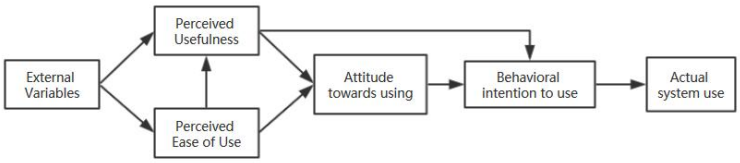

Figure 3.3: Technology Acceptance Model (TAM)

However, TAM is universal in researching user's information behavior, but it is too simple and theorizing when applied in specific research (Lee et al,2005)[30]. Due to the lack of consideration of external variables such as individual differences and technology types, many researchers supplemented the model building process in their studies.

There emerges several studies which incorporated others constructs:perceived enjoyment and perceived trustworthiness into the TAM, it's found that perceived enjoyment and perceived trustworthiness are important antecedents of online consumption behavior[31]. TAM has been continuously expanded - the two major upgrades are TAM 2 and the unified theory of acceptance and use of technology (UTAUT)(Venkatesh Bala 2008)[32].

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

Unified theory of acceptance and use of technology (UTAUT) which is derived from TAM was proposed by Venkatesh in 2003. It integrates arguments from more than eight models and the deficiencies of the previous models have been correspondingly improved.

Many important theories have emerged in information technology acceptance re-

search field. Venkatesh and Davis combines the features and advantages of the eight theoretical models and proposes the unified theory of acceptance and use of technology (UTAUT), additionally, it's proved that the UTAUT model has higher explanatory power of individuals' use intention and use behavior than other models, from 40 percent of the TAM model to 70 percent. UTAUT adds four dynamic factors (age, sex, experience, and voluntary), which have improved the explanatory power of the model. The results of Venkatesh (2003) found that the combined effect of more than two control variables will make the effect more significant[33].

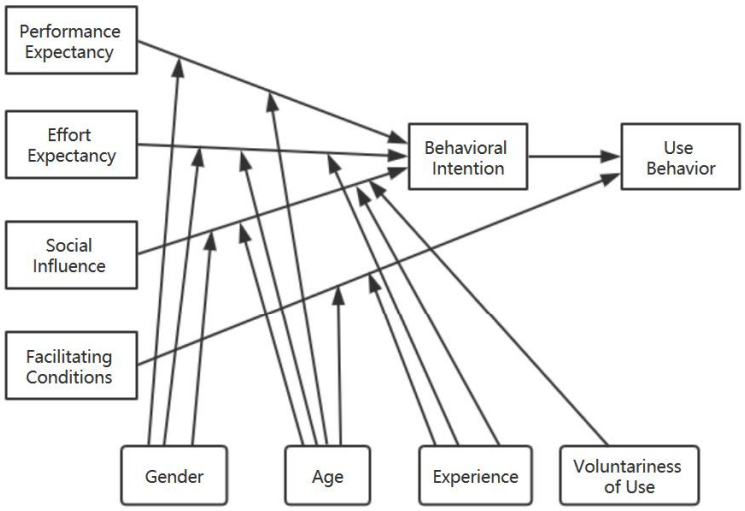

Figure 3.4: Unified Theory of Acceptance and Use of Technology (UTAUT)

Four main concepts in UTAUT: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) are independent variables which influence dependent variables, behaviors and usage. Gender, age, experience, and volunteers of system use are proved to have indirectly impact to four main constructs, and behavioral intention is seen as a critical predictor of technology use (Venkatesh et al., 2003)[33].

The UTAUT model has been applied in many fields since it was proposed, such as mobile banking, e-commerce, and microblog. Moreover, the research on the expansion of UTAUT models with other factors is also constantly evolving.

Variables	*Description*
Performance expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance. And performance expectancy is hypothesized to moderate the influence on behavioral intention by gender and age.
Effort expectancy	The degree of ease associated with the use of the system. And effort expectancy hypothesized to moderate the influence on behavioral intention by gender and age, and experience.
Social influence	The degree to which an individual perceives that important others believe he or she should use the new system. Social influence, hypothesized to moderate the influence on behavioral intention by gender and age, and experience, and volunteers of system.
Facilitating conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. And hypothesized to moderate the influence on behavioral intention by age, and experience.

Table 3.1: Description of variables in UTAUT

From the development history of the UTAUT model, the theory of technology acceptance model has been continuously improved, and it has continuously evolved and adapted to a wider range of research fields. Moreover, the relevant interpretative models have also been updated and evolved. As theoretical models become more and more sophisticated, most scholars are not satisfied with the existing variables of the UTAUT model when they study the willingness and behavior of users of information technology, they begin to modify and build new model by adding new variables to the original one to fit the needs of actual research. For instance, Anderson et al (2003) utilizes UTAUT to analyzed the adoption of wireless technologies as well as SME adoption[34].Kim et al (2005) used UTAUT to study people's acceptance of information technology. He suggested that past usage habits will indirectly affect the current intention of use, and involve three new influencing factors: use value, social value, hedonic value[15].Steve Baron Anthony Patterson (2006) used the social influence factors in the UTAUT model, and re-

placed the remaining three core factors with perceived enjoyment, perceived usefulness, and perceived ease of use, it's shown that these variables have positive effects on individuals' willingness and use of mobile phone text messages[35].Wang et al (2009) added perceived playfulness and self-management of learning to the UTAUT in their paper of illustrating determinants of mobile learning adoption[36].Alwahaishi Snasel (2013) composed a new hybrid theoretical framework to identify the factors affecting the acceptance and use of an ICT application in a consumer context based on the UTAUT model and flow theory[37]. Yoon et al (2014) added the concepts of trust and flow experience to the original UTAUT, the new modified model of IT adoption can better explain behavioral intentions of 'e-learning' and 'online gaming' towards online services than the original model[38].

3.2.6 Customer Perceived Value (CPV)

Customer perceived value (CPV) means that there are differences between the prospective customer's evaluation of all the benefits and all the costs of a product or a service. The customer perceived value reflects users' subjective feelings of the product value provided by the company, and it's different from the product objective value. The core of customer perceived value is the trade-off between perceived benefits and perceived sacrifices[39].There are two layers of meaning of this concept.Firstly, perceived value are individualized and different people have different feelings; secondly, when customers make purchase decisions, their actions are based on the value they feel,and are by no means dependent on a single factor.

Zeithaml (1988) defines perceived value as "the overall assessment on the product (or service) utility determines by customer's perceptions of what is received and what is given" [40].Schoolars suggested that perceived value to be a key multidimensional determinant of behavioral intentions of information products or services, such as wireless short messaging services(Turel et al ,2007) [41]. Moreover, some customer usage model refer

to perceived value as its construct with other variables to analyse customer behavior. For example, Alsheikh Bojei (2012) presented a mobile banking usage model using benefit factors (performance expectancy and effort expectancy) in conjunction with sacrifice factors (cost and risk) based on CPV theory, this research enabled banks to complete better marketing strategic plan from the customer's point of view [42].Also,an online purchase intention model proposed by Ponte et al (2015) adopted perceived value, trust and the antecedents of perceived security and privacy[43].

3.2.7 Flow Theory

Flow also called "optimal experience" is a concept developed by Mihaly Csikszentmihalyi (1977). Flow theory is developed in the reference discipline of psychology and is very much linked to the concept of intrinsic motivation, it's indicated that when people are in the flow state, people could become absorbed in their activities,they feel they have control over their environment when their awareness is focused on the activity itself without self-consciousness,thus flow theory has been used to address optimal user experiences with personal computers (Zhang Finneran ,2005)[44] ,browsing a website[45] and so on. Flow theory indicates people's intrinsic motivation compared with perceived usefulness, which deals with users' extrinsic motivation. According to most of previously papers, research on information systems emphasized the role of extrinsic motivation in explaining user behavior, however, they have gradually realized the importance of intrinsic motivation recently(Agarwal Karahanna, 2000)[46].

Researchers often measure concept flow through multiple dimensions for its complexity. For example, Huang (2003) included control, attention focus, curiosity, and intrinsic interest four constructs to address[47]. Li Browne (2006) deemed that flow experience included focused attention, control, curiosity and temporal dissociation[48]. Moon Kim (2001) suggested that perceived enjoyment, concentration, and curiosity are inclued in concept measures[49]. Thus, it's founded that enjoyment is regarded as essential mea-

surement of flow in users' behavior.It's obvious that when people using a technology or information system can make them enjoyable, people will be intrinsically motivated to adopt it, perceived enjoyment have been proved to have a significant influence on users' intrinsic motivation of technology acceptance, especially for hedonic systems.

Chapter 4

RESEARCH MODEL AND RESEARCH HYPOTHESES

This chapter presents the sports social APP adoption model, including model constructs and their relationships hypothesized among the constructs. Three external variables: Individual Innovation, Perceived Cost and Perceived Entertainment are incorporated into the sports social adoption model based on unified theory of acceptance and use of technology(UTAUT).

4.1 Model specification

Sports social application is a kind of mobile application that basically belongs to mobile services and is a small information system. UTAUT integrates the arguments of the eight models into four core constructs: performance expectancy, effort expectancy, social influence and facilitating conditions with four moderating variables, gender, age, experience, and voluntariness. The empirical results show that UTAUT can explain the use behavior by up to 70%, which is more effective than any model known in the past. Therefore, this study is also based on the UTAUT model. The four core variables in the model have been repeatedly verified by numerous studies, which has become the

important factors influencing the adoption of information technology, so this study still retains these four variables.

However, if we directly refer to the original model to study the user's adoption of sports social applications, there will still be some limitations. This study extends the UTAUT model, adding three new variables: individual innovation, perceived cost and perceived entertainment to test whether the new variables have an impact on users' adoption of sports social applications.

4.1.1 Individual Innovation

The earliest involvement of individual innovation in the field of information technology was proposed by Agarwal et al. (1998) to measure individuals' willingness to try out new information technologies. UTAUT measures many variables but neglects the study of individual characteristics, such as individual innovation.

Individual innovation refers to the degree that individuals accept new things. Some scholars believe that the individual's innovativeness will affect its cognitive and decision-making processes. Rogers (1995) believes that innovators can assume higher risks and uncertainties, that is to say, individuals with higher innovations are more inclined to use an innovative technology. Agarwal et al. (1998) believe that with the same information, individuals with innovative spirits will have more creative ideas, the impact of individual innovation on technology acceptance behavior is manifested by its relationship with personal attitudes or intentions, and with the inclusion of individual innovation, technology acceptance models can better illustrate the role of individual traits in the process of acceptance[50]. Lewis et al (2003) also believe that personal innovativeness with technology has a positive influence on beliefs about the ease of use and usefulness of the technology[51]. Van Raaij Schepers (2008) believe that individual innovation is the degree of openness to a certain new change, and the stronger the individual's ability to innovate, the more aware they are. Thus it's easier for them to operate or use a system or

new technology[52].

For users, integrating social element into exercise is a relatively new service innovation and they do not have experience in using it. However, the user's curiosity about the service innovation will also allow them to pay attention to these new sports mode to a certain extent, and take the initiative to obtain diverse information of sports, thus driving them to try these new technologies. Therefore, individual innovation is also an important factor affecting the acceptance behavior of sports social application users.

4.1.2 Perceived Cost

Research on value was first introduced in the field of marketing and economics before 1980s, and the focus was on the value of companies, products and services. In the early 1990s, with the concept of perceived value and the maturation of related theories, scholars began to focus on the user level in value research, and the focus of research turned to perceived benefits and perceived cost of customers. It's considered that consumer's perception of price, quality, and value are pivotal determinants of purchase behavior and product choice. In addition, Zeithaml (1988) provided conclusive findings in the research on these concepts and their linkages. It's stated that monetary price as well as time costs, search costs and psychic costs all enter into the consumer's perception of sacrifice when obtain products or services[40].

Some scholars have introduced perceived cost as an external variable in the technology acceptance model in order to increase the explanatory power of users' behavior. Kuo Yen found that perception of costs has a negative effect on user attitudes through the study of users adopting 3G mobile value-added services. It's suggested that providers can increase consumer's adoption intention by reducing the tariffs of value-added services[53].

When people use sports social applications, the cost to run the system needs to be considered, includes the price of the service as well as elements like time and efforts. perceived cost of sports social applications includes the cost of owning a mobile device,

the data cost when text messaging and sharing pictures or videos, the battery consumption when using GPS. In addition, sports equipment such as running shoes and the smart sports wearable devices is always in coordinate with the use of sports social applications, for example, ”Nike+” running shoes communicate with the iPod via the wireless apple Nike+iPod motion module. After connecting the Nike+ shoes with the iPod, the iPod can store and display the date of the exercise, time, distance, calories exercise data, the update of sports equipment is also included in the costs. As a kind of mobile service, sports social software will be perceived by users its data cost, power consumption or expenditure in the mall. Therefore, this article outlines the perceived cost will bring the user with economic costs, such costs have a negative impact on the user's adoption.

4.1.3 Perceived Entertainment

Davis et al, (1992) analyzed the impact of enjoyment on usage intentions of technology acceptance model (TAM) and porved both usefulness and enjoyment as entirely intentions. He also defines enjoyment in usage intentions research: when users use information technology, the pleasure can be felt. Moon Kim (2001) introduced playfulness as a fresh element that reflects the user's intrinsic belief in WWW adoption[49]. They used it as an intrinsic motivation factor, and proved it through empirical research which enhances the predictive power of the TAM model. In addition, perceived entertainment is often embodied in pleasure-oriented IT usage research, such as computer games (Guo Barnes, 2011)[54], according to Wu Holsapple (2014), the results provide strong support for the major hypotheses of entertainment in IT acceptance[55].

As noted above, sports social APP is embedded with rich entertainment functions to attract users cause obtaining great enjoyment when using it is very important. Thus we expect that perceived enjoyment will improve their affective attitude toward this product and promote their adoption intention of it. Sports social software as an innovation in mobile services and information technology is a challenge to traditional sports and fitness

methods. It will produce a different exercise experience and a sense of entertainment. Therefore, this article outlines the Perceived Entertainment as the degree of entertainment that sports and social software brings to the user. This kind of entertainment is supposed to have a positive influence on the user's acceptance.

4.2 Research hypotheses

In this part we explore the relationship among the constructs put forward in the research model.

4.2.1 Performance Expectancy

Users use sports social APP mainly for its assistance to exercise or fitness, that is to obtain expectant benefit, the performance expectation is the direct driving force of the adoption behavior. In the traditional UTAUT model, performance expectancy is considered to be the most direct and major influencing factor of adoption behavior and have been empirically supported by numerous industry data. Similarly, the perceived usefulness in the TAM model also reflects the user's expected earnings from adoption.

Literarily, when users try a specific new technology, the good performance with the help of this technology can positively impact individual's use of the technology. Performance expectancy incorporates perceived usefulness, external motivation, job relevance, relative advantage and outcome expectancies. perceived usefulness is proved as a salient determinant of behavioral intention in the research of TAM.

Therefore, when the user thinks that the sports social applications can provided service to help himself obtain the necessary resources and information more conveniently than the regular service, he is willing to use it; for example, sports social Apps can record the exercise at any time so that users can share them with sports friends, also, users can find good coach, training plans as well as friends with same sports interests. Thus users

can gain more effect and efficiency. However, when the user believes that the gap with the traditional service is not very big, they will not easily change the existing usage habits. The special social service serves as an information channel between sports fans, enabling communication to break the constraints of time and space. Users can master professional knowledge through mobile devices, instantly obtain information, retrieve resources, and obtain a good user experience.

Here I define Performance Expectancy (PE) as the degree to which an individual believes that using the sports social applications will help him or her to attain gains in exercise performance. And this study proposes the following assumptions:H1. Performance Expectancy influences users' adoption intention of sports social applications positively.

4.2.2 Effort Expectancy

Effort expectancy of users refers to the degree of ease associated with the use of the system. The user's effort expectancy has a significant positive impact on the willingness to use the system, that is, if users believe that the new mobile service is easy to get hold of, they are more likely to use this service. From Davis's theoretical model, it can be seen that "perceived ease of use" contains users' evaluation of cost-effectiveness. whether the information system is easy to operate or it requires a lot of effort and time to understand memory. In a free-learning situation, at least perceived ease of use is a basic condition for behavioral willingness, that is, a system that requires less effort and is more likely to be accepted by users (Davis, 1992)[28].

Effort Expectancy incorporate perceived ease of use, complexity and ease of use. From Davis's theoretical model, it can be seen that "perceived ease of use" contains users' evaluation of cost-effectiveness. No matter the information system is easy to operate or complicated, or even it requires a lot of effort and time to understand by users, they will first make value judgments in cognitive terms. Although there may be other factors, such as the user's personal background, interests, etc. In a free-learning situation, at least

perceived ease of use is the basic condition for behavioral willingness, that is to say, the system requires less effort is more likely to be accepted by users.

The application like sports social software is based on information technology, which requires the user to use the terminal device independently. Therefore, the ease of use of the business and the degree of tediousness of the terminal settings directly affect the user's intention of use. An important reason for users to use sports social APPs' services is because they are convenient and time-saving. Therefore, if the system design of sports social APPs is simple and easy to operate, it will save users' conversion costs and attract users. If the design of the service system is complicated, the user needs to use it for learning, which may cause the user's conversion cost to be too high and cause the user to lose interest in using the new service.

Here I define Effort Expectancy(EE) as the degree of ease associated with the use of sports social applications. And this study proposes the following assumption:H2. Effort Expectancy influences users' adoption intention of sports social applications positively.

4.2.3 Social Influence

Both the performance expectancy and effort expectancy above are discussing the relationship between users and technology products, UTAUT model also proposes that the user's product adoption behavior depends not only on individual needs and the product itself, but also on the social environment in which it is located. The relationship between the social interaction and other social relations groups such as family, friends, colleagues, etc., has a positive effect on their adoption. For example, according to the individual innovation spirit difference of sports social APP users, the early adopters are mostly innovators, they are usually the target of mass consumers and traditional consumers to follow and imitate, and the strong social connection between innovators and potential users. Its early use behavior has played a good demonstration effect.

Social influence integrates variables which are subjective norm in TRA/TAM, social

elements and image. In information systems, a large number of studies have demonstrated the significant impact of social influence on users' intentions. Roger divided social influence into two forms: one is the mass media and the other is the interpersonal influence. Media includes newspapers, magazines, periodicals, television, and the Internet etc; interpersonal influences include social networks such as colleagues, friends, and bosses. Teo Pok (2003) studied the importance of subjective norms for use intentions from the perspective of information systems[56]. Nysveen et al. (2005) showed that when people use a mobile service in a public environment, they must first observe other people's behavior and be affected by others[57]. As sports social applications are new exercising and fitness mode under the influence of mobile internet and social media, if a sports fan find their friends with same interest use the applications and they can interact with each other with the sports social applications, they may be affected by others' adoption. Here I define Social Influence(SI) as the degree to which an individual perceives that important others believe he or she should use the new sports social applications. And this study proposes the following assumption:H3. Social Influence influences users' adoption intention of sports social applications positively.

4.2.4 Facilitating Conditions

Facilitating conditions integrates perceived behavioral control in TRA, that is individuals' perception degree of restrain from internal and external environments and compatibility, that is whether the information technology perceived by users is consistent with their values, needs and experience. It should be noted that TAM fail to consider the impact of the external environment, while the UTAUT model not only increases the impact of the social environment, but also takes into account the convenience of the technical conditions of use, also, this convenience directly influences users' practical action. That is to say, whether the sports social APP has very good conditions for use, such as the hardware and software conditions of the mobile phone, wireless network, and external

smart device, or whether these applications are compatible with other software.

Here I define Facilitating Conditions (FC) as the degree to which an individual believes that an organizational exists to support use of the sports social applications. And this study proposes the following assumption: H4. Facilitating Conditions users' adoption behavior of sports social applications positively.

4.2.5 Adoption intention and behavior

Adoption intention refers to the possibility that consumers expect to use an information system or new technology at a specific time in the future under acceptable conditions. A study by Venkatesh (2003) found that the adoption intention has a direct and significant impact on actual behavior and is not affected by other disturbance variables. The stronger the individual's intention or desire for a certain behavior, the more likely it is to engage in the action. This point was also confirmed in many previous studies (Fishbein Ajzen, 1985)[58]. thus, we have the assumption:H8. Users' adoption intention of sports social applications influences users' adoption behavior of sports social applications positively.

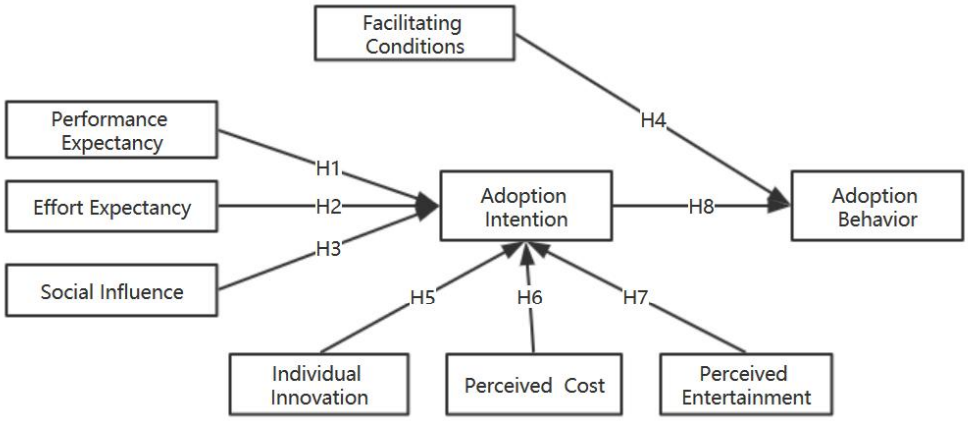

Figure 4.1: Research model of sports social APP adoption with hypotheses

This paper retains the four variables in the original UTAUT model and introduces three extra variables "individual innovation", "perceived cost" and "perceived entertain-

ment". The model of the individuals' adoption of sports social APP is shown in the figure 4.1, and the definitions of the research constructs in the model are provided in Table 4.1.

Construct	***Definition***	***Reference***
Performance Expectancy	The degree to which an individual believes that using the sports social applications will help him or her to attain gains in exercise performance.	Venkatesh et al., (2003)
Effort Expectancy	The degree of ease associated with the use of sports social applications.	Venkatesh et al., (2003)
Social Influence	The degree to which an individual perceives that important others believe he or she should use the	Venkatesh et al., (2003)
	new sports social applications.	
Facilitating Conditions	The degree to which an individual believes that an organizational exists to support use of the sports social applications.	Venkatesh et al., (2003)
Individual Innovation	The degree to which an individual is willing to try new information technologies/system/application.	Agarwal et al. (1998)
Perceived Cost	The degree of economic cost which an individual feels when using social sports APP	Zeithaml (1988)
Perceived Entertainment	The degree of pleasure and entertainment sports social applications brings to users.	Davis et al., (1992)
Adoption Intention	The extent to which the respondents feel that they intend to use sports social applications.	Venkatesh et al., (2003)
Adoption Behavior, AB	The extent to which the respondents use sports social applications.	Venkatesh et al., (2003)

Table 4.1: Definitions of the research constructs

Hypotheses
H1: Performance Expectancy influences users' adoption intention of sports social applications positively.
H2: Effort Expectancy influences users' adoption intention of sports social applications positively.
H3: Social Influence influences users' adoption intention of sports social applications positively.
H4: Facilitating Conditions users' adoption behavior of sports social applications positively.
H5: Individual Innovation influences users' adoption intention of sports social applications positively.
H6: Perceived Cost influences users' adoption intention of sports social applications negatively.
H7: Perceived Entertainment influences users' adoption intention of sports social applications positively.
H8: Users' adoption intention of sports social applications influences users' adoption behavior of sports social applications positively.

Table 4.2: List of research hypotheses

Chapter 5

METHODOLOGY

This study collects data through online questionnaires and uses empirical research methods to test the theoretical models and research hypotheses proposed in Chapter four. This chapter mainly introduces the measurement instruments, questionnaire design, data collection, and data analysis methods. It adopts a scientific and rigorous attitude to conduct research and design, and strives to fully prepare for the empirical analysis of sample data.

5.1 Measurement instruments

Measurement instruments The main objective of this dissertation is to explore the influencing factors that influence the willingness of consumers of social sports applications. The study contains 9 latent variables: Performance Expectations (PE), Effort Expectations (EE), Social Influence (SI), Facilitating Conditions (FC), Individual Innovation (II), Perceived Cost (PC), Perceived Entertainment (PEN), Adoption Intention (AI) and Adoption Behavior (AB). Each latent variable is measured using multiple items. In order to ensure the content validity of the scale, the measurement of all variables in this paper is derived from the previous classic literature and has been adjusted appropriately in the context of sports social service. The contents were performance expectancy (e.g. I think

sports social APP is useful for my exercise), effort expectancy (e.g. I think it is easy to use sports social APP), social influence (e.g. Friends around support me to use sports social APP), facilitating conditions (e.g. I know how to use sports social APP), intention (e.g. I have an intention to use sports social APP). After a series of language adjustments, a preliminary draft of the questionnaire was formed. In addition, the actual usage behavior of sports social software (AB) including usage experience of sports social, the hours of weekly sports social APP use, and use frequency. The detailed measurement items of each construct and their sources are listed in Table 5.1.

5.2 Questionnaire design

Questionnaires are often applied to the research in the field of social behavior. The main questions asked in the questionnaire were obtained after reading a large amount of related literature. Such an approach can improve the overall reliability and validity of the questionnaire, and at the same time combine the existing maturity scale with the actuality of this research to design the part is able to complete the study questions better.

In this paper, a Chinese survey is conducted for ease of understanding because most of the respondents of the questionnaire are Chinese, the questionnaire for this study is divided into three parts:

The first part is the motivation letter, it mainly introduces the research purpose, the definition of sports social applications and lists the common domestic sports social applications to provide the reference for the respondents.

The second part includes basic background questions such as age and gender. The respondents are also asked about their exercise frequency, sports social APPs experience and their most used APPs, this allows us to determine whether the respondent is an existing user or potential user of this kind of applications because only those respondents who have used sports social applications are the study targets, and this part collects data

Construct	*Item*	*Supporting references*
Performance Expectancy	PE1: I find sports social APP useful in my daily life.	Davis (1989), Venkatesh&Davis (2003), Venkatesh et al (2012)
	PE2: Using sports social APP helps me accomplish things more quickly.	
	PE3: Using sports social APP increases my productivity.	
Effort Expectancy	EE1: How to use sports social APP is clear and understandable.	Davis (1989), Venkatesh&Davis (2003), Venkatesh et al (2012)
	EE2: It is easy for me to become skillful at using sports social APP.	
	EE3: I find sports social APP easy to use.	
	EE4: Learning how to use sports social APP is easy for me.	
Social Influence	SI1: If people who are important to me use sports social APP, I will use ports social APP	Davis (1989), Venkatesh&Davis (2003)
	SI2: If people who influence my behavior use sports social APP, I will use ports social APP	
	SI3: I think many friends in my circle use sports social APP	
	SI4: I think many of my friends will continue to use sports social APP in the future	
Facilitating Conditions	FC1: I have the resources necessary for using sports social APP (mobile phones, networks, smart wearable devices, etc.)	Davis (1989), Venkatesh&Davis (2003), Venkatesh et al (2012) , Moore & Berbasat (1991)
	FC2: Sports social APP is compatible with other technologies or software I use.	
	FC3: If there are problems and difficulties when use sports social APP, I can get help from the software.	

Table 5.1: The operationalization of the measurements (a)

of individuals' actual usage (AB) of sports social APP.

The third part is the investigation of the influencing factors of users' adoption of sports social applications. This part includes measurements questions of variables: PE, EE, SI, FC, II, PC, PEN, AI and each construct is illustrated with two to five items. The items measuring variables, were built based on prior literature review. Respondents are

Individual Innovation	II1: I am a person who likes to do all kinds of new attempts	Agarwal, R., & Prasad, J. (1998), Rogers (1983)
	II2: Among my peers, I am often the first person to try new technologies	
Perceived Cost	PC1: Expenses related to sports social APP (such as: data expenses, wearable sports equipment, etc.) are very expensive for me	Zeithaml (1988)
	PC2: The transaction costs (such as time cost, information search cost etc.) required for sports social APP use are very high	
Perceived Entertainment	PEN1: Use Sports Social APP enrich my social networking when doing sports.	Davis et al., (1992),
	PEN2: Using sports social APP bring me with pleasure.	
	PEN3: I enjoy using sports social APP when I do sports	
Adoption Intention	AI1: I intent to try sports social APP for sports	Venkatesh & Davis (2003), Moon & Kim (2001)
	AI2: I intent to recommend sports social APP to people around me	
Adoption Behavior(actual usage)	AB1: What is your usage experience of sports social APP	Venkatesh & Davis (2003), Moon & Kim (2001)
	AB2: How many hours do you use sports social APP every week	
	AB3: How often do you use sports social APP	

Table 5.2: The operationalization of the measurements (b)

asked to choose the answer based on their previous experience of using sports social APPs and must be their true feelings. A five-point Likert-scale is used to measure them, five levels: “Strongly disagree”, “Disagree”, “Neither agree nor disagree ”,” Agree” and ”Strongly agree” are assigned to 1 point, 2 points, 3 points, 4 points, and 5 points respectively.

5.3 Data collection and analysis

This study collects empirical data with a quantitative questionnaire. The sample for this study was any people who had sports social software using experience in China. It's stated that the form of online questionnaires can make respondents answer the questions in similar situation. At the same time, the forms of online surveys are more in line with the interests of consumers, and thus are more likely to receive positive responses from consumers and encourage them to fill out questionnaires. Therefore, this study mainly adopts the online survey questionnaire collection method, which is to use a professional questionnaire survey site ("Questionnaire Star" website) to issue questionnaires.

The sample was mainly derived from users of the questionnaire website, users in the sports social software group, and friends interested in sports social software in the social circle. In this study, after questionnaire distributed online, 324 responses were collected. Excluding the respondents who don't have usage experience of sports social applications before, 290 valid questionnaires were screened out.

In this study, I will use structure equation modeling (SEM) as the main method for analyzing and evaluating the research model and hypotheses put forward. Structural Equation Modeling is a multivariate analysis technique for establishing, estimating, and testing causality models. It includes a serious of analysis methods such as multiple regression, factor analysis, path analysis, and multivariate analysis of variance. It is a very general and linear statistical modeling techniques for hypothesis testing with the aid of theory. Different from the traditional multivariate statistical analysis, structural equation model allows measurement errors of the independent variable and the dependent variable. The model contains observed variables as well as latent variables that cannot be directly observed. It can estimate the relationship between multivariate and interrelated dependent variables.

Chapter 6

EMPIRICAL RESULTS OF THE RESEARCH

This chapter is an empirical analysis of the research model, Firstly, a descriptive statistics of the sample are presented, then reliability and validity of the scale are tested with SPSS22.0, finally the research model is tested with SmartPLS3.0 to examine the hypotheses put forward.

6.1 Descriptive statistic of the sample

In this study, after questionnaire distributed online, 324 responses were collected, 44 respondents were not included in the sample because they indicated that they had never used sports social APP before. The sample was mainly derived from users of the questionnaire website, users in the sports social software group, and friends interested in sports social software in the social circle. Excluding the respondents who don't have usage experience of sports social applications before, 290 valid questionnaires were screened out, and the basic situation of respondents with valid questionnaires is as follows.Structural equation modeling (SEM) recommends sampling of 200 as fair and 300 as good(Lamb et al,2016)[59]. The demographic information of the respondents is shown in Table 6.1.

Variable	*Description*	*Frequency*	*Percentage*
Gender	Male	121	41.72%
	Female	169	58.28%
Age	Under 18	0	0%
	18-24	95	32.76%
	25-35	154	53.1%
	36-40	20	6.9%
	Above 40	21	7.24%
Exercise experience (years)	1-2	89	30.69%
	3-5	78	26.9%
	6-10	44	15.17%
	Above 10	28	9.66%
	Little experience	51	17.59%
Exercise frequency	More than 5 times per week	28	9.66%
	3-5 times per week	87	30%
	1-2 times per week	96	33.1%
	1-2 times per month	62	21.38%
	Seldom exercise	17	5.86%
Usage experience of sports social APP	Less than 1 year	98	33.79%
	1-2 years	127	43.79%
	3-5 years	54	18.62%
	More than 5 years	11	3.79%
Usage frequency of sports social APP	Occasionally use	106	36.55%
	4-5 times per month	18	6.21%
	2-3 times per month	50	17.24%
	2-3 times per week	68	23.45%
	Everyday	48	16.55%

Table 6.1: Demographics of respondents

In order to understand the current state of sports social network industry in China, the respondents were asked to indicate their exercise experience, exercise habits, mobile internet service using experience and so on. The age profile of the respondents represents most age groups with the majority of more than 90% being in the 18 to 35 age range and 58.28% of the respondents are female.

A total of 82.41% of the respondents have the habit to exercise,30.69% of the respondents have been doing sports or exercise for one to two years, 26.9% of the respondents

have been doing sports or exercise for three to five years, 15.17% of the respondents have been doing sports or exercise for six to ten years, 9.66% of the respondents have been doing sports or exercise over ten years. for the respondents that had used sports social software before, 33.79% of the respondents had used the sports social software for less than one year, the majority usage experience is one to two years, which is 43.79% of the respondents, 18.62% of the respondents have been using sports social applications for three to five years, cause mobile internet sports service is popular in recent years, only 3.79% of the respondents have used sports social applications more than 5 years. As for usage frequency of sports social APP, 16.55% of the respondents use sports social applications every day, 23.45% and 17.24% of the respondents use two to three times per week and two to three times per month respectively, 6.21% of the respondents only use four to five times per month, 36.55% of the respondents only use sports social applications occasionally when they come to think of it.

6.2 Reliability and validity of the scale

6.2.1 Reliability

Reliability refers to the stability and consistency of questionnaire survey results when the same object is investigated by the same method repeatly. The higher the reliability, the smaller the scores measured on different items in the same scale are affected by the error, so that the scores of the scale items are consistently changed among the respondent's responses so that real situation can be reflected. It shows the consistency and stability of the results obtained by the test tool and is an indicator of the true degree of the measured features.

The Cronbach's alpha coefficient is a method used to test reliability. It was proposed by Lee Cronbach in 1951 and is the most commonly used reliability assessment tool in psychological or educational tests. It measures the internal consistency of the test accord-

ing to a certain formula and serves as an indicator of reliability. It overcomes the shortcomings of partial halving and is the most commonly used reliability indicator in current social studies, it's a set of synonymous or parallel measures of "sum" reliability[60].

According to reliability standards, it is generally believed that the reliability coefficient of the scale should be above 0.8, greater than 0.9 is considered very credible, 0.6 to 0.8 is considered acceptable, but when Cronbach's coefficient is below 0.6, the questionnaire should be considered redesign.

Cronbach's Alpha	*N of Items*
.943	26

Table 6.2: Overall reliability statistics

Variable	*Items*	*Cronbach's Alpha*
Performance Expectancy	3	0.824
Effort Expectancy	4	0.871
Social Influence	4	0.801
Facilitating Conditions	3	0.714
Individual Innovation	2	0.751
Perceived Cost	2	0.834
Perceived Entertainment	3	0.943
Adoption Intention	2	0.789
Adoption Behavior	3	0.846

Table 6.3: Cronbach's Alpha for each variable

From the above table, the test results show the overall reliability coefficient value is 0.943, which is greater than 0.9, and most of reliability coefficient for variables exceed 0.7, all of the reliability coefficient for variables exceed 0.6, it indicates that the reliability of collected data is good, meanwhile, after the deletion of the item, the reliability coefficient value does not increase significantly, it's indicated that the comprehensive explanation of the data shows good quality and reliability, and the data can be used for further analysis.

6.2.2 Validity

Validity is a measure of the correctness of the measurement scale and reflects whether the items truly measures the problem the investigator initially wanted to figure. The validity test in this study includes content validity and construct validity.

Content validity refers to appropriate degree to which items in a research instrument reflect the content, that is, the appropriateness and consistency of the measurement content. The constructs and their measurements in this study are derived from the literature review of the discipline in relevant research field and that has provided a strong theoretical base. The 9 constructs in the instrument are based on the technology acceptance model and literature review in IS/IT acceptance behavior.

Construct validity refers to the extent to which an item can actually measures the theoretical structure and characteristics, or it refers to the degree to which a test score can explain a certain structure or trait of a psychological theory, it emphasis on whether the items can work together to reflect the essence of the represented construct. There are generally two criteria for construct validity: convergent and discriminant validation. Convergent validity means that the measurements used to reflect constructs fall on the same common factor which the that are assumed to be theoretically associated. Convergent validity can be assessed by examining the estimates of the factor loadings of the measurements, the composite reliability (CR) and the average variance extracted (AVE) in a research instrument. Discriminant validity is tested by the estimates of the square root of the AVE for each construct.

From the table 6.4, the values of composite reliability (CR) and average extracted variance (AVE) satisfy the threshold value of 0.7 and 0.5 respectively, the results indicate reasonable internal consistency and the reliability of the research instrument, supporting the convergent validity of the data.

In this study, the test results show that most of the factor loadings of the measurement items in the research model exceed 0.7 (table 6.6). The 26 items short version of the scale

	rho_A	*Composite Reliability (CR)*	*Average Extracted Variance (AVE)*
Adoption Behavior	0.856	0.906	0.764
Adoption Intention	0.789	0.905	0.826
Effort Expectancy	0.873	0.912	0.722
Facilitating Conditions	0.727	0.838	0.633
Individual Innovation	0.762	0.889	0.8
Perceived Cost	0.901	0.921	0.854
Perceived Entertainment	0.944	0.964	0.898
Performance Expectancy	0.829	0.895	0.739
Social Influence	0.804	0.87	0.626

Table 6.4: Values of composite reliability (CR) and average extracted variance (AVE)

	Adoption Behavior	Adoption Intention	Effort Expectancy	Facilitating Conditions	Individual Innovation	Perceived Cost	Perceived Entertainment	Performance Expectancy	Social Influence
Adoption Behavior	**0.874**								
Adoption Intention	0.66	**0.909**							
Effort Expectancy	0.439	0.561	**0.85**						
Facilitating Conditions	0.573	0.55	0.683	**0.795**					
Individual Innovation	0.511	0.49	0.38	0.455	**0.895**				
Perceived Cost	0.259	0.131	0.062	0.245	0.297	**0.924**			
Perceived Entertainment	0.693	0.606	0.517	0.63	0.427	0.198	**0.948**		
Performance Expectancy	0.647	0.604	0.562	0.612	0.412	0.184	0.74	**0.86**	
Social Influence	0.601	0.647	0.597	0.628	0.486	0.269	0.625	0.641	**0.791**

Table 6.5: The correlations between the constructs

formed based on factor loadings was also noted to have satisfactory reliability and validity.

	Component								
	1	2	3	4	5	6	7	8	9
PE1				.584					
PE2				.742					
PE3				.560					
EE1	.670								
EE2	.780								
EE3	.786								
EE4	.823								
FC1									.685
FC2									.635
FC3									.650
SI1						.711			
SI2						.801			
SI3						.648			
SI4						.698			
II1					.812				
II2					.781				
POC1							.931		
POC2							.922		
POE1		.786							
POE2		.762							
POE3		.796							
AI1			.548						
AI2			.705						
AB1								.674	
AB2								.683	
AB3								.742	

Table 6.6: Rotated Component Matrixa

6.3 Empirical results of the research model

The proposed sports social APP adoption model was tested using the structural equation model(SEM), structural equations are a method of using the hypothesis test in statistics to analyze the theory. Combining factor analysis and path analysis, the relationship between model variables can be analyzed. Based on previous studies, the author proposes a research model for the influencing factors of consumer adoption behaviors of sports social APP. By running the SmartPLS software, the standardized regression coefficients and significance of each path of the model are obtained.

Path analysis as a statistical technique is used to analyze the relationship between observation variables in research model. Using the covariation between the measured variables, all parameters in the model are estimated at the same time, and in conjunction

with the specific hypothesis model or competition model proposed by the researcher, the suitability of the theoretical model and observation data is tested to find the best model. Path analysis results are shown in Figure 6.1 and Table 6.9.

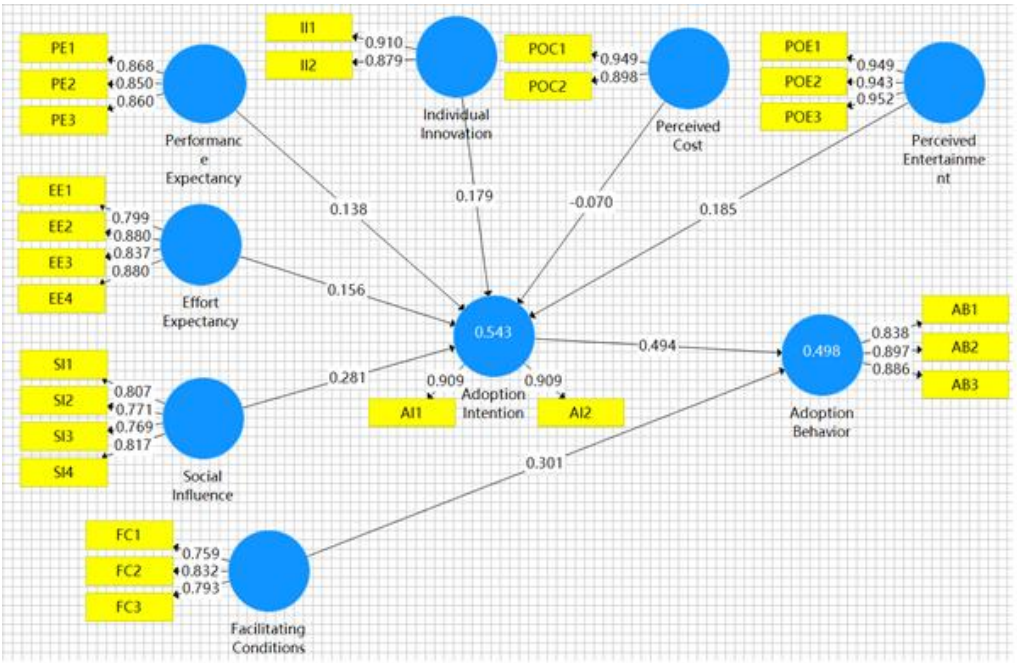

Figure 6.1: Sports social APP adoption model in SmartPLS

	Original Sample (O)	*Mean value*	*STDEV*	*t-value*	*P*
Adoption Intention -> Adoption Behavior	0.494	0.493	0.061	8.066	0
Effort Expectancy -> Adoption Intention	0.156	0.155	0.064	2.427	0.015
Facilitating Conditions -> Adoption Behavior	0.301	0.305	0.063	4.816	0
Individual Innovation -> Adoption Intention	0.179	0.178	0.058	3.088	0.002
Perceived Cost -> Adoption Intention	-0.07	-0.065	0.041	1.7	0.089
Perceived Entertainment -> Adoption Intention	0.185	0.185	0.087	2.132	0.033
Performance Expectancy -> Adoption Intention	0.138	0.134	0.071	1.944	0.052
Social Influence -> Adoption Intention	0.281	0.285	0.079	3.563	0

Table 6.7: Path analysis results

The empirical results in this part provide good support for some of the hypotheses in this study. Effort expectancy, social influence, facilitate conditions, individual innovation, perceived entertainment are supported as being positively related to user' adoption behavior of sports social software, while performance expectancy and perceived cost not supported as being related to it.

The analytical results show that effort expectancy (t=2.427, p¡0.05) positively affects user adoption intention of sports social APP, providing support for H2. social influence (t=3.563, p¡0.001) significantly and positively affects user adoption intention of sports social APP, providing support for H3. facilitating conditions (t=4.816, p¡0.001) significantly and positively affects user adoption behavior of sports social APP, providing support for H4. individual innovation (t=3.088, p¡0.05) positively affects user adoption intention of sports social APP, providing support for H5. perceived entertainment (t=2.132, p¡0.05) positively affects user adoption intention of sports social APP, providing support for H7. adoption intention (t=8.066, p¡0.001) significantly and positively affects user adoption behavior of sports social APP, providing support for H8.

However, H1 and H6 are not supported according to the analytical results, indicating that performance expectancy (t=1.944, p¿0.05) and perceived cost (t=1.7, p¿0.05) are not significantly related to users' adoption intention.

Thus, in this study, effort expectancy, social influence, individual innovation, perceived entertainment were found to have positive effects on user adoption intention of sports social applications, these factors account for 54.3% of the variance(table 6.8) ,facilitating conditions and adoption intention have directly positive effects on user adoption behavior of sports social applications and account for 49.8% of the variance (table 6.8) Table lists a summary of the structural parameter estimates and the test results of the hypotheses.

	R^2	R Square Adjusted
Adoption Behavior	0.498	0.495
Adoption Intention	0.543	0.534

Table 6.8: The connections between the antecedents to adoption behavior

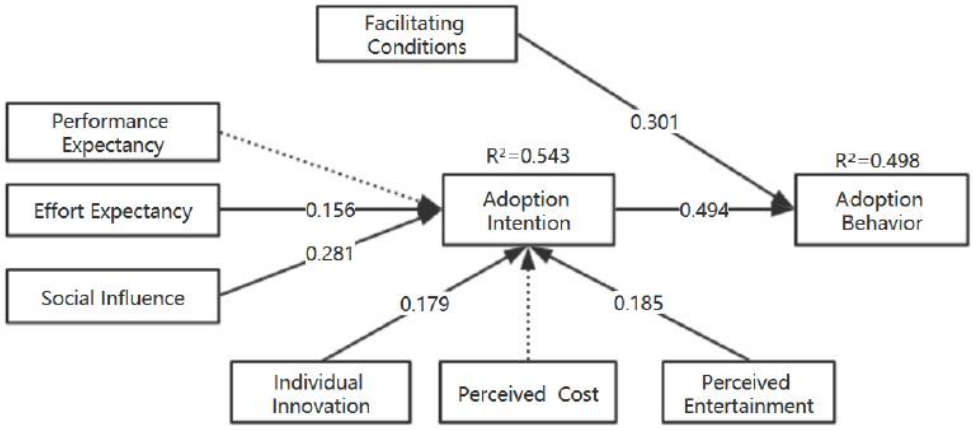

Figure 6.2: Structural analysis of the research model

Hypotheses	*Path*	*P*	*t-value*	*Results*
H1	Performance Expectancy -> Adoption Intention	0.052	1.944	Not supported
H2	Effort Expectancy -> Adoption Intention	0.015	2.427	Supported
H3	Social Influence -> Adoption Intention	0	3.563	Supported
H4	Facilitating Conditions -> Adoption Behavior	0	4.816	Supported
H5	Individual Innovation -> Adoption Intention	0.002	3.088	Supported
H6:	Perceived Cost -> Adoption Intention	0.089	1.7	Not supported
H7	Perceived Entertainment -> Adoption Intention	0.033	2.132	Supported
H8	Adoption Intention -> Adoption Behavior	0	8.066	Supported

Table 6.9: The test results of the hypotheses

Chapter 7

DISCUSSION

This chapter presents further discussion based on the empirical results. First, it summarized the research findings. Then, both theoretical and practical contributions are discussed. Finally, the limitations of the current study are discussed, including shortcomings and prospect.

7.1 Summary of the research findings

After path analysis and hypothesis testing, of the 8 hypotheses proposed in this paper, 6 are proved supported and 2 are not. The specific analysis of the factors that influence the intention and behavior of users' adoption of sports social software are as follows.

In this study, the UTAUT is employed to assess individuals' acceptance and use of sports social applications and further clarified the relationship among the constructs. First of all, when three out of the four constructs of the UTAUT model (i.e. effort expectancy, social influence and facilitating conditions) are related to the people's behavioral intention as well as their time involvement and frequency of use. it shows that individuals' belief in easiness, their encouragement from social members and necessary environmental resources effect their acceptance of the technological tool.

H1: Performance Expectancy is not proved to have salience impact on people's use

of sports social APP in this study, in previous study, this factor is always conducted in the context of work environment, people use information system to gain benefit for work which is different from the environment in this study.H2: Effort Expectancy influences users' adoption intention of sports social applications positively. It means the simple operation process of sports social APP makes users easier to be skillful of the software, which provide with good user experience without much learning cost, then users have stronger willing to use sports social software. The result is consistent with previous research findings on the UTAUT model.H3: Social Influence influences users' adoption intention of sports social applications positively and significantly. The empirical analysis results show that the social influence has a greater effect on the users' willingness to use the sports social APP that other variables, that is, when sports social APP are more popular among relatives and friends in users' social circle, the use intention will enhance. This result also is consistent with previous research findings on the UTAUT model, that is, there is a positive effect between social influence and use intention, because users are in a social environment where many behaviors are easily affected by other people. If people around a sports fan are delivering positive information on the sports social APP, he may attempt to use it. Conversely, if people around are delivering negative information, it will cause users to have a bad impression on the product and greatly reduce the user's desire to use it. H4: Facilitating Conditions users' adoption behavior of sports social applications positively. In this study, we learned that the facilitating factors have positive effect on the use intention. facilitating conditions refer to the extent to which the external conditions that are objectively present in the surrounding environment support user behavior, such as compatibility of devices, support of networks, and so on. Sports social APP use experience involve influences of surrounding environment in many aspects, the function of mobile devices, fluency of attached smart devices and networks.

Moreover, two out of three antecedents are proved to have impact on use behavior. H5: Individual Innovation influences users' adoption intention of sports social applica-

tions positively. Sports social software integrates information technology, Bluetooth technology, GPS technology with sports and exercise. It changes the traditional way of doing exercise or play sports, enables sports fans to acquire sports-related resources from various way by modern technologies. Information technology is one of the prerequisites. Individuals with innovative and creativeness dare to try new things, apply new technologies, and broaden their access to sports information resources. Therefore, individual innovators have more intention to use sports social software.H7: Perceived Entertainment influences users' adoption intention of sports social applications positively. This assumption has been fully validated. As a kind of mobile service, sports social software can effectively increase the number of users if it allows users to feel different pleasures from traditional boring sports. Therefore, from the user's point of view of use, from the software's appearance to all aspects of the function, enhancing the entertainment of the software has become an effective means for merchants to enhance their competitiveness.H6: Perceived Cost influences users' adoption intention of sports social applications negatively. This assumption was not verified in the research. This is because the basic functions of the software are all free. At the same time, technological innovations and the combination of Bluetooth and GPS technologies have greatly saved the data and power consumption. Therefore, from the user's point of view, the software can be brought into a state of zero consumption or low consumption. so perceived cost have not become a determinant of the use intention

7.2 Contributions and implications

7.2.1 Theoretical contributions

The research findings offer insights into the factors influencing consumers' behavioral intention to adopt sports social applications. The key point of this study is not to consider unilaterally how to improve information services, but to shift the perspective to

the logical way of user's information behavior research. In information activities, users' initiative is valuable and worthy of study. This article follows the inherent laws of user information behavior, starts with the analysis of the internal process of user information behavior, and gradually develops the logical framework for research. It builds and validates the comprehensive model of technology acceptance established by Venkatesh et al. (UTAUT), which makes important contributions in information technology acceptance research in the field of sports community.

The emergence of sports social software is another breakthrough in the rapidly development of mobile services field. On the one hand, it breaks the traditional way of exercise and fitness and brings more entertainment to the sport. On the other hand, the scientific way of recording improves the efficiency of sports. Many company have seen business opportunities and have launched sports social software. Many of them are similar with some functions, but each has its own advantages and breakthroughs. However, what factors have a greater impact on users' adoption attitudes to use, and what innovations can improve user experience remains to be resolved. Based on this kind of thinking, this paper selects sports social software to adopt the as the research object. After reading the previous studies of literature, a model synthetized research model is put forward.

7.2.2 Practical implications

This study helps sports social application providers to identify who is positive toward their services and how to improve consumers' perceived value of the services, eventually expanding their user base. Based on empirical research, the following management suggestions are proposed for the hypothesis verification.

First, enhance and enrich software function to increase user experience especially entertainment. Studies show that perceived entertainment has positive impact on use intention, so software's ease of use is a fundamental competency. The users of the survey showed great enthusiasm for offline activities. Some software combined sports matches

with the O2O model which brings exercise with pleasure to increase users number. Thus, how to enrich the function of sports social software, build stronger entertainment and sociality are the key to prompting users to continue using.

Secondly, it recommends to expand user groups determine the potential customer groups. According to empirical research results, individual innovation plays an important role on the use intention. In the software promotion process, not all users tend to use. In the initial stage of promotion, we should focus on selecting some customers who have a strong ability to accept new technologies and use them as target customers, and then gradually expand the scope of users and gradually develop them through the methods recommended by acquaintances. For example, it is recommended that 3 users register to use the method of earning points to develop more users.

Moreover, the empirical results of this research show that social factors can have a positive impact on the use of the service. This is because people are in the society and they have certain social needs. Therefore, they are also affected by their social circle. When more people around us talk about or use a certain product, they will be affected accordingly in the environment, which will affect their willingness to use. To address this situation, the software team should formulate appropriate advocacy strategies, provide high-quality user experiences, make them feel good in the hearts of users, and spread word-of-mouth to gain more support from users. let more people use the product.

Finally, improve the operation process to stratify user's effort expectations. Through research, we found that users' intention to use is positively related to their efforts. Therefore, the enlightenment for sports social applications is that they make it easy for users to get started. In practical applications, the software team can enhance the design of the interactive interface, such as beautifying the visual interface, simplifying the operation process, and making the interface and interaction more humane; The speed of response and feedback methods will affect the user experience, so speeding up the system response can also improve the user's operating experience.

7.3 Limitations and suggestions for further studies

This study establishes sports social software users' adoption model based on the study results of scholars, then uses scientific analysis methods of empirical research to analyze the model and hypothesizes. In this study, including research design, questionnaire survey, data collection, and verification analysis, each step follows the principles of empirical study strictly, uses professional data analysis tools, and obtained certain research results. However, this study inevitably has some limitations on research.

From the perspective of model construction, the hypothesis model of this study is based on the UTAUT model, then developed and innovated. the model integrates the features of sports mobile internet service and social media and then constructed with nine variables. The deficiency is that these variables are all unidimensional factors, the lack of analysis and explanation of the antecedent variables weakens the explanatory power of the model and leads to the incompleteness of the model. In the future research, some external variables can be appropriately added to the model to explore the factors affecting the user's use of sports social applications from multiple perspectives.

From the perspective of sample selection, the questionnaires of this study are distributed online and are mainly filled by users of friend circles and professional questionnaire websites, sports and exercise is kind of public activities and is popular among universal public which set low threshold to the sample selection, but the source of the sample is slightly monotonous, and the virtual nature of the network also influence the quality of questionnaire. because of the constraints of research funding, the number of valid questionnaires collected in this study is relatively small, it may affect the accuracy of the data analysis results. so there were still some limitations in the representativeness of the sample, the universality of this research has yet to be strengthened.

This section will address the above issues and propose future research perspectives. Specifically, based on the study of this article, the author believes this study could involve in-depth study from the following two aspects.

Firstly, research variables could be expanded in many ways, the hypothesis model established in this paper contains nine major variables. However, in practical applications, it is far more than these factors that influence people to make behavioral decisions. In the future expansion studies, independent variables should be selected and examined more extensively to perfect the research model as much as possible. At the same time, the user's gender, age, experience and other factors can also be used as control variables for in-depth study. It is possible to innovate on the basis of theory and enrich the relevant set of influencing factors through the introduction of new research perspectives. In the subsequent relevant research, other classification variables or more levels of classification methods can also be considered to deepen the existing research results.

Moreover, the process of questionnaire design and answering directly affects the quality of measurement data. A verified questionnaire with good reliability and validity plays an important role in the research work. In order to conduct a more comprehensive study of user behavior, a wider range of users should be included in sample selection. the research object is sports social applications, there are few cases of online and offline interviews with qualitative analysis except the questionnaire analysis. the research method can be richer.

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Appendix A

Questionnaire in English

Research on individuals' acceptance of sports social app

I am a student from School of Economics, University of Turku, Finland. Now I am studying the users' adoption behavior of sports social apps. It takes you a little time to complete the following survey. This questionnaire is an anonymous survey. The results of the questionnaire are only used for dissertation research and are not used for other purposes.

Sports social refers to the social characteristic of sports. Both include basic sports data records, but also provides sports-related social interaction, sharing and other services. And sports social applications refer to mobile apps that provide sports social services. Your experience and feelings are very important to this research. Please answer according to your actual situation and ideas. Thank you very much for your support and help in my work!

Part1

1. What is your gender ? *

○Male ○Female

2. What is your age? *

○Under 18 ○18-24 ○25-35 ○36-40 ○Above 40

3. What is your exercising or fitness experience? *

○1-2 years ○3-5 years ○6-10 years ○More than 10 years ○Seldom do exercise

4. How often do you do exercise? *

○More than five times per week ○3-5 times per week ○1-2 times per week ○1-2 times per month ○Never do exercise

5. What is your usage experience of sports social APP? *

○Less than one year ○1-2 years ○3-5 years ○More than 5 years ○No experience

6.How many hours do you use sports social applications every week?

○1-5h ○5-15h ○15-20h ○20-25h ○more than 25h

7. How often do you use sports social applications? *

○Everyday ○2-3 times per week ○4-5 times per month ○2-3 times per month ○Seldom

Part2

For the following items, please select your degree of recognition according to your feelings and situation in the description of the following questions, and choose the option that best suits your wishes.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
PE1: I find sports social APP useful in my daily life.	○	○	○	○	○
PE2: Using sports social APP helps me accomplish things more quickly.	○	○	○	○	○
PE3: Using sports social APP increases my productivity.	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
EE1: How to use sports social APP is clear and understandable.	○	○	○	○	○
EE2: It is easy for me to become skillful at using sports social APP.	○	○	○	○	○
EE3: I find sports social APP easy to use.	○	○	○	○	○
EE4: Learning how to use sports social APP is easy for me.	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
SI1: If people who are	○	○	○	○	○

important to me use sports social APP, I will use ports social APP					
SI2: If people who influence my behavior use sports social APP, I will use ports social APP	○	○	○	○	○
SI3: I think many friends in my circle use sports social APP	○	○	○	○	○
SI4: I think many of my friends will continue to use sports social APP in the future	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
FC1: I have the resources necessary for using sports social APP (mobile phones, networks, smart wearable devices, etc.)	○	○	○	○	○
FC2: Sports social APP is compatible with other technologies or software I use.	○	○	○	○	○
FC3: If there are problems and difficulties when use sports social APP, I can get help from the software.					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
II1: I am a person who likes to do all kinds of new attempts	○	○	○	○	○
II2: Among my peers, I am often the first person to try new technologies	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor	Agree	Strongly agree

			disagree		
PC1: Expenses related to sports social APP (such as: data expenses, wearable sports equipment, etc.) are very expensive for me	○	○	○	○	○
PC2: The transaction costs (such as time cost, information search cost etc.) required for sports social APP use are very high	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
PEN1: Use Sports Social APP enrich my social networking when doing sports.	○	○	○	○	○
PEN2: Using sports social APP bring me with pleasure.	○	○	○	○	○
PEN3: I enjoy using sports social APP when I do sports	○	○	○	○	○
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
AI1: I intent to try sports social APP for sports	○	○	○	○	○
AI2: I intent to recommend sports social APP to people around me	○	○	○	○	○

Appendix B

Questionnaire in Chinese

运动社交类 APP 用户采纳行为研究

尊敬的用户：

我是芬兰图尔库大学经济学院信息管理专业的学生，现在我正在进行运动社交类 APP 用户采纳行为的研究，需要您花费一点时间完成下面的问卷调查。本问卷采用不记名调查，问卷结果仅用于学位论文研究，不做他用。

随着运动热兴起，可以发现朋友圈有越来越多的好友晒运动，同时也有越来越多运动 App 应运而生，运动社交类 APP 是指将运动健身与社交功能结合在一起的 APP，例如：咕咚、乐动力、悦跑圈、keep 等等。人们利用运动社交类 APP 可以追踪分享运动路线，邂逅运动好友，发现运动资讯，还可以在线进行视频直播，参加或围观各种运动比赛。

您的经历和感受对本研究至关重要，请根据您的实际情况和想法作答。十分感谢您对本人工作的支持与帮助！

1. 请问您的性别是？ [单选题] *

○男 ○女

2. 您属于哪个年龄段？ [单选题] *

○18 岁以下 ○18-24 岁 ○25-35 岁 ○36-40 岁 ○40 岁以上

3. 您的运动健身经验是？ [单选题] *

○1-2 年 ○3-5 年 ○6-10 年 ○10 年以上 ○几乎不运动健身

4. 您参加体育锻炼的频次为？ [单选题] *

○5 次以上/周 ○3-5 次/周 ○1-2 次/周 ○1-2 次/月 ○从不锻炼

5. 您使用运动社交类 APP 的经验是？ [单选题] *

○少于一年 ○1-2 年 ○3-5 年 ○大于 5 年 ○无经验

6.您一周使用运动社交类 APP 的时间是？

○1-5 小时 ○5-15 小时 ○15-20 小时 ○20-25 小时 ○大于 25 小时

7. 您使用运动社交类 APP 的频率是？ [单选题] *

○每天 ○2-3 次/周 ○4-5 次/月 ○2-3 次/月 ○偶尔使用

第二部分

针对以下题项，请根据您的感受与自身情况对以下各题中的描述选择您的认同程度，选择最符合您意愿的选项打勾

8. 绩效期望

	非常不同意	不同意	不确定	同意	非常同意
PE1:我发现运动社交类APP在我的生活中很有用（如:记录分享运动情况，获得运动建议，寻找教练或运动好友，参与线下活动等）	○	○	○	○	○
PE2:使用运动社交类APP使我更好地达到运动健身效果	○	○	○	○	○
PE3:使用运动社交类APP可以提高我的效率	○	○	○	○	○

9. 努力期望

	非常不同意	不同意	不确定	同意	非常同意
EE1:如何使用运动社交类APP是清楚和可理解的	○	○	○	○	○
EE2:我很容易就可以熟练地掌握运动社交类APP的使用方法	○	○	○	○	○
EE3:我发现运动社交类APP很容易使用	○	○	○	○	○
EE4:学习如何使用运动社交类APP是很容易的	○	○	○	○	○

10. 社群影响

	非常不同意	不同意	不确定	同意	非常同意

SI1:对我有影响的人（如：同学，同事，家人，朋友）如果在使用运动社交类APP，我也想去尝试使用	○	○	○	○	○
SI2:对我重要的人（如：同学，同事，家人，朋友）如果在使用运动社交类APP，我也想去尝试使用	○	○	○	○	○
SI3:在我的生活圈子里很多人都在用运动社交类APP	○	○	○	○	○
SI4:我认为我身边的许多朋友今后还会使用运动社交类 APP	○	○	○	○	○

11. 便利条件

	非常不同意	不同意	不确定	同意	非常同意
FC1:我有使用运动社交类APP 的条件（手机、网络、可穿戴设备等）	○	○	○	○	○
FC2:运动社交APP与其他软件兼容	○	○	○	○	○
FC3:在运动社交类APP的使用过程中，若出现问题和困难，我能得到软件方的帮助。					

12. 个体创新性

	非常不同意	不同意	不确定	同意	非常同意
II1:我是喜欢做各种新的尝试的人	○	○	○	○	○
II2:在同龄人当中,我经常	○	○	○	○	○

是先去尝试新技术的人					

13. 感知成本

	非常不同意	不同意	不确定	同意	非常同意
PC1:与运动社交类APP有关的费用（如：流量费用、可穿戴运动设备等）对我来说很昂贵	○	○	○	○	○
PC2:使用运动社交类APP所需的交易成本（如：时间成本、信息搜寻成本，精力等）是很高的	○	○	○	○	○

14. 感知娱乐

	非常不同意	不同意	不确定	同意	非常同意
PEN1:使用运动社交类APP丰富我的社交运动生活	○	○	○	○	○
PEN2:使用这种运动社交类APP让我觉得更快乐	○	○	○	○	○
PEN3:总之，我很享受运动时使用这种软件	○	○	○	○	○

15. 使用意愿

	非常不同意	不同意	不确定	同意	非常同意
AI1:如果有机会，我愿意尝试运动社交类APP	○	○	○	○	○
AI2:如果有机会，我会向周围人推荐运动社交类APP	○	○	○	○	○