

# A Study of Behavior Intention of Runners' Virtual Community

## The Case of Marathon's World Website

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**Abstract**—According to the World Health Organization (2015) statistics, the population of today's global obesity has already doubled since 1980, the number nearly doubled. World Health Organization also estimates that depression, along with cancer and AIDS, will be the three major diseases in the world. It can be seen that in modern society, we need to focus more on people's physical and mental health. Moreover, moderate exercise on a regular basis can strengthen the body function, enhance the physical and mental health, and has positive impact on disease prevention, rehabilitation and weight control. Wherein jogging for physical and psychological improvement can have great help, will also enhance the quality of life. Governments around the world have held various road running events. With support of the government of and promotion of the enterprise, the road running atmosphere in Taiwan is growing year by year.

Since the rising atmosphere of road running, there are various website about road running around the world. In this study, the research object is the road running platform of Taiwan's largest virtual sports community website called "Marathon's World". The basic model of this study is based on integrated technology acceptance model (UTAUT) proposed by Venkatesh, Morris, Davis and Davis (2003). In this study, 276 valid questionnaires were collected and analyzed for data compilation. The results indicates that among the original model of UTAUT, almost every facets of the assumptions are tangible, except for the impact caused by Facilitating Conditions among User Behavior remains not significant. The impact on behavioral intention caused by the added new variable - sense of community in the performance expectancy and expectation of payment categories were different; and different levels of condensation of a sense of community may result in variation of User Behavior influenced by Facilitating Conditions. The results of this study can provide the same type of reference to build and promote the site in the future and hoping to promote exercise habits and sports atmosphere by enhancing the cohesion of the road running virtual platform community. In order to have a positive impact on the national health.

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### I. INTRODUCTION

A report of World Health Organization (WHO) in 2015 indicates that since 1980, world growth in the number of obesity has nearly doubled. According to statistics, in 2014, there were more than 1.9 billion adults over 18 years old (39%) are overweight, of which 600 million (13%) reached the qualification of obesity. Overweight and obesity may lead to cardiovascular disease, musculoskeletal disorders and certain

cancers, for which there is great harm to human health. However, obesity and overweight can be prevented. People can prevent overweight and obesity by choosing healthy food and engaging regular physical activities [1].

In addition to the viewpoint of physical health, exercise is also beneficial to mental health. The World Health Organization have predicted that by 2020, depression, along with cancer and AIDS, will be the three major diseases in the world. A survey conducted by John Tung Foundation in 2015 also forecasted that one in every five teenagers in Taiwan under significant depressive mood on average, who requires professional mental health intervention [2]. Regularly engaged in regular and moderate exercise can have great effects on strengthening the body function, physiological and psychological health, disease prevention, weight control and mortality reduction [3]. According to Taiwan's "National Health Department", appropriate physical activity can not only reduce the risk of cardiovascular diseases and chronic diseases, enhance physical and mental health, but also can reduce the risk of fractures, osteoporosis, weight control and maintaining youthful vigor.

Given previous research, Taiwanese government values the importance of promoting public leisure activities and enhancing the quality of life of people more. However, among many sports, jogging has great benefits on improving mental, physical conditions and the quality of life [4]. At present, by the promotion conducted by both governmental and nongovernmental organizations, the number of road running tournament held in Taiwan gradually has reached 520 times and over 1.5 million participants attended by 2014. However, to be able to continue to promote healthy road running events, apart from providing the public with correct knowledge of road running, a platform which provide sport products and running events discussion for runners' participation and sharing is also very important. As a result, there have been many "Road Running Community Websites" on the Internet to provide platforms for runners to communicate and share the experiences of running. They also provide individual sport history records and statistics to help users set goals and exercise programs.

Wenger, McDermott and Snyder (2002) considered that the virtual community is not just a website, forum or staging database, but an interaction of a group, which builds a close and linked relationship by interaction, share information with

common feelings, and develop a sense of belonging and mutual commitment through the process [5]. According to the previous studies, when the community develops to a certain stage, the Sense of Community (SOC) will be emerged. The concept of SOC proposed by McMillan and Chavis (1986) contains four facets: membership, influence, integration and fulfillment of needs and shared emotional connection. Membership stands for the community's sense of belonging and identity; influence stands for being affected by communities or affect other community members; integration and fulfillment of needs is the feeling of community supports and supporting community; shared emotional connection is to share their experiences, feelings and opinions [6]. The virtual community environment would also generate a sense of virtual community. Therefore the researchers believe that Sense of Virtual Community has personal differences, which may affect the users' Behavioral Intention and Behavior towards virtual community platforms.

The current study selected a website called Marathon's World (MW) as the research platform. The reason for choosing this platform is due to its professional virtual community platform. It has the number of users among Taiwanese runners, the function of road running information is relatively well-structured, and has high reputation. In this study, Unified Theory of Acceptance & Use of Technology (UTAUT) is conducted to exam MW members' Users Behavioral Intention and User Behavior towards this platform. Sense of Virtual Community is added as one of individual difference variables to explore the impacts of Behavioral Intention and User Behavior caused by Sense of Virtual Community.

## II. LITERATURE REVIEW

### A. Road Running

According to the data from the US Road Running Association in 2013 indicated that from 1990 to 2011, the country's long-distance road runners increased by 270% [7]. On the basis of the statistics run by the note from a list of sports events of Taiwan's road running events (excluding Iron Man project), the number of road running events is increasing from 168 in 2012, 282 in 2013, to 520 in 2014. There were one or two races held on the daily average [8]. The booming number of road running events and participants curve is amazing, with an estimated average number of 3,000 to 5,000 participants per race. The actual population who participated in running activities in 2015 is around 1.5 to 2.6 million. From the magnitude of the growth of annual events and the number of participants, it is clear that road running has become a popular movement. Road running is not only a sport which requires endurance, it can also cultivate personal perseverance and willpower, and enhance the individual's thinking ability [9].

Since the rising atmosphere of road running, there are various domestic and foreign road running-related sites. However, information and functions provided by each site are different. Marathon's World (MV) is the most versatile road running site in Taiwan, and MV also launched its own brand of GPS watches to encourage users to record and upload

personal sports statistics. For number of users, MV has the most number of users who participated history recording among road running websites in Taiwan. In December 2014, about 1,000 people's monthly run accumulated were over 200 kilometers, while there were more than 10,000 people's monthly run accumulated over 20 kilometers[10]. Therefore, this study will explore the Behavioral Intention and User Behavior of Roadrunner users of Marathon's World.

### B. Virtual Community

The concept of Virtual Community was first proposed by the Rheingold (1993) [11]. Rheingold believes that virtual community is a social aggregate, which has sufficient number of participants conducting adequate and long-term exchange and sharing, that generates group in cyberspace where its relations can be maintained in the network group. Schubert (2000) pointed out that through electronic media; virtual communities have a mutual understanding of the usage of language network to exchange experiences and interests, which creates linkage between individuals and groups. Furthermore, there is no restriction of time and space [12]. Wenger, McDermott and Snyder (2002) consider that the virtual community is not just a website, forum or a staging database, but a group of human interaction [5]. Build close relationship by interactions, share information and common feelings, and develop a sense of belonging and mutual commitment during the process.

By the definition of the above virtual community, Marathon's World (MW) not only is a professional road running information website, it also has personal "sports history", "World Ranking" and "my friends" and other information to share with Forums. It designed many interactive elements and comparisons to unite enthusiasts and arouse incentives to increase the individuals' Behavioral Intention. As a result, besides being a professional road running information website, it is also a virtual community website for the rally enthusiasts.

### C. Sense of Virtual Community

The concept of a sense of community originated in 1974, Sarason believes that a sense of community is: "the perception of similarity to others, an acknowledged interdependence with others, a willingness to maintain this interdependence by giving to or doing for others what one expects from them, and the feeling that one is part of a larger dependable and stable structure "[13]. Afterwards, there are many scholars describe and define sense of community, and extend the application. Wherein, the most widely discussed one is the concept proposed by McMillan and Chavis (1986), the concept of sense of community consists of four facets [6]:

- Membership: identity and sense of belonging to the community
- Influence: affected by the community, or affect other community members
- Integration and fulfillment of needs: the feeling of community supports and supporting community
- Shared emotional connection: share their experiences, feelings and opinions

However, virtual community in cyberspace also creates a virtual sense of community. Blanchard and Markus (2004) to McMillan and Chavis (1986) proposed the concept of virtual community that the group should include awareness and membership, integration and meet the needs and emotions to share. Afterwards, with the popularity of those networks, there are many researchers explored virtual sense of community in online game [14]. Su (2006) found that online games have a positive impact on users' Behavioral Intention by the impact of community-related sense of belonging, influence and immersion [15]. Hu (2012) found that a virtual sense of community has a positive effect on the behavioral intention of the user who operates the mobile games [16]. Chen (2012) also pointed out that a sense of community has a positive influence on online gaming addiction and happiness, which indicates that when players participating in online game, they tend to communicate, interact and discuss with teammates instead of playing alone [17].

In addition to exploring the virtual sense of community in online games, researchers also found that sense of virtual community of Facebook has a positive impact on site members' loyalty in the virtual community websites while exploring the virtual social networking websites [18]. The virtual sense of community and interactive level of the community have highly positive correlation [19]. In addition, the studies in sport community website also indicates that the behavior of community members' participation and the formation of a sense of community within the website have a positive relationship [20]. The composing elements of sense of community have a significant positive relationship with the members' behavior of adhesion and reputation degree [21]. The above study have indicated that sense of virtual community, whether directly or indirectly, are indeed influence on the behavioral intention of users.

Virtual community and real-world community is not exactly the same. Since the virtual community has many factors and situational characteristics that are different from the actual face-to-face communities, the past scale of the sense of community cannot be fully applied to the virtual ones [22]. Blanchard (2007) proposed a revised index of measuring virtual sense of the community (Sense of Virtual Community Index, SVCI) by using past scale of the sense of community as foundation. After executing statistical analysis on virtual community, Blanchard found that the measuring index of the virtual sense of community is indeed an indicator with higher validity, and be able to represent the consciousness of virtual community more [23].

McMillan and Chavis (1986) divided the sense of community into four categories: membership, influence, integration and fulfillment of needs and shared emotional connection [6]. This study refers to the concept of McMillan and Chavis (1986) by dividing Blanchard (2007) proposed SVCI into four categories: sense of belonging, trust, mutual assistance, friendship, and explore the usage of Sense of Virtual Community Index [19].

#### D. Unified Theory of Acceptance and Use of Technology

Many researchers proposed different treatises about the occurrence of what affect actual behavior. In the study of

information model proposed by Lu, Lin, Lo and Wu (2012), they summarized and integrated similar theory and research methods into five research schools: customer satisfaction theory, behavioral intentions theory, structural theory of action, innovation diffusion theory and genres adaptation theory [24]. Wherein the behavioral intention refers to a person's subjective judgment of the tendency of possible future actions [25], behavioral intentions originated in social psychology, which means the relationship among attitudes, intentions and behavior.

Venkatesh, Morris, Davis and Davis (2003) found that the previous theories and models have their own advantages and disadvantages [26]. Therefore, they tried to combine these theoretical models, integrate the past eight technology usage behavior theory models about behavioral intention and acceptance of technology-related information, including Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology acceptance model (TAM), Motivation Model (MM), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT). After analysis and discussion, they proposed integrated technology acceptance model (Unified Theory of Acceptance and Use of Technology, UTAUT).

Venkatesh et al. Unified Theory (2003) proposed Acceptance and Use of Technology (UTAUT), which integrated previous theoretical model into four Core Determinants and four Moderators. Four main facets are: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC); and four interference variables are: gender, age, experience, voluntariness of use [27].

UTAUT integrated the different schools of technology acceptance theory in the past. Therefore it has been widely quoted by researchers in recent years. Through the display on empirical research, the explanatory power of UTAUT on User Behavior of science and technology is up to 70%, which is more effective than any previous model [28]. Therefore, this study adapts UTAUT as the base of proposed model in order to explore the science and technology user acceptance of road running virtual community platform.

### III. METHOD

#### A. Proposed Model and Research Hypothesis

In this study, UTAUT is the base of proposed model. In addition, the Sense of Virtual Community is added as an individual difference factors, and serves as one of confounding factors for the models. In the original UTAUT interference variables, they are defined as the experience of such technology platform. However, the researchers believed that in addition to experience outside of the platform, road running experience would also have an impact on User Behavior. Therefore, an interference variable called running experience is also added. However, researchers believed that the user of "Road Running Community Website" is all interested in the sport which they are participated in. User Behavior should be all voluntary. Thus, in this study, the original interference variable of UTAUT's voluntariness of use will not be

discussed. Research Hypothesis and proposed model of this study are shown in Figure I.

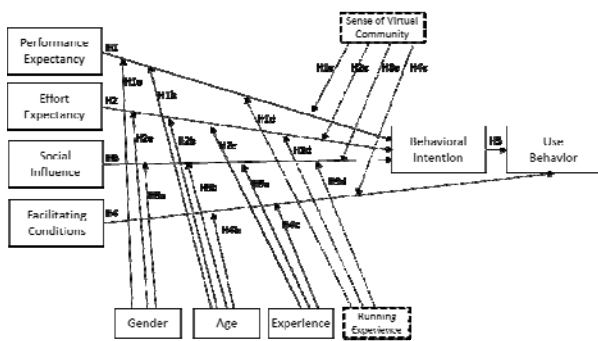


FIGURE I. RESEARCH HYPOTHESIS AND PROPOSED MODEL OF THIS STUDY

B. Questionnaire

In this study, original UTAUT questionnaire proposed by Venkatesh et al. (2003) is modified for suitable questions about "Road Running Community Website" to explore the user's intent. The original experience questions are copied and modified into running experience questions to explore this interference variable. Furthermore, the Virtual Community Index (SVCI) proposed by Blanchard Sense (2007) is adapted as the foundation of basic questions of Sense of Virtual Community. Researchers collected 70 valid questionnaires for the pre-test in order to build the reliability and validity of the questionnaire. After conducting the reliability and validity analysis factor analysis and correlation analysis on pretest questionnaire, 1 question of Performance Expectancy, 1 question of Social Influence, 2 questions of Facilitating Conditions, 4 questions of sense of community to question, a total of eight questions was deleted in order to achieve better quality and validity of the questionnaire. The official questionnaire contains 57 questions in total. It meets with the standard of statistical reliability and validity of the standard value.

IV. RESULT AND DISCUSSION

In this study, the official questionnaire is performed online, a total of 383 questionnaires were collected, of which a total of 276 valid questionnaires (response rate 72.1%). According to basic data analysis, participants in this study are mostly males (221, 80.1%); the age between 20 to 29 is the most (177, 64.1%); the major usage time of Mara World Web is six months (105, 38.0%); the major running age of the users is between 6 months and 1 year (118,42.8%), and 1 to 3 years (106, 38.4%); the major use frequency of the site is once a week (138, 50.5%).

TABLE I. THE PATH ANALYSIS OF THE PROPOSED MODEL

Hypothesis <sup>a</sup>	Path of Causal Relationship <sup>b</sup>	Standardized Coefficient <sup>c</sup>	T Value <sup>d</sup>	Significance <sup>e</sup>
H1 <sup>a</sup>	Performance Expectancy <sup>a</sup> → Behavioral Intention <sup>a</sup>	0.220 <sup>a</sup>	7.871 <sup>a</sup>	*** <sup>a</sup>
H2 <sup>a</sup>	Effort Expectancy <sup>a</sup> → Behavioral Intention <sup>a</sup>	0.534 <sup>a</sup>	15.737 <sup>a</sup>	*** <sup>a</sup>
H3 <sup>a</sup>	Social Influence <sup>a</sup> → Behavioral Intention <sup>a</sup>	0.244 <sup>a</sup>	8.482 <sup>a</sup>	*** <sup>a</sup>
H4 <sup>a</sup>	Facilitating Conditions <sup>a</sup> → User Behavior <sup>a</sup>	-0.018 <sup>a</sup>	-0.695 <sup>a</sup>	0.487 <sup>a</sup>
H5 <sup>a</sup>	Behavioral Intention <sup>a</sup> → User Behavior <sup>a</sup>	0.204 <sup>a</sup>	3.408 <sup>a</sup>	*** <sup>a</sup>

<sup>a</sup>p < 0.05 <sup>b</sup>p < 0.01 <sup>c</sup>p < 0.001

As for the test on research model, researchers adapted the most commonly used Maximum Likelihood (ML) analysis in Structural Equation Model (SEM) to conduct an overall mode adaptation analysis, via the estimation of parameters to validate the overall mode adaptation of adaptability and the degree of influence with the causal relationship between the dimensions. Then validate model assumptions proposed by this study whether possess sufficient explanatory power. The path of model analysis of this study is shown in Table I.

The table indicates that the research hypotheses proposed by this study is based on each facet of UTAUT's hypothesis, the influence Facilitating Conditions on User Behavior is not significant. The possible reasons are as follows: Marathon's World is a virtual community site, not a complex system of science and technology website. Under the current popular network environments, such sites which require the relevant knowledge, skills, equipment and other factors have no impacts on users' willing to use. In the inspection of interference variables, independent samples T test and one-way analysis of variance (ANOVA) were proposed to explore whether gender, age, experience and running experience, have significant impact on the hypothesis such as: Performance Expectancy, Effort Expectancy. And whether Social Influence has significant impact on Behavioral Intention (H1~H3), whether Facilitating Conditions has significant impact on User Behavior (H4), respectively. In the case of multiple comparisons, scheffe's method is conducted to perform post hoc comparisons, in order to learn more about the difference scenario.

For disturbance variables of Sense of Virtual Community, this study summarized Sense of Virtual Community into four categories: sense of belonging, trust, mutual assistance, friendship. Then we categorized participants into groups by using K-means Clustering algorithms during analyzing the official questionnaire. The result categorized participants into two groups: one with a low overall average in virtual sense of community and the lowest average in friendship, and the other with a high overall average in virtual sense of community and the highest average in trust, named as low friendship group and high trust group respectively. This study adapted these two groups for independent samples T test analysis. Researchers aggregated the entire research hypothesis and the results of interference variables in Table II.

TABLE II. RESEARCH HYPOTHESIS AND THE RESULTS OF INTERFERENCE VARIABLES

Interference Variables <sup>a</sup>	gender <sup>a</sup>	age <sup>a</sup>	Experience <sup>a</sup>	Running experience <sup>a</sup>	Sense of Virtual Community <sup>a</sup>
Path of Proposed Model <sup>b</sup>					
Performance Expectancy <sup>a</sup> → Behavioral Intention <sup>a</sup>	X <sup>a</sup> (H1a) <sup>a</sup>	X <sup>a</sup> (H1b) <sup>a</sup>	..	Middle>High, Low<(H1d) <sup>a</sup>	High>Low<(H1e) <sup>a</sup>
Effort Expectancy <sup>a</sup> → Behavioral Intention <sup>a</sup>	X <sup>a</sup> (H2a) <sup>a</sup>	High>Low<(H2b) <sup>a</sup>	High>Middle>Low<(H2c) <sup>a</sup>	Middle>Low<(H2d) <sup>a</sup>	High>Low<(H2e) <sup>a</sup>
Social Influence <sup>a</sup> → Behavioral Intention <sup>a</sup>	Male>Female<(H3a) <sup>a</sup>	Low>High<(H3b) <sup>a</sup>	High>Middle, Low<(H3c) <sup>a</sup>	Middle>High, Low<(H3d) <sup>a</sup>	X <sup>a</sup> (H3e) <sup>a</sup>
Facilitating Conditions <sup>a</sup> → User Behavior <sup>a</sup>	..	X <sup>a</sup>	Middle>Low<(H4c) <sup>a</sup>	..	High>Low<(H4e) <sup>a</sup>

(within the text indicates hypothesis number; X indicates not significant; . indicates that there was no such assumption)

According to the results of the above table, in terms of the category of Performance Expectancy towards Behavioral Intention, gender, age has no impact. The probable reason is

that since Marathon's World's functional mechanisms tend to enhance the knowledge and results of road running,. Therefore the impact caused by different gender and age is not significant. In terms of the category of payment expectancy for Behavioral Intention, gender has no significant impact, presumably due to the current environment based on the widespread of the web usage, the users generally possess the basic ability for web usage. Therefore, the differences in payment expectancy of the website caused by gender are not significant. In Social Influence on Behavioral Intention category, Sense of Virtual Community doesn't have significant impact either, the probable reason for that is because Sense of Virtual Community generated internally in virtual community, so there is no significant impact on others recommendations before the user joins the community.

In terms of running experience category, the analytical results indicates that runners with middle running age are being affected the most, compared with high and low ones. The possible reason for this is as follows: When a runner just participated in road running sports would want to seek for advancement and methods of passion and power for continuing. "Road Running Community Website" perhaps serves as one of the source to meet the demand. After achieving middle running age, the previous problem might have been solved. The runners have also developed road running as a habit, or even complete set up goals by self-discipline. Therefore, when the runners reach long running age, the impacts on each facet is less than the middle running age ones.

## V. CONCLUSION AND FUTURE RESEARCH

This study adapted UTAUT model as foundation and extended the model to explore the effect of "Road Running Community Website" and the usage of Behavioral Intention caused by which important factors. In this study, whether the virtual road running website be able to provide the necessary resources (Performance Expectancy), can be easily learned to use (Effort Expectancy) and be able to have recommendations (Social Influence), are important factors for influencing users' willing to use and user behavior of. The results can provide suggestions to the site builders with similar interests. Validation via interference variables indicates that the runners' interest towards "Road Running Community Website" started relatively high, but it would decline when the runners reach a certain road running age. The website users are mostly with basic road running experience, ranging from 1 year to 3 years. Thus, "Road Running Community Website" operators who wish to attract different running ages may need to provide other services. This section will be explored in the future research projects.

In addition, except for aiming on personal physical characteristics, this study also explore the Sense of Virtual Community as individual differences towards the usage intention of the "Road Running Community Website". The result also indicates that people with higher virtual sense of community does affect their intention to use. Therefore, for the builders and the operators of virtual communities, how to agglomerate the virtual sense of community is also an important issue. Given this study adapted questionnaires method to collect users' opinions, follow-up studies will add interviews with the actual road

runners' usage experience and suggestions for "Road Running Community Website". This study adapted Sense of Virtual Community as a factor for the starting point of studying individual differences, more different individual differences factors will be added in the future, such as Life Style, cognitive style, etc. The current study points to new possibilities for future research.

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