



**Analysis of Satisfaction and Reuse of Smart Health Trails with a Fitness App:
A Case Study of Yunlin County**

Huey-Yeh Lin¹ and Chien-Sa Wang^{2}*

^{1,2} Department of Finance, National Formosa University

Keywords

Smart Health Trails,
Fitness App, RFID System,
Satisfaction

Abstract

The Yunlin County government has implemented multiple walking trails within the region to support local aging and promote health. By integrating RFID technology with a mobile Application, the government aims to understand the preferences and satisfaction levels of residents, thus assessing the effectiveness of resource allocation. This study analyzes user interactions with the App while utilizing these trails. Data were collected through both online and physical surveys, yielding 441 valid responses, which were analyzed using SPSS statistical software. The findings indicate that higher ease of use and utility perceptions of the App correlate with greater satisfaction with the trails. Additionally, increased satisfaction is linked to a higher likelihood of future use of these health trails. Beyond optimizing resource allocation for the public sector, these results also provide valuable insights for expanding the App's adoption to other regions.

1. Introduction

Taiwan's aging issue is becoming increasingly severe. According to statistics from the Ministry of the Interior, Taiwan became an aged society in 2018, with a national average life expectancy of 79.84 years in 2022, exceeding the global average. It is projected that by 2025, Taiwan will enter a super-aged society. Among the counties, Yunlin County ranks third in the elderly support ratio and sixth in the aging index. Given the limited county resources and the rapid increase in the elderly population, assisting Yunlin County residents with healthy aging locally is a critical issue that the Yunlin County government urgently needs to address.

Following the lifting of pandemic restrictions, outdoor activities have resumed, and the Sports Administration announced in 2022 that the regular exercise population in Taiwan was 34%, while that in Yunlin County was only 30.4%, indicating a comparatively low regular exercise rate in the county. Regarding types of exercises, outdoor activities accounted for 81.6%, with people not only using mobile devices like smartphones and tablets to access exercise-related information but also utilizing wearable devices to enhance the benefits of physical activities.

*corresponding author. Email: wangchiansa@gmail.com

Thus, how to integrate information technology to assist the county's residents in regular exercise, enhancing their quality of life and promoting healthy aging, has become one of the key policies of the Yunlin County government.

Based on the core concepts of "aging in place" and "local learning", the Yunlin County government has implemented the "Yunlin Health Trail" initiative, constructing nine trails within the county. After establishing these trails, the county government lacked the ability to understand the usage of the trails and the popular features of the selected locations for these trails, which are crucial for the allocation of resources for future trail constructions.

To understand the usage of the originally established trails, the county government commissioned an IT team to install RFID systems on the trails and develop a fitness App. This App, connected through RFID technology to a cloud platform database, helps the county government understand the usage status of the "Smart Health Trails". It also integrates "Yunlin Coin" as a reward mechanism for trail users, thus enhancing the utility of the smart trails. By understanding the satisfaction of trail users with the fitness App, valuable information is provided for the construction and promotion of future smart trails. Increasing user satisfaction can enhance the intention to reuse the smart trails, thereby improving the effectiveness of the smart trails and enhancing the health and quality of life of the residents. Consequently, the purpose of this study is to explore the overall satisfaction with the trails after using the fitness App through the Technology Acceptance Model, focusing on the ease of use and usefulness of information technology, to understand the intentions for subsequent reuse.

2. Literature Review

In 2022, the Yunlin County government integrated local characteristics with the concept of healthy aging to promote the "Smart Health Trail" initiative. This involved selecting nine locations within the county to establish trails equipped with RFID technology and developing a free-to-download App, which was launched in 2023. The goal was to understand trail user preferences through the combination of RFID technology and software, optimizing the allocation of limited resources to continuously promote exercise habits and increase usage frequency. If successful, this initiative could be extended to other towns in the county and serve as a reference for other counties and cities. User satisfaction is a crucial factor influencing the success of this promotion. Regarding the Technology Acceptance Model (TAM) and satisfaction studies: Tsai (2012) used Davis's TAM to explore tourist satisfaction and usage intention of an RFID mountain rescue system. Chou and Lu (2014) also used TAM to investigate attitudes towards digital learning systems, while Yang (2016) employed the IS Continuance Model to study satisfaction and continued usage intention of nursing information systems. This study builds on these references to establish a research framework and analyze the satisfaction and reuse intention of the smart health trails.

2.1 Radio Frequency Identification (RFID) System

The RFID system has advantages such as long reading distance, small size, waterproof, high temperature resistance, and long lifespan. It offers large storage capacity and fast reading speed, making it highly efficient in interactive applications. Consequently, RFID technology is applied in various fields such as logistics, healthcare, and transportation.

2.2 RFID System and Fitness App Setup

The Yunlin County government commissioned an IT team to understand the usage of the smart trails. In addition to assessing their effectiveness, the government incentivized residents to exercise by distributing Yunlin Coins as rewards. The IT team applied the RFID system to the trails and developed a fitness App. Due to the varying environments and distances of each trail, Bluetooth transmitters with built-in RFID systems were installed in two or three zones along each trail: the starting point, checkpoints, and the endpoint. These Bluetooth transmitters use solar charging modules, reducing power consumption and maintenance costs, aligning with sustainable environmental concepts. as shown in Figure 1.

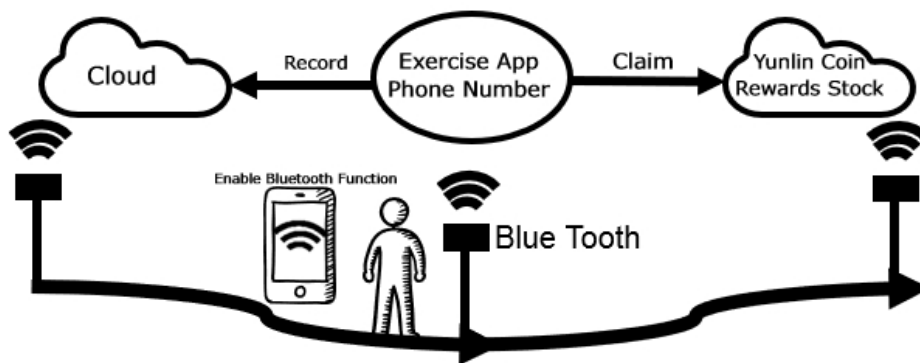


Figure 1 *Conceptual Diagram of Smart Health Trail RFID System and Fitness App Usage*

When users first install the fitness App, they need to fill in personal information and bind their mobile number. When the user's phone, with the App and Bluetooth enabled, enters the Bluetooth transmitter's sensing range, it acts as a receiver. Upon receiving the Bluetooth (Beacon) signal, the App transmits the signal to the cloud, where the system determines whether the user has completed the trail. The App records the exercise history, including the duration, and connects to the Yunlin Coin database, allowing users to claim rewards after completing the trail.

Comparing the original and smart trails, the primary difference between the original trails and the smart trails equipped with RFID and the App lies in whether users utilize the fitness App while walking the trails. This study compares the benefits of smart trails versus original trails as follows:

Table 1 Comparison of Benefits between Original Trails and Smart Trails

| | Residents' Perspective | Government's Perspective |
|-----------------------|---|---|
| Original Trail | Simple leisure and fitness activities like walking and hiking | Unaware of residents' usage, delayed management, inability to distribute Yunlin Coins |
| Smart Trail | Access to all smart trail information, can check usage records, immediate reward claims | Understand usage efficiency and preferences, timely reward distribution and feedback |

Figure 2 and Figure 3 are Smart Health Trail App Interface. Figure 2: This is the home screen of the App when opened. Below the home screen is the Task List, illustrated here using the Ciwu Trail as an example. When the App interface is on step two, users can start experiencing the trail. After completing the RFID sensing, users can proceed to step three (illustrated here using the Artistic Waterfront Trail), where they can claim a reward of 10 Yunlin Coins, as shown in Figure 3.



Figure 2 Home Pages of the Smart Health Trail App



Figure 3 Usage Interface of the Smart Health Trail App

2.3 Technology Acceptance Model (TAM)

Davis (1989), building on the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975) and the Theory of Planned Behavior (TPB) by Ajzen (1985), developed the Technology Acceptance Model (TAM). This model posits that "Perceived Usefulness" and "Perceived Ease of Use" indirectly influence user attitudes towards new technology, further affecting behavioral intentions. TAM is widely used to analyze and predict factors influencing the use and acceptance of new technology.

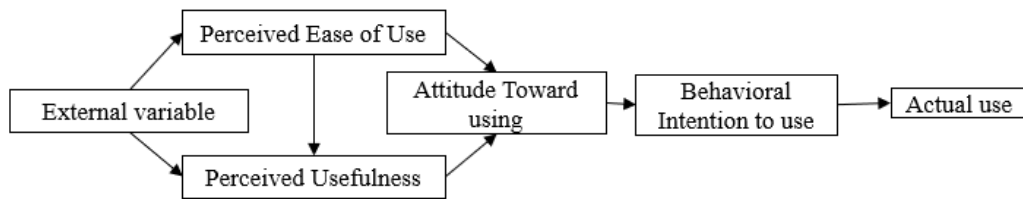


Figure 4 *Technology Acceptance Model by Davis (1989)*

2.4 Satisfaction and Reuse Intention

Oliver's (1980) Expectation-Confirmation Theory (ECT) is frequently used to predict and explain consumer satisfaction and post-purchase behavior, applicable across various products and services. DeLone & McLean (1992) proposed the Information System Success Model to assess the impact of information system implementation in organizations, where Adeyinka & Mutula (2010) considered user satisfaction as the overall satisfaction with system usage.

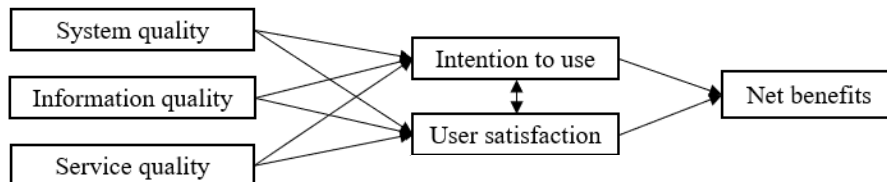


Figure 5 *Information System Success Model by DeLone & McLean (1992)*

Bhattacharjee (2001) suggested that the decision to continue using an information system mirrors consumers' repurchase decisions, asserting that users' reuse intentions are influenced by post-use satisfaction. This led to the development of the IS Continuance Model.

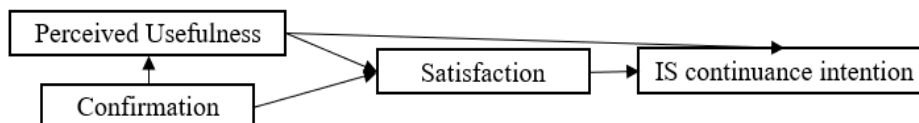


Figure 6 *IS Continuance Model by Bhattacharjee (2001)*

Synthesizing the above, this study integrates the Technology Acceptance Model, Information System Success Model, and IS Continuance Model to establish the research framework. As Figure 7.

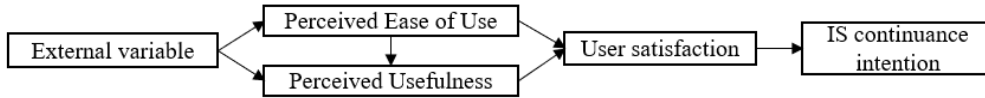


Figure 7 *Research Framework*

3. Research Methodology

This study collected sample data through questionnaires distributed to users of the fitness App, conducting both online and in-person surveys. The questionnaires used a five-point Likert scale. The online survey period was from June 28, 2023, to August 21, 2023, and the in-person survey period was from July 31, 2023, to August 6, 2023.

3.1 Research Hypotheses

The Yunlin County government aimed to understand the effectiveness of integrating RFID technology and the App into smart health trails, users' overall satisfaction with the trails after using the App, and their willingness to reuse the trails in the future. To achieve these research objectives, this study focused on user satisfaction with the trails, using satisfaction analysis to predict users' reuse intentions. Based on this, the study integrated Davis's (1989) Technology Acceptance Model (TAM), DeLone & McLean's (1992) Information System Success Model, and Bhattacharjee's (2001) IS Continuance Model, establishing a research framework and hypotheses to verify the relationships between various constructs. The study aimed to explore the experiences of trail users after using the App. The study collected and analyzed samples from actual App users to understand their perceptions of the App and their intentions to reuse the trails in the future.

External variables in the Technology Acceptance Model refer to external factors that potentially influence user perceived ease of use and perceived usefulness when using a system. These external variables are not uniformly defined and can be set according to the research context, such as objectives, subjects, and environment (Zhao, 2017). External variables indirectly influence users' usage intentions through perceived ease of use and perceived usefulness. Accordingly, the following hypotheses were proposed:

- H1: External factors will influence trail user perceptions of the App's ease of use.
- H2: External factors will influence trail user perceptions of the App's usefulness.

Spreng, MacKenzie, and Olshavsky (1996) defined satisfaction as an emotional response to post-purchase behavior, which, in the context of information systems, refers to user experiential feelings after using the system. Liao and Cheung (2001) found that system quality significantly positively affects the perceived ease of use and perceived usefulness of a website. Devaraj et al. (2002) identified perceived usefulness as an important variable affecting customer satisfaction with a website. Li (2015) found that perceived ease of use significantly positively affects perceived usefulness and satisfaction in the context of life insurance App services. Chen (2020)

explored the understanding and willingness to use smart wearable devices combined with health insurance, finding that perceived ease of use is significantly positively related to perceived usefulness. Based on these findings, the following hypotheses were proposed:

- H3: The App's ease of use will positively influence trail user perceptions of the App's usefulness.
- H4: The App's ease of use will positively influence trail user satisfaction.
- H5: The App's usefulness will positively influence trail user satisfaction.

Beard & Ragheb (1980) defined leisure satisfaction as the positive feelings and perceptions individuals gain from participating in leisure activities. Cronin & Taylor (1992) found that user experiential feelings and satisfaction influence repurchase intentions more than service quality does. Kotler (1996) suggested that customer satisfaction is the gap between perceptions and expectations. Oliver (1997) viewed satisfaction as an emotional and affective response to the provision of products or services. Dan (2018) used the IS Continuance Model to explore factors influencing the continued use of mobile traffic information Apps, finding that perceived ease of use and perceived usefulness significantly positively affect user satisfaction, which, in turn, positively influences continued use intentions. Huang (2021) used the IS Continuance Theory to explore factors influencing the use of mobile food ordering Apps, finding significant positive relationships between perceived usefulness, satisfaction, and continued use intentions. Based on these findings, this study hypothesized that user satisfaction with the smart trail App would influence their willingness to reuse the trails:

- H6: Satisfaction will positively influence trail user willingness to reuse the trails.

3.2. Variable Definitions

The questionnaire used a five-point Likert scale to measure responses, with the following scoring: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5. The questionnaire included personal demographic information, external factors, App ease of use, App usefulness, satisfaction, and trail reuse intentions.

Table 2 Summary of Questionnaire Variables

| Variable | Operational Definition | Number of Questions | Source |
|------------------|--|---------------------|---|
| External Factors | External factors such as convenience and rewards of the smart trail affecting the experience of using the fitness App. | 3 | Self-developed |
| Ease of Use | Perception of how easy the fitness App is to use. | 5 | Davis(1989) |
| Usefulness | Perception of the benefits of using the fitness App. | 5 | |
| Satisfaction | Feelings and perceptions after using the fitness App. | 3 | Ragheb & Beard(1980) Bhattacharjee(2001) |
| Reuse Intention | Willingness to reuse the smart trail. | 1 | Kotler(1999) Bhattacharjee(2001) |

3.3 Survey Subjects

The survey targeted users who had downloaded the fitness App and used the nine health trails launched in 2023, distributing both physical and online questionnaires. Convenience sampling was used, with a total of 508 questionnaires distributed, 67 of which were invalid, resulting in 441 valid responses.

4. Empirical Analysis

This study analyzed the collected samples in three parts: descriptive statistics analysis, exploratory factor analysis (EFA) to extract key factors and assess reliability and validity, and regression analysis to explore the relationships between user perceptions of the fitness App, satisfaction, and reuse intentions.

4.1 Basic Demographic Analysis of Trail Users

The survey found that female users outnumbered male users, indicating that women preferred low-intensity leisure activities. The main age group of trail users was 36-55 years old. Respondents generally had low incomes and mostly resided in metropolitan areas such as Douliu, Dounan, and Huwei. Over 70% of users spent less than 30 minutes traveling to the trails, indicating that the proximity of smart trails to residential areas is an important factor influencing usage intentions. The main motivations for use were exercise, leisure, and earning related rewards. Despite being promoted for only a few months, 40% of users never experienced App failures, indicating that the fitness App needs further promotion.

Table 3 Basic Demographic Analysis of Fitness App Users ($n=441$)

| Item | Group | Frequency | Percentage | Cumulative Percentage |
|----------------|--|-----------|------------|-----------------------|
| Gender | Male | 194 | 44.0 | 44.0 |
| | Female | 247 | 56.0 | 100.0 |
| Marital Status | Single | 149 | 33.8 | 33.8 |
| | Married | 292 | 66.2 | 100.0 |
| Age | Under 20 | 11 | 2.5 | 2.5 |
| | 21-35 | 84 | 19.0 | 21.5 |
| | 36-45 | 101 | 22.9 | 44.4 |
| | 45-55 | 116 | 26.3 | 70.7 |
| | 56-65 | 72 | 16.3 | 87.1 |
| | Over 65 | 57 | 12.9 | 100.0 |
| Occupation | Student | 24 | 5.4 | 5.4 |
| | Service Industry | 58 | 13.2 | 18.6 |
| | Military/Police/Civil Servant/Teacher | 74 | 16.8 | 35.4 |
| | Business/Manufacturing | 86 | 19.5 | 54.9 |
| | Agriculture/Forestry/Fishery/Livestock | 21 | 4.8 | 59.6 |
| | Medical Personnel | 14 | 3.2 | 62.8 |
| | Homemaker | 70 | 15.9 | 78.7 |
| | Retired | 59 | 13.4 | 92.1 |
| Others | 35 | 7.9 | 100.0 | |

| Item | Group | Frequency | Percentage | Cumulative Percentage |
|---|---|-----------|------------|-----------------------|
| Monthly Income | Below 25,000 | 136 | 30.8 | 30.8 |
| | 25,001-35,000 | 109 | 24.7 | 55.6 |
| | 35,001-45,000 | 82 | 18.6 | 74.1 |
| | 45,001-60,000 | 68 | 15.4 | 89.6 |
| | Above 60,000 | 46 | 10.4 | 100.0 |
| Residence | Douliu | 114 | 25.9 | 25.9 |
| | Dounan | 70 | 15.9 | 41.7 |
| | Huwei | 50 | 11.3 | 53.1 |
| | Gukeng | 17 | 3.9 | 56.9 |
| | Beigang | 57 | 12.9 | 69.8 |
| | Linnei | 15 | 3.4 | 73.2 |
| | Kouhu | 7 | 1.6 | 74.8 |
| | Tuku | 10 | 2.3 | 77.1 |
| | Others | 101 | 22.9 | 100.0 |
| Weekly Trail Visits | 1 time | 173 | 39.2 | 39.2 |
| | 2-3 times | 114 | 25.9 | 65.1 |
| | 4-5 times | 74 | 16.8 | 81.9 |
| | 6-7 times | 56 | 12.7 | 94.6 |
| | 8 times or more | 24 | 5.4 | 100.0 |
| Travel Time to Trail | Within 15 minutes | 165 | 37.4 | 37.4 |
| | 15-30 minutes | 154 | 34.9 | 72.3 |
| | 31-59 minutes | 78 | 17.7 | 90.0 |
| | 60 minutes or more | 44 | 10.0 | 100.0 |
| Usage Motivation (Multiple Choice) | Exercise and Leisure | 389 | 51.9 | 51.9 |
| | Social Entertainment | 60 | 8.0 | 59.9 |
| | Earning Yunlin Coins | 185 | 24.7 | 84.6 |
| | Receiving "Healthy Walking, Good Rewards" Gifts | 114 | 15.3 | 99.9 |
| | Others | 1 | 0.1 | 100.0 |
| Source of Information (Multiple Choice) | Introduced by Friends/Relatives | 170 | 28.7 | 28.7 |
| | News Media | 49 | 8.3 | 37.0 |
| | Government Promotion | 149 | 25.1 | 62.1 |
| | Lohas Information LLC Facebook | 109 | 18.4 | 80.5 |
| | Trail Checkpoint Posters | 107 | 18.0 | 98.5 |
| | Others | 9 | 1.5 | 100.0 |
| App Usage Experience | No Failures | 189 | 42.9 | 42.9 |
| | 1-2 Failures | 166 | 37.6 | 80.5 |
| | 3-4 Failures | 50 | 11.3 | 91.8 |
| | 5 or More Failures | 36 | 8.2 | 100.0 |

4.2 Descriptive Statistical Analysis

The questionnaire included 20 items on external factors, App ease of use, and App usefulness, one control question, and six items that were excluded after factor analysis due to lack of fit, resulting in 13 items being analyzed. The descriptive analysis of each item is summarized in Table 4. The top five user experiences with the Yunlin Health Trail App were: "Establishing more trails with checkpoints" (mean 4.26), "The closer the trail is to home, the greater the willingness to use" (mean 4.26), "Helps improve overall health of county residents" (mean 4.21), "Increases options for leisure activities" (mean 4.12), and "Relieves stress" (mean 4.08).

Table 4 *Descriptive Statistics of Questionnaire Items (n=441)*

| Item | Mean | Dev. | Rank |
|---|------|-------|------|
| 2-1 Using the Yunlin Health Trail App is easy | 3.73 | 0.880 | 8 |
| 2-6 Checkpoints on the Yunlin Health Trail are clearly marked | 3.53 | 1.025 | 12 |
| 2-7 The closer the Yunlin Health Trail is to home, the greater the willingness to use | 4.26 | 0.820 | 2 |
| 2-8 The promotional materials for the Yunlin Health Trail are clear and attractive | 3.61 | 0.937 | 10 |
| 2-9 The Yunlin Health Trail has diverse promotional channels | 3.50 | 0.991 | 13 |
| 2-10 The Yunlin Health Trail activity information is easy to obtain | 3.54 | 0.983 | 11 |
| 3-3 Walking the Yunlin Health Trail relieves stress | 4.08 | 0.792 | 5 |
| 3-4 Walking the Yunlin Health Trail improves my interpersonal relationships | 3.63 | 0.937 | 9 |
| 3-5 Establishing the Yunlin Health Trail increases options for leisure activities | 4.12 | 0.753 | 4 |
| 3-6 Exchanging Yunlin Coins rewards increases the willingness to walk the trail | 4.02 | 0.942 | 7 |
| 3-7 I hope the county government establishes more trails with checkpoints | 4.26 | 0.830 | 1 |
| 3-8 Establishing the Yunlin Health Trail increases the happiness of county residents | 4.04 | 0.877 | 6 |
| 3-9 Establishing the Yunlin Health Trail helps improve the overall health of county residents | 4.21 | 0.793 | 3 |

(Note: Evaluated using a five-point Likert scale, with 1 indicating very low and 5 indicating very high.)

4.3 Factor Analysis and Reliability Analysis

The study performed factor analysis on user experiences with the fitness App, using factor loadings to measure the validity of each questionnaire item. Items with factor loadings below 0.5 were excluded, resulting in 13 items being included and simplified into three factors (as shown in Table 5), with a total explained variance of 70.220%. The factors were named based on the factor loadings as follows: Factor 1: App Usefulness, including improving health, relieving stress, increasing happiness, increasing leisure activity options, and improving interpersonal relationships. Factor 2: App Ease of Use, including diverse promotions, easy access to information, clear and attractive promotional materials, clearly marked checkpoints, and ease of use of the App. Factor 3: External Factors, including rewards increasing willingness to use, establishing more trails, and the closer the trail is to home, the greater the willingness to use.

The study used Cronbach's alpha coefficient to measure the reliability of each variable construct, following DeVellis's (1998) recommendation that an alpha below 0.6 is unacceptable, 0.6-0.65 is best avoided, 0.65-0.7 is minimally acceptable, 0.7-0.8 is quite good, and 0.8-0.9 is very good. The Cronbach's alpha coefficients for the three factors were 0.882, 0.913, and 0.776, indicating good internal consistency reliability.

Table 5 *Factor Analysis and Reliability Statistics*

| Variable | App Usefulness | App Ease of Use | External Factors |
|--|----------------|-----------------|------------------|
| 3-9 Establishing the health trail helps improve the overall health of county residents | .812 | | |
| 3-3 Walking the Yunlin Health Trail relieves stress | .775 | | |
| 3-8 Establishing the Yunlin Health Trail increases the happiness of county residents | .775 | | |
| 3-5 Establishing the Yunlin Health Trail increases options for leisure activities | .761 | | |
| 3-4 Walking the Yunlin Health Trail improves my interpersonal relationships | .680 | | |
| 2-9 The Yunlin Health Trail has diverse promotional channels | | .845 | |
| 2-10 The Yunlin Health Trail activity information is easy to obtain | | .838 | |
| 2-8 The promotional materials for the Yunlin Health Trail are clear and attractive | | .833 | |
| 2-6 Checkpoints on the Yunlin Health Trail are clearly marked | | .806 | |
| 2-1 Using the Yunlin Health Trail App is easy | | .627 | |
| 3-6 Exchanging Yunlin Coins rewards increases the willingness to walk the trail | | | .769 |
| 3-7 I hope the county government establishes more trails with checkpoints | | | .677 |
| 2-7 The closer the Yunlin Health Trail is to home, the greater the willingness to use | | | .626 |
| Cronbach's α | .882 | .913 | .776 |
| Eigenvalue | 7.437 | 1.882 | 1.213 |
| Explained Variance (%) | 49.583 | 12.550 | 8.088 |
| Cumulative Variance (%) | 49.583 | 62.133 | 70.220 |
| KMO Value | 0.915 | | |
| Significance | 0.000 | | |

4.4 Regression Analysis

To explore the factors influencing satisfaction with the smart health trails, linear regression analysis was conducted.

4.4.1 Regression Analysis of Factors

Table 6 shows the regression analysis results of external factors affecting App ease of use

and usefulness. The coefficients for external factors on ease of use and usefulness are 0.595 and 0.590, respectively, both significant at the 1% level, indicating significant positive relationships. Hypotheses H1 and H2 were supported, suggesting that closer proximity to home and more trail establishments enhance user perceptions of the App's ease of use and usefulness.

Table 7 shows the regression analysis results of App ease of use on App usefulness. The coefficient for App ease of use is 0.470, significant at the 1% level, indicating a significant positive relationship. Hypothesis H3 was supported, although easy access to information and diverse promotions did not significantly affect perceived usefulness.

Table 6 Regression Analysis of External Factors on App Ease of Use and Usefulness

| Independent Variable | App Ease of Use | App Ease of Use | App Usefulness | App Usefulness |
|---|----------------------|---------------------|----------------------|---------------------|
| Intercept | 1.094*** (5.460) | 1.133*** (5.602) | 1.549*** (10.215) | 1.440*** (9.715) |
| External Factors | 0.595*** (12.605) | | 0.590*** (16.515) | |
| 2-7 The closer the trail is to home, the greater the willingness to use | | 0.203*** (3.751) | | 0.237*** (5.975) |
| 3-6 Rewards ncrease the willingness to use | | 0.266*** (6.109) | | 0.027 (0.897) |
| 3-7 Establishing more trails | | 0.121** (2.158) | | 0.342*** (8.293) |
| Adj-R ² | 0.264 | 0.266 | 0.382 | 0.422 |
| F-test | 158.897 | 54.181 | 272.731 | 108.203 |
| P-value | 0.000*** | 0.000*** | 0.000*** | 0.000*** |

Note: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 7 Regression Analysis of App Ease of Use on App Usefulness

| Independent Variable | App Usefulness | | App Usefulness | |
|--|------------------|---------|------------------|---------|
| | β Estimate | T-value | β Estimate | T-value |
| Intercept | 2.334*** | 19.577 | 2.197*** | 17.569 |
| App Ease of Use | 0.470*** | 14.498 | | |
| 2-1 Using the Yunlin Health Trail App is easy | | | 0.222*** | 5.581 |
| 2-6 Checkpoints on the Yunlin Health Trail are clearly marked | | | 0.079* | 1.942 |
| 2-8 The promotional materials for the Yunlin Health Trail are clear and attractive | | | 0.097* | 1.801 |
| 2-9 The Yunlin Health Trail has diverse promotional channels | | | 0.063 | 1.175 |
| 2-10 The Yunlin Health Trail activity information is easy to obtain | | | 0.041 | 0.754 |
| Adj-R ² | 0.322 | | 0.334 | |
| F-test | 210.195 | | 45.111 | |
| P-value | 0.000*** | | 0.000*** | |

Note: *** significant at 1%, ** significant at 5%, * significant at 10%

4.4.2 Regression Analysis of User Satisfaction

Table 8 shows the regression analysis results of App ease of use and usefulness on overall satisfaction with the smart trails. The coefficients for App ease of use and usefulness are 0.317 and 1.416, respectively, both significant at the 1% level, indicating significant positive relationships. Hypotheses H4 and H5 were supported, suggesting that higher ease of use and usefulness perceptions lead to higher satisfaction with the smart trails.

Table 8 Regression Analysis of App Ease of Use and Usefulness on Satisfaction

| Independent Variable | Satisfaction | | Satisfaction | |
|---|------------------|---------|------------------|---------|
| | β Estimate | T-value | β Estimate | T-value |
| Intercept | 1.428*** | 5.809 | 0.588*** | 4.592 |
| App Ease of Use | 0.317*** | 5.340 | | |
| App Usefulness | 1.416*** | 19.697 | | |
| 2-1 Using the Yunlin Health Trail App is easy | | | 0.121*** | 3.887 |
| 2-6 Checkpoints on the Yunlin Health Trail are clearly marked | | | -0.029 | -0.946 |
| 2-8 The promotional materials for the Yunlin Health Trail are clear and attractive | | | 0.057 | 1.376 |
| 2-9 The Yunlin Health Trail has diverse promotional channels | | | -0.047 | -1.151 |
| 2-10 The Yunlin Health Trail activity information is easy to obtain | | | 0.095*** | 2.304 |
| 3-3 Walking the Yunlin Health Trail relieves stress | | | 0.146*** | 3.936 |
| 3-4 Walking the Yunlin Health Trail improves my interpersonal relationships | | | 0.105*** | 3.548 |
| 3-5 Establishing the Yunlin Health Trail increases options for leisure activities | | | 0.137*** | 3.293 |
| 3-8 Establishing the Yunlin Health Trail increases the happiness of county residents | | | 0.096*** | 2.408 |
| 3-9 Establishing the Yunlin Health Trail helps improve the overall health of county residents | | | 0.209*** | 4.700 |
| Adj-R ² | 0.643 | | 0.652 | |
| F-test | 396.463 | | 83.414 | |
| P-value | 0.000*** | | 0.000*** | |

Note: *** significant at 1%, ** significant at 5%, * significant at 10%

4.5 Logistic Regression Analysis

Table 9 shows the logistic regression analysis results of satisfaction on the willingness to reuse the trails. The coefficient for satisfaction is 1.166, significant at the 1% level, indicating a significant positive relationship. Hypothesis H6 was supported, suggesting that higher satisfaction with the overall trail experience increases the willingness to reuse the smart trails.

Table 9 *Logistic Regression Analysis of Satisfaction on Willingness to Reuse Trails*

| Independent Variable | Predicted Direction | β Estimate | Wald | p-value | Odds Ratio |
|--------------------------------------|---------------------|------------------|-----------|---------|------------|
| Intercept | | -1.426 | 1.887 | 0.170 | 0.240 |
| Satisfaction | + | 1.166 | 16.824*** | 0.000 | 3.211 |
| Chi-square | 16.937 | | | | |
| P-value | 0.000 | | | | |
| Nagelkerke – R^2 | 0.122 | | | | |
| Summary percentage | 95.5% | | | | |

Note: *** significant at 1%, ** significant at 5%, * significant at 10%

5. Research Conclusions and Limitations

5.1 Research Conclusions

Ensuring the local population in Yunlin County can age healthily is a crucial issue for the county government. Therefore, the government has established "Smart Health Trails" to achieve the expected benefits of healthy aging. To support this, the government planned and implemented an information management system for the trails, focusing on the needs of trail users. In 2023, they completed the installation of the RFID system and the development of a fitness App to enhance the quality and efficiency of trail usage, aiming to improve the service and sustainability goals of the county government.

This study collected samples through questionnaires, analyzing the overall satisfaction of respondents with the trails after using the fitness App. The results show that, demographically, there are more female users than male users. The primary age group of trail users is between 36 and 55 years old, with many low-income individuals using the trails. The travel time from home to the trail significantly affects the willingness to use the trails. Factor analysis extracted three main constructs: external factors, App ease of use, and App usefulness. External factors positively influence user perceptions of App ease of use and usefulness. The higher the user perception of App ease of use, the more they perceive the App as useful. The higher the user agreement on the ease of use and usefulness of the App, the higher their satisfaction with the App and the trails. Logistic regression analysis revealed that higher user satisfaction leads to a higher willingness to reuse the trails in the future. The research hypotheses and their results are summarized in Table 10. The findings provide valuable insights for optimizing public sector resource allocation and for promoting the App to other counties and cities with smart trails.

Table 10 *Summary of Research Hypotheses Results*

| Research Hypothesis | Empirical Result |
|---|------------------|
| H1: External factors will influence trail user perceptions of App ease of use. | Supported |
| H2: External factors will influence trail user perceptions of App usefulness. | Supported |
| H3: App ease of use will positively influence trail user perceptions of App usefulness. | Supported |
| H4: App ease of use will positively influence trail user satisfaction. | Supported |
| H5: App usefulness will positively influence trail user satisfaction. | Supported |
| H6: Satisfaction will positively influence trail user willingness to reuse the trails. | Supported |

5.2 Research Scope and Limitations

This study employed a questionnaire survey method, distributing both online and physical questionnaires to fitness App users, focusing on their post-usage experience. The research scope is limited to the nine trails activated in Yunlin County in 2023. Therefore, the results are only applicable to this specific case and may not be generalized to other trails and paths nationwide. It is suggested that future research could explore the differences in App usage satisfaction between urban and non-urban areas.

6. Acknowledgements

This research was supported by funding from the Yunlin County Government Planning Department. Special thanks to Director Ming-Yueh Lee of the Yunlin County Government Planning Department for his support, Chief Hsin-Sheng Lin of the Information Management Division for his guidance, and all the staff from the county government and the IT team for their assistance with administrative tasks.

References

- Adeyinka, T., & Mutula, S. (2010). A proposed model for evaluating the success of WebCT course content management system. *Computers in Human Behavior*, *26*(6), 1795-1805. <http://doi.org/10.1016/j.chb.2010.07.007>
- Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological bulletin*, *82*(2), 261-777. <http://doi.org/10.1037/h0076477>
- Beard, J. G. & Ragheb, M. G. (1980). Measuring leisure satisfaction. *Journal of leisure Research*, *12*(1), 20-33. <http://doi.org/10.1080/00222216.1980.11969416>
- Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, *25*(3), 351-370. <http://dx.doi.org/10.2307/3250921>
- Bhattacharjee, A., & Premkumar, G. (2004). Understanding Changes in Belief and Attitude Toward Information Technology Usage: A Theoretical Model and Longitudinal Test. *MIS Quarterly*, *28*(2), 229-254. <http://doi.org/10.2307/25148634>
- Bhattacharjee, A., & Premkumar, G. (2008). Explaining Information Technology Usage: A Test of Competing Models. *Omega*, *36*(1), 64-75. <http://doi.org/10.1016/j.omega.2005.12.002>

- Chen, H. (2020). *Study on the integration of smart wearable devices with health insurance - application of tam and innovation resistance theory*. [Unpublished master thesis]. Department of Business Administration, National Taipei University of Business.
- Chou, J. Y., & Lu, L. (2014). Exploring the Attitude Differentiation on E-Learning Systems Based on TAM: The Strength of Growth Need as a Moderator. *Journal of Information Management*, 21(1), 83-105. <https://www.airitilibrary.com/Article/Detail?DocID=16085752-201401-201402260019-201402260019-83-105>
- Cronin, J., & Taylor, S. (1992). Measuring Service Quality: A Reexamination and Extension. *Journal of Marketing*, 56, 55-68. <https://doi.org/10.2307/1252296>
- Dan, H. (2018). *Factors influencing continuous use intentions of mobile traffic information apps - a case study of Kaohsiung ibus*. [Unpublished master thesis]. Department of Information Management, National Kaohsiung First University of Science and Technology.
- Davis, F. D., Bagozzi, R.P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982-1003. <http://doi.org/10.1287/mnsc.35.8.982>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. <http://doi.org/10.2307/249008>
- DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: the Quest for the Dependent Variable. *Information Systems Research*, 3(1), 60-95. <http://doi.org/10.1016/10.1287/isre.3.1.60>
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, 19(4), 9-30. <http://doi.org/10.1080/07421222.2003.11045748>
- Devaraj, S. Fan, M., & Kohli, R. (2002). Antecedents of B2C Channel Satisfaction and Preference: Validating E-commerce Metrics. *Information Systems Research*, 13(3), 316-333. <https://doi.org/10.1287/isre.13.3.316.77>
- DeVellis, R. F. (1998). *Scale development: Theory and applications*. CA:Sage.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Research and Theory*. Reading, PA: Addison-Wesley.
- Huang, Y. (2021). *Factors influencing the continuous use intentions of mobile food ordering apps*. [Unpublished master thesis]. Department of Information Management, I-Shou University.
- Kotler, P., & Armstrong, G. (1996). *Principles of Marketing*. 7th Edition, Prentice-Hall, Englewood Cliffs.
- Li, Z. Y. (2015). The Study of Life Insurers Enhance Customer Satisfaction: an Empirical Analysis from Mobile Application (App) Service. *Journal of Management Information and Computing*, 4(2), 54-64. [https://doi.org/10.6285/MIC.4\(2\).05](https://doi.org/10.6285/MIC.4(2).05)
- Liao, Z., & Cheung, M. T. (2001). Internet-based e-shopping and consumer attitudes: an empirical study. *Information and Management*, 38(5), 299-306. [http://doi.org/10.1016/S0378-7206\(00\)00072-0](http://doi.org/10.1016/S0378-7206(00)00072-0)
- Ministry of the Interior, Department of Household Registration, Republic of China (n.d.). *Annual Report on Household Registration Statistics*. Retrieved March 6, 2024, from <https://statist.moi.gov.tw/micst/webMain.aspx?k=defjsp>
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction. *Journal of Marketing Research*, 17(4), 460-469. <http://doi.org/10.2307/3150499>

- Oliver, R. L. (1997). *Satisfaction- A Behavioral Perspective on Consumer*. New York: McGraw-Hill.
<https://doi.org/10.4324/9781315700892>
- Sports Administration, Ministry of Education (n.d.). *Survey on the Current Status of Sports in the Republic of China 2024*. Retrieved March 6, 2024, from <https://reurl.cc/XGQngE>
- Spreng, R. A., MacKenzie S. B., & Olshavsky R. W. (1996). A Reexamination of the Determinants of Consumer Satisfaction. *Journal of Marketing*, 60(3), 15-32. <http://doi.org/10.2307/1251839>
- Tsai, M. (2012). *Analysis of RFID mountain rescue system and tourist satisfaction*. [Unpublished master thesis]. Institute of Management, National Formosa University of Science and Technology.
- Yang, S. (2016). *Study on satisfaction and continued use intentions of nursing information systems - a case study of a regional teaching hospital in southern Taiwan*. [Unpublished master thesis]. Department of Information Management, National Chung Cheng University.
- Zhao, D. (2017). *Exploring TED app usage intentions using TAM*. [Unpublished master thesis]. Department of Business Administration, National Kaohsiung University of Applied Sciences.

Huey-Yeh Lin

Department of Finance, National Formosa University, Taiwan, R.O.C.

E-mail address: linhykoo@gmail.com

Major area(s): Financial accounting, Financial Statement Analysis, Sports Economics

Chien-Sa Wang

Department of Finance, National Formosa University, Taiwan, R.O.C.

E-mail address: wangchiansa@gmail.com

Major area(s): Financial accounting, Economics

(Received February 2023; accepted February 2024)