Iterative Innovation Path Design Based on Technology Acceptance Model

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Abstract

In the iterative innovation mode, this paper proposes an iterative path based on the technology acceptance model. By putting the least feasible products into the market, collecting feedback data based on user experience, using cluster analysis and other methods to evaluate and analyze the collected data, and finally select the optimal improvement points, and then design and improve the scheme according to the optimal improvement point. The method steps established in the article have been tested by actual cases and have practical operability, which can be used to support the implementation of iterative improvement of Internet products.

Keywords

Iterative innovation; technology acceptance model; iterative path.

1. Introduction

Iterative innovation is a product innovation model that is far from the old waterfall-like development. This iterative innovation model follows market trends and consumer preferences, and iterates through the user experience. This kind of innovation is not because subversive innovation generally allows the product to occupy the market as soon as it appears, but close to the user experience based on user feedback information to get the follow-up direction and demand information of the next product, and strive to obtain the ratio through continuous trial and error and constant update. The last time the results were better, the goal was higher than the previous goal, and we strive to satisfy the market by satisfying the market.

Under the guiding ideology of iterative innovation, this paper proposes an iterative path based on TAM model, which can provide new ideas for product development.

2. Literature Review

At present, domestic research and use of iterative innovation is relatively late, and many related theories and information come from abroad. However, with the rapid application of relevant theories such as iterative innovation to the Chinese, the research on iterative innovation has quickly become a focus. The elaboration and understanding of iterative innovation, the study of iterative innovation features, and the research on patterns and processes of iterative innovation and process design models are endless, but most of these iterative innovation processes have limitations for iterative paths that are widely applicable to Internet products. In-depth research is relatively lacking.

Iterative innovation first appeared in the practice of the enterprise, combining the iteration and innovation of the process of “repetition, continuous approach to the ultimate goal”, and a new innovation model born—iterative innovation. In his article, Huang Yan and Tao Qiuyan [1] gave the goal of accelerating the pace of innovation, focusing on continuous innovation, and building a fully empowered small innovation team to innovate with multiple iterations with minimal cost and minimum risk. Innovative behavioral patterns. Sun Li and Yang Xiaoming [2] believe that iterative innovation is due to the high uncertainty of the market. Before the demand is not fully confirmed, the first generation of imperfect products will be developed, and then the immature products will be handed over to the leading users. Get user needs and improve products.

On the characteristics of iterative innovation, Hui Huaihai [3] and others believe that the characteristics of iterative innovation are open, continuous, accelerated, and dual. Xi Tao & Zheng Xianqiang [4] believe that micro-innovation (that is, a single point of breakthrough for the user's heart to innovate and accumulate, from quantitative to qualitative change, incremental improvement, and finally form a revolutionary approach to product innovation) and rapid change (ie for users) The quickest adjustment of feedback is a feature of iterative innovation.

Regarding the process research of iterative innovation, Ma Lihui and Tan Runhua [5] established the design goals of the whole product through product demand analysis and technological evolution analysis, and determined the conflicts of the ideal solution element IFRM through evolutionary obstacles, and selected the corresponding TRIZ according to the conflict type. The solution solves the analogy of the problem. The designer establishes a reverse iterative design model driven by the conflict network based on the experience and the specific product finalization domain solution. Xu Wei [6] constructed an iterative innovation mechanism model through code analysis, and made a reasonable establishment of the sub-categories in the main categories of iterative innovation, and analyzed the relationship between the main categories.

3. Iterative Path Design

3.1 Iterative path design theory basis

Based on the theory of rational behavior, Davis [7] proposed the Technology Acceptance Model (TAM), which assumes that the more users use a technology, the higher its use of the technology.

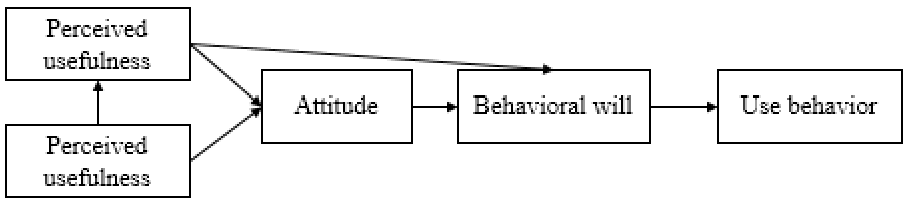

Figure 1 Technology acceptance model

The initial technology acceptance model theory consists mainly of the following elements. Use behavior: The actual operation behavior of a technology user on a new technology, referred to as UB; Behavioral intention: The willingness of a technology user to adopt this technology in the face of a certain new technology, referred to as BI; : The positive or negative attitude of technical users to a new technology, referred to as UA; perceived usefulness: technical users subjectively believe that the use of a particular technology system can improve the performance of individual work performance, referred to as FU; Perceived ease of use: The degree to which a user of a technology subjectively considers the effort of an individual to use a particular technology system, referred to as FE.

The original hypothesis of the technology acceptance model is that external variables influence the perceived usefulness and perceived ease of use, and the mutual influence between perceived usefulness and perceived ease of use, which together affect the attitude of use, and the attitude of use further influences the intention to use, ultimately affecting users' use. behavior. The TAM model has received extensive attention from the academic community since its introduction. The follow-up scholars have improved the TAM model and demonstrated the scientific relationship between the variables.

3.2 Iterative path design

The iterative path based on TAM in this paper is shown in the figure below. Only the macroscopic process of the iterative path is given here, and the details of the whole process are not given. The specific implementation steps of the iterative path are explained as follows:

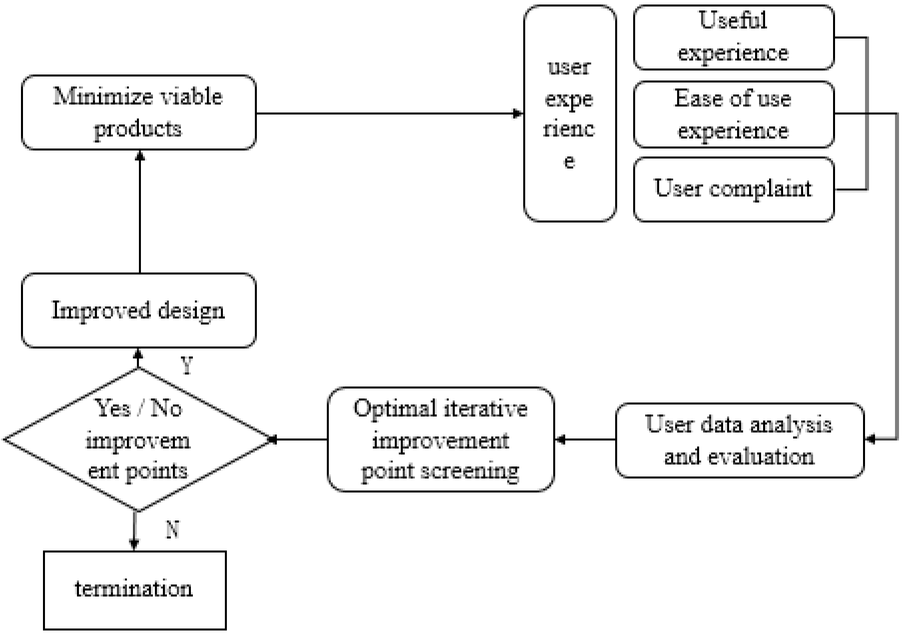

Figure 2 Iteration path

3.2.1 Minimizing viable products

The minimum viable product requires basic functions to be completed, which is a collection of functions that minimize the cost of the product and make the product simple.

3.2.2 User Experience

Based on the technology acceptance model, the dimensions of ease of use, usefulness, and user satisfaction are measured by questionnaire.

3.2.3 User Data Analysis and Evaluation

Through the data obtained by the user experience, the user analyzes the usefulness index data and the usability index data of the product together with the user complaints and user suggestions, and finally obtains the user's real need to improve the product problem. The indicators of the questionnaire design are shown in the table below.

Let the score of the i-th question be Ci, the scores are all given according to the forward question; the reverse problem is all converted to the positive score, and the conversion formula is “positive score=(6-reverse score)” (C1—C20 is Positive score, C21-C26 is the reverse score).

Table 1 Questionnaire indicator system

Core category（A）	Main category（B）	Subcategory（C）
Usefulness（A1）	Login system usefulness（B1）	Permissions are implemented（C1）
		Insufficient authority（C2）
		Login/registration response is fast（C3）
	Online communication system usefulness（B2）	Produced effective inspiration（C4）
		Free to publish ideas（C5）
		The experiment produced enough good ideas（C6）
		The experiment produced enough ideas（C7）
		Good teamwork（C8）
		Group atmosphere is active（C9）
		Reasonable experiment time（C10）

Ease of use（A2）	Easy to understand（B3）	Clear theme（C11）
		Concise experiment flow（C12）
		Clear rules of experiment（C13）
		Responsibilities are very clear（C14）
	Easy to operate（B4）	Easy to register/login（C15）
		Easy to operate when exercising（C16）
		Sending information without delay（C17）
		Instantly see the latest posts（C18）
		Easy access to the record of the experiment（C19）
		The number of BUGs in the platform is small（C20）
User complaint（A3）	Vision（B5）	Unreasonable page layout（C21）
		Color matching makes you feel uncomfortable（C22）
	Friendly（B6）	Platform language makes you feel unfriendly（C23）
		Feedback to the platform is not convenient（C24）
	Feature（B7）	Single platform function（C25）
	Content（B8）	Between published content and experimental topics Serious deviation（C26）

① Calculate the mean of each problem in the subcategory

$\overline{Ci}$ =∑The score of the i-question of each questionnaire / the total number of questionnaires

② Calculate the mean of each main category

$\overline{B1} = \sum \overline{Ci} /3$ (i=1,2,3) $\overline{B2} = \sum \overline{Ci} /7$ (i=4,5,6,7,8,9,10)

$\overline{B3} = \sum \overline{Ci} /4$ (i=11,12,13,14) $\overline{B4} = \sum \overline{Ci} /6$ (i=15,16,17,18,19,20)

$\overline{B5} = \sum \overline{Ci} /2$ (i=20,22) $\overline{B6} = \sum \overline{Ci} /2$ (i=23,24)

$\overline{B7} = \overline{C25}$ $\overline{B8} = \overline{C26}$

③ Calculate the mean of the core category

$\overline{A1} = \overline{B1} *3/10+ \overline{B2} *7/10$ $\overline{A2} = \overline{B3} *4/10+ \overline{B4} *6/10$

$\overline{A3} = \overline{B5} *2/6+ \overline{B6} *2/6+ \overline{B7} *1/6+ \overline{B8} *1/6$

3.2.4 Optimal iteration improvement point screening

(1) The questionnaire is measured by the 5-point Likert scale. According to the characteristics of the score and the design of the questionnaire, the 5-point scale can be divided into three fractional areas, as shown in the following table:

Table 2 Questionnaire score area division table

Region	Fractional segment
Affirmative area (advantageous area of the platform)	>3.5
Weak positive area (transition area)	3~3.5
Negative area (defect area of the platform)	<3

(2) According to the above calculation results, sort the contents of the three levels A, B, and C (ascending order)

(3) According to the results obtained in step one, cluster analysis is performed on the main category (B) and the sub-category (C). The systemic clustering (exploration clustering) is first divided into several categories, and then K-means clustering is used for statistical testing.

(4) According to the cluster analysis of step 2, the one with the lowest score is selected.

(5) Sort all the questions raised by the user in the non-formatting problem according to the frequency of occurrence.

(6) Combining analysis to screen out the optimal iteration point.

3.2.5 Improvement plan design

If there is a improvement point, the point design improvement scheme is improved according to the optimal iteration; if not, the iterative process is terminated.

4. Application Example

The Creative Incentive Platform of the School of Economics and Management of Chongqing University of Posts and Telecommunications is a local area network application dedicated to helping students inspire creativity between school teachers and students. This article uses this as an application example for the iterative innovation path design.

4.1 Minimizing viable products

The MVP requirements of the creative inspiration platform have core functions: the user enters the platform, builds the topic, and the topic establisher acts as the moderator. The fixed number of people follow the experimental principle to complete the brainstorm experiment at a fixed time.

Product form: Brainstorm on the Internet in a "chat room" (website) mode.

Implementation function:

(1) Ability to support brainstorming task activities (room/sandbox form) on the website and to propose brainstorming activities

(2) Ability to support free publishing of creative stickers composed of text on the website

(3) The number of all creatives that can support all the brainstorming activities on the website in the form of “cover building”

(4) Being able to use the publisher of the current brainstorming activity as the moderator, tentatively set the permissions of the moderator by “Remove Creative Sticker”, “Prohibit Speak/Block”, and “Change Event Theme”.

(5) Ability to automatically schedule events

(6) The system can automatically record all creative quantities after the event time

Parameter setting: Activity time limit: 20-60 minutes / single event Activity capacity: 7 people

4.2 User Experience

Experience crowd: 5806 office graduate students (first-stage experience crowd), full-time students, faculty and staff users (second stage)

Number of experience: 7 people / time, 40 people / time.

Experience activity content: experience the crowd to enter the platform; experience personnel use the functional application in the platform to carry out creative stimulation training; after the experience personnel experience the product, the user feedback information is obtained by issuing questionnaires and accessing and talking; sorting and counting user experience information .

Questionnaires and interviews: Set up a questionnaire to collect data on usefulness and usability indicators. The usefulness/ease of use indicators are counted through an iterative innovation test system, and finally the questionnaires of the same user complaints/suggestions/satisfaction are sorted, classified, and counted.

4.3 User Data Analysis and Evaluation

The following user data is obtained by conducting a questionnaire survey on the user's usefulness index data, usability index data, and user complaints.

Table 3 Questionnaire statistics score table

Core category (A)	Main category (B)	Subcategory (C)
3.92	3.88	4.12
		3.81
		3.72
	3.94	3.11
		4.27
		4.19
		4.32
		4.28
		3.18
		4.25
3.49	3.41	3.06
		3.49
		3.81
		3.27
	3.55	3.53
		2.91
		3.14
		3.42
		4.18
		4.09
2.69	1.79	1.81
		1.78
	3.25	3.16
		3.33
	3.28	3.28
	2.81	2.81

4.4 Optimal iterative improvement point screening

(1) According to the above calculation results, the three categories are divided separately, as shown in the following figure.

Table 4 Indicators of each layer

Level Region	Core category (A)	Main category (B)	Subcategory (C)

Positive area (>3.5)	A1	B1, B2, B4	C1-C3, C5—C8, C10, C12, C13, C15, C18-C20
Weak positive area (3~3.5)	A2	B3, B6, B7	C4, C9, C11, C14, C17, C23-C25
Negative area (<3)	A3	B5, B8	C16, C21, C22, C26

(2) According to the data obtained by user data analysis and evaluation, the calculation results of each category are sorted in ascending order.

Table 5 Sorting of indicators at each level

Ranking / Level	1	2	3	4	5	6	7	8	……	24	25	26
Core category(A)	A_3	A_2	A_1									
Main category(B)	B_5	B_8	B_6	B_7	B_3	B_4	B_1	B_2				
Subcategory(C)	C_{22}	C_{21}	C_{26}	C_{16}	C_{11}	C_4	C_{17}	C_{23}	……	C_5	C_8	C_7

4.5 Improve the design of the scheme

According to the screening of the optimal iteration point, it can be seen that the user complains the lowest score in the core category, the visual score is the lowest in the main category, and the sub-category color matching score is the lowest. From this we chose to improve on visual color matching in the next iteration to improve user satisfaction.

5. Conclusion

In this iterative innovation mode, this paper proposes an iterative path based on TAM. Firstly, the minimum feasible product is put into the market, the feedback data is collected based on the user experience, and the collected data is evaluated and analyzed by cluster analysis. Finally, the optimal improvement point is obtained by screening, and then the improvement scheme is designed according to the optimal improvement point.

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