Research on the User Demand for the Wechat Official Account of Innovation and Entrepreneurship in Universities

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Abstract: Nowadays, the top-level design of nation's promotion of innovation and entrepreneurship education has been constructed and a series of important policies have been released. With great importance to the innovation and entrepreneurship education that our nation attaches, a number of universities begin to intensify educational reforms in this aspect, eager to explore the Innovation and Entrepreneurship in Universities practice teaching system and participate such communication. In recent years, WeChat Official Account becomes not only one of the mobile internet medias with the largest user coverage but also a significant platform for universities to release information and communicate innovation and entrepreneurship education. Therefore, its service content and related user demand are worth analysis and research. Based on the classification of the service content of the WeChat Official Account of Innovation and Entrepreneurship in Universities, this paper analyzes the quality of user experience and related parameters, uses Markov discrete random process as the forecast of user demand level, and finally corresponds to the Kano model, develops a portable user demand analysis model of the WeChat Official Account of Innovation and Entrepreneurship in Universities.

1. Introduction

In recent years, with our nation attaching great importance to the innovation and entrepreneurship education, a number of universities begin to intensify educational reforms in this aspect and strengthen the cultivation of students' creative spirit, enterprise consciousness and innovative entrepreneurial ability[1]. The top-level design of nation's promotion of innovation and entrepreneurship education has been constructed and a series of important policies have been released at present, showing that the innovation and entrepreneurship education has already become a "national behavior" with the promotion of the government, the action of universities as well as the participation of enterprises and the effort of the whole society [2].

On February 28, 2019, China Internet Network Information Center(CNNIC) released the 43rd China Internet Development Statistics Report in Beijing. The Report indicates that Chinese mobile phone netizens have reached 817 million and the proportion of Internet users accessing the Internet through mobile phones has reached 98.6% by December 2018. On January 9, WeChat officially released the 2018 WeChat Data Report, showing that by September 2018, WeChat's monthly active users have reached 1.082 billion and WeChat usage has reached 83.4%, which make it stand out among many social apps. The use frequency of various functions of WeChat has also been dramatically increased. About 80% of WeChat users follow official accounts, which provides enterprises, public institutions, media and individuals with all-round communication and interaction functions with specific groups. With regard to the Innovation and Entrepreneurship education in Universities, the WeChat Official Account has also become one of the important platforms for teachers and students to obtain official information, interpret educational policies and exchange

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educational experiences [3].

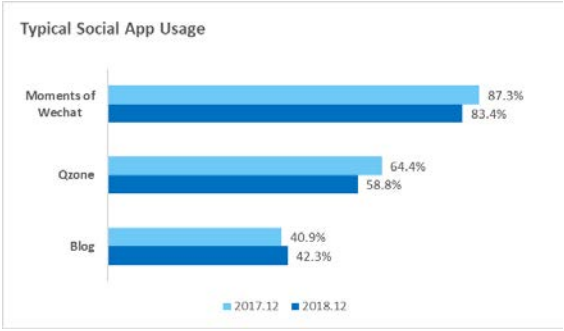

Fig.1 Typical Social App Usage

2. Concept and Theoretical Model

2.1 Wechat Official Account

WeChat official account is an application account applied by individuals or enterprise organizations on WeChat, providing service to users who follow official accounts through messages and web pages in official account. It can be divided into three types: subscription account, service account and enterprise account [4].

Table 1 Table Type Styles.

Type and content	Table column subhead	Subscription	Service
Mass message	One piece per day	√	×
Mass message	Four pieces per month	√	√
User management	User information	√	√
User management	User grouping	√	√
Information management	Upload/Download media	√	√
User service mode	One-on-one conversation	√	√
Payment interface	Wechat online payment	×	√
Web page authorization interface	Fan binding	×	√
Web page authorization interface	Marketing activities	×	√
Web page authorization interface	Other apps	×	√
Generate QR code	Get a series of QR codes with parameters	×	√
Location	User location acquisition	×	√

This paper mainly aims at two user-oriented types: subscription account and service account, excluding the enterprise account that serves its own staff. Subscription account is suitable for not only individuals but also enterprise organizations. It is generally not displayed directly in the chat list but under the folder named Subscriptions in WeChat interface with other subscription accounts. Service account is an enhanced version of subscription account, a platform for enterprises and organizations to provide more comprehensive services, which is directly displayed in the WeChat chat list with a higher exposure rate. The main differences between the two are shown in Table 1.

From the comparison of the basic functions of subscription account and service account in Tab.1, it can be seen that except for the slight difference in the frequency of group messages in information push (subscription account can send group messages every day, but service account only has four opportunities of sending group messages per month), they are basically identical in user management, information management and user service mode. In addition, service account is more complete in terms of payment interface, web page authorization interface, QR code generation (member management), and user location.

2.2 The Service Content of the Wechat Official Account of Innovation and Entrepreneurship in Universities

At present, there are many domestic official accounts serving the staff of the Innovation and Entrepreneurship in Universities. Their active service direction is mainly divided into policy interpretation and conference forum publicity, and the passive service direction is mainly divided into inquiry and consultation. However, due to the seriousness of education itself, the status quo of the official accounts of innovation and entrepreneurship is not optimistic, mainly manifested in low attention, weak interaction, and failure in maximizng its professional service function. Supported by new media technology, the prospect of official accounts in their professionalism and interaction is still worth looking forward to[5].

The service content of the WeChat Official Account of Innovation and Entrepreneurship in Universities is approximately divided into four categories. First, propaganda which focuses on the publicity, information and research of the practical work of Innovation and Entrepreneurship in Universities. Second, policy interpretation which makes a plain interpretation and a key classification of obscure policy documents, so that they can be understood and disseminated by teachers and students. Third, case category which mainly shares excellent cases and outstanding deeds in colleges. Fourth, research content which enables teachers and students in colleges to obtain relevant research information and data easily through real-time links of research, voting and so on.

2.3 Quality of Experience of the Wechat Official Account of Innovation and Entrepreneurship in Universities

New media service has become prosperous, and the importance of service level assessment has become prominent, while user experience is directly affected by the quality of service. QoE (QoE, Quality of Experience) is drawing more and more attention, which is an important factor for WeChat official accounts to maintain and attract more users, especially for WeChat official account operators. However, WeChat official account is mainly evaluated by its influence, such as the amount of liking, reposting and reading. These indicators only reflect the recognition of basic service, or even the recognition of the content of an single article of the official account, neglecting user subjective factors. Therefore, they can not reflect user's recognition of the service of WeChat official account directly. However, QoE is the ultimate standard to measure a WeChat official account and its business quality, which is a more comprehensive evaluation criterion.

The index of QoE takes the WeChat Official Account of National College Student Alliance for Innovation & Entrepreneurship Practice (NCSAP) as an example. This alliance, under the guidance and support of Higher Education Department of Education Ministry, is a non-profit organization established voluntarily and sponsored jointly by domestic universities and related enterprises and institutions, whose purpose is to unite all members of universities, and related enterprises and institutions to explore the culture system of Innovation and Entrepreneurship education in Universities in the field of practical teaching, and to serve for the talent training of innovative and entrepreneurial in colleges and universities[6]. The official account has a certain degree of influence. Take its January reading source as an example, as can be seen from Fig.2, the number of readings shared on Moments and to friends is relatively high, which indicates that users prefer to recommend it. In addition, there is some data derived from messages under the circumstance of strong recommendation, which user is willing to send to friends for sharing and discussing and so on.

Moreover, in respect to following, as shown in Fig.3, during the same period, the number of followers has risen largely. It indicates that this release or service behavior have greatly improved QoE. Users spontaneously share it with their colleagues and friends, so that the number of followers increased significantly in such a short period of time.

These indicators can be used as an important index to measure the overall service level of WeChat official accounts. As ordinary users, we are more concerned about the experience of each specific tweet and application service of WeChat official accounts, and need obvious and clear feedback indicators that reflect QoE.

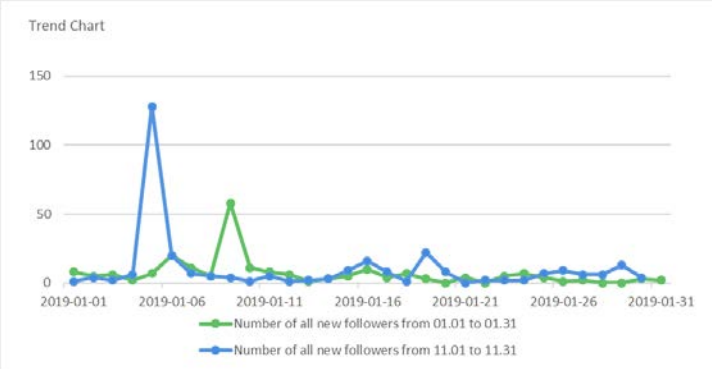

Fig.2 Reading Sources for the Official Account of National College Student Alliance for Innovation & Entrepreneurship Practice (2019.01.01-2019.01.31)

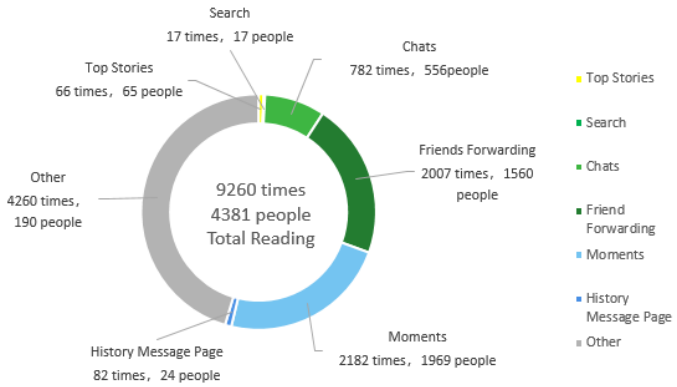

Fig.3 Statistics on the Number of New Follows for the Official Account of National College Student Alliance for Innovation & Entrepreneurship Practice (2019.01.01-2019.01.31)

3. An Analytical Model of the User Demand for the Wechat Official Account of Innovation and Entrepreneurship in Universities

3.1 Subjective Evaluation

Subjective evaluation is user's consideration of real-time service and their score for the service. QoE (Quality of Experience) reflects user subjective feelings about the service and therefore accurate measurement results can be ensured. However, users are rarely willing to evaluate the service they have experienced unless they want to complain about the service. Under such circumstances, it is difficult to require users to offer specific reasons for their evaluation and other detailed information. When building a model of QoE subjective evaluation, the toughest problem is the lack of information. In addition, users may ask for more service than the accounts can offer or give comment on some WeChat official accounts in a hostile way, lowering the QoE of other users. The accuracy of the model will be largely affected as a result of unpredictable comments brought by subjective evaluation. On the other hand, machine learning and artificial intelligence computing, such as neural networks and genetic algorithms, can be used to predict users' perception based on their QoE information to increase the reliability of subjective evaluation.

3.2 The Prediction Model of the User Demand for Qoe

Statistical analysis, fuzzy mathematics and other methods are used to predict users' subjective satisfaction. The Markov discrete random process is used to analyze the user demand and build the model of QoE demand level forecast. Through analyzing users' behavior, this model can infer the arguments to users' demand for QoE, predicting different levels of quality.

The state of objective things is not fixed and often changes with conditions changing. For example, as the QoE demand level decreases, the service level is increased. As a result, the QoE

demand state increases. Use the user state variable xt as the QoE demand level.

$$x_t = i\begin{pmatrix} i = 1,2,\cdots,N \\ t = 1,2,\cdots \end{pmatrix} \quad (1)$$

This formula tells that the state (the states referred to thereafter are all after quantization, and parameters of user behavior collected by the system before the quantization stage are denoted by *d)* of the systems of stochastic process for the QoE demand level in time *t* ($t = t_1 , t_2 ,\ldots$), and the sate is *i* ($i = 1 , 2 , \ldots, N$) .

There may exist different levels as $e_1, e_2, \ldots e_N$ (it is later defined 5 levels as *A, B, C, D, E*), and each of them can only be at one level at a time, and each state has *N* turnings (including turning itself, namely e_i - e_1, e_i - e_2, …, e_i - e_j, e_j - e_N).

The change from one QoE level to another is called the QoE level state transition. Since the QoE level state transition is random, probability must be used to describe the possibility of the state transition of user demand.

Collect the QoE level state of M months and count the number of transition states for each interval, denoted by $M_{11}, M_{12}, \cdots, M_{1N}, \cdots, M_{NN},$. Under such circumstances, the probability of QoE level moving from level e_i to level e_j can be calculated, and it can be called as transition probability from *i* to *j*. It's the probability of going from state e_i to state e_j in one step. Denoted as:

$$P_{ij} = P(e_j|e_i) = P(e_j \to e_i) = P(x_{n+1} = j|x_n = i) \quad (2)$$

Arrange transition probabilities of *N* states of QoE in order, a Matrix of *N*×*N* is set up. The matrix P_k is called the state transition probability matrix of user *k*. When the number of steps is not specified, it is generally a one-step transition probability matrix. Each row in the matrix is called a probability vector.

$$P_k = \begin{bmatrix} P_{11} & \cdots & P_{1N} \\ \vdots & \ddots & \vdots \\ P_{N1} & \cdots & P_{NN} \end{bmatrix} \quad (3)$$

Therefore, the transition probability matrix of each user's QoE level state can be obtained, and the QoE demand state can be predicted according to Markov prediction. If the probability of changing to a higher level is larger, the QoE demand level will be higher, or the level will be lower.

3.3 Portable Analytical Model of the User Demand for the Wechat Official Account of Innovation and Entrepreneurship in Universities

According to Kano model, the service quality of the WeChat Official Account of Innovation and Entrepreneurship in Universities can be divided into the following five categories corresponding to the user demand.

Must-be Quality(m): The WeChat official account tweets or service which users think that WeChat official account must have. Users will be unsatisfied about its absence and take for granted when it is satisfied without their satisfaction increasing. For instance, the propaganda which focuses on the publicity, information and research of the practical work of Innovation and Entrepreneurship in Universities.

One-dimensional Quality(o): The WeChat official account tweets or service that will increase user satisfaction when satisfied and will make users unsatisfied when not satisfied. It is a kind of service content that can be used for propaganda and competition, such as a plain interpretation and a fundamental classification of obscure policy documents so that they can be understood and disseminated by teachers and students.

Attractive Quality(a): The WeChat official account tweets or service that will increase user satisfaction rapidly when satisfied but will not make users unsatisfied when not satisfied. For instance, case category which mainly shares excellent cases and outstanding deeds in colleges.

Indifferent Quality(i): The WeChat official account tweets or service that satisfy or dissatisfy users that will not influence the user experience and satisfaction, such as offering users some offline gifts of no practical value.

Reverse Quality(r): The WeChat official account tweets or service that will decrease user satisfaction when satisfied and will make users satisfied when not satisfied, such as some questionnaire surveys highly data-required and user-unfriendly WeChat mini apps.

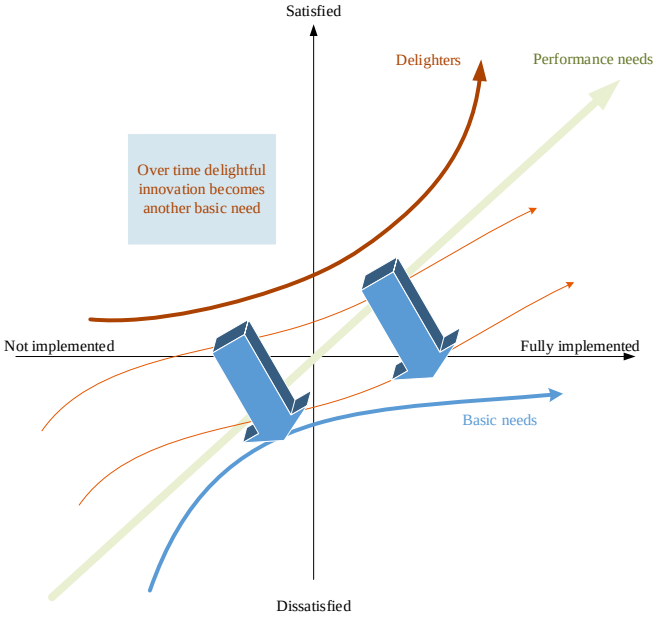

Fig.4 Kano Model of the Wechat Official Account of Innovation and Entrepreneurship in Universities

Therefore, 5 QoE forecast levels, namely *m, o, a, i, r,* and five predictors, namely *A, B, C, D, E are set*. Afterwards, five corresponding transition probabilities are calculated according to Markov model and the maximum among them is chosen as the QoE demand forecast level.

Under the circumstance, the user statistical state is a random process. Add all QoE level transition probabilities longitudinally and compare the longitudinal sum of state transition matrix according to Markov prediction model. The QoE level with a higher probability is generated to forecast the QoE demand level.

The QoE Markov prediction process is illustrated in Fig.6. When user habit is detected, if the QoE demand level changes, then correspondingly the statistical figures in the 5X5 matrix M is added 1, and the state transition matrix is obtained. Next step is to calculate 5 corresponding transition probabilities according to formula, take the maximum among them and obtain the QoE demand forecast level.

$$P_k = \begin{bmatrix} P_{AA} & P_{AB} & \cdots & P_{AE} \\ P_{BA} & P_{BB} & \cdots & P_{BE} \\ \cdots & \cdots & \cdots & \cdots \\ P_{EA} & P_{EB} & \cdots & P_{EE} \end{bmatrix} \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$P_A \quad P_B \quad \cdots \quad P_E \longrightarrow (e_f)$$

Fig.5 Qoe Demand Level Forecast

The measurement providing the QoE demand level is expressed as em and predicted value of the QoE demand level is expressed as ef , which can be m, o, a, i, r-Must-be Quality, One-dimensional Quality, Attractive Quality, Indifferent Quality and Reverse Quality. M[4][4] is a 5×5 matrix of the QoE level transition state. P[4] is the total probability of a one-dimensional array which stores five QoE level transition states.

The advantage of this prediction algorithm is its adequate theoretical basis. Although Markov chain is typically used in commercial prediction and image processing, it is already a relatively mature prediction method. As a result, there is a reliable theoretical basis for adopting this

prediction model.

4. Summary

This paper makes a deep analysis on “how to judge whether the WeChat Official Account of Innovation and Entrepreneurship in Universities meets users’ QoE demand in real time” and “which kind of content of the WeChat Official Account of Innovation and Entrepreneurship in Universities guaranteeing QoE should be provided”, and puts forward some solutions to some of the key problems. On the basis of classifying the relevant official account service content, this paper analyzes the user experience quality and its related parameters, and uses Markov discrete stochastic process as the forecast of user demand level. Finally, corresponding to Kano model, this paper obtains the analytical model of the user demand for the WeChat Official Account of Innovation and Entrepreneurship in Universities. In addition, if the parameters of the Kano sub-model in the model are partially adjusted, the prediction model can also be easily applied to the user demand analysis of other types of official accounts, and the model has a very high scope of application and portability.

Moreover, from the research process of the model, it can be found that the degree of the WeChat Official Account of Innovation and Entrepreneurship in Universities meeting user needs should be strengthened. In service items corresponding to Indifferent Quality, there still exists relatively high user demand, which is the basic content that can not be ignored. The QoE of this part is relatively low for the reason that the service design is still under their expectations. It does not mean that users do not have requirements for these items. In the future, WeChat official account management should improve and enhance the function of these items, trying to transform them into One-dimensional Quality which can improve user satisfaction.

According to the model, it can be inferred that the operation and service of the WeChat Official Account of Innovation and Entrepreneurship in Universities still need to be strengthened in the following three parts. First, increase the number of users. Meet the substantive needs of users through the release of high-quality types of tweets, and release articles and organize related activities to attract more attention. Second, increase the stickiness of users. According to the user feedback, adjust the content of tweets in time and maintain the frequency of interaction with users. At the same time, on the basis of providing more comprehensive, useful and timely educational administration information for teachers and students, share the content of derivative fields of innovation and entrepreneurship education, maintaining professionalism while enhancing the marketability. Third, improve feedback channels. Ensure the smooth communication between teachers and wechat official account operators, and provide fast and convenient feedback channels for teachers and students, so as to ensure that their problems and needs are dealt with in a timely and effective manner.

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