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Innovative Characteristics of Users' Intention to Continue Using Personalized Recommendation News Apps

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Abstract

With the massive increase in the available news information, it is difficult for users to quickly obtain the news they are interested in, resulting in personalized recommendation news applications. As the popularity of such innovative products grows, it is important to understand how people perceive and use these innovations. The focus of this study was the personalized recommendation news app "Toutiao," which has a high level of user activity in China. Based on the diffusion of innovation theory, this study investigates the relative advantages, compatibility, complexity, and observability characteristics of the Toutiao App as independent variables (IV). The dependent variable is the users' intention to continue using (DV) products. Furthermore, the research on innovation characteristics will help developers and service providers of mobile news apps in determining which innovations are more capable of attracting and retaining users, as well as which innovations have specific reference significance for the improvement of user experience mechanisms and market development strategies.

Keywords: Mobile News, Personalized Recommendation News App, Diffusion of Innovation Theory, Innovative Characteristics, Continued Use Intention

Introduction

Reading the news is a method of gathering information, keeping track of national and international happenings, and staying up to date on current events. Television, newspapers, magazines, and radio are examples of traditional news media. The market for news media has transitioned from traditional terminals to mobile terminals as network technology has advanced and new media platforms have gained prominence (Jia, 2022). Even though news broadcasting technologies are continually evolving, news reading has always been an important part of people's lives.

According to the 48th China Internet Development Statistics Report (2021) released by the China Internet Network Information Center (CNNIC), the size of mobile internet users in China reached 1.007 billion, and the size of online news users in China reached 760 million. Mobile news apps have become one of the most widely installed and used applications by consumers (Cheng et al., 2020). More and more users are relying on mobile news for their daily news and media diets (Kazai et al., 2015), thus reducing their exposure to traditional media.

News content is highly diverse and unpredictable, and news consumers' preferences vary. A good news app is not only a content production machine but also provides users with a variety of experiences. The user's reading experience is mainly reflected in the personalized settings of the app (Su, 2017). Media organizations are also adopting innovations to reach consumers, creating apps that facilitate access to information on mobile devices based on user choices, interests, etc. (Cheng et al., 2020). In the mobile news market, an innovative news application based on personalization has also emerged, that is, a personalized recommendation news app. This can largely meet the personalized news reading needs of users (Li et al., 2018). Although the rapid growth of personalized recommendation news applications has multifaceted effects, there is little exploration of the innovative dimensions of personalized recommendation news applications, so it is worth exploring.

Chan-Olmsted et al (2012) argue that beliefs about innovation often determine a person's attitude toward using the innovation, which in turn affects his or her intention to use the innovation. That is, an individual's attitude toward innovation affects their intention to use it. When individuals form their attitudes toward innovation, they tend to consider five main perceived characteristics: relative advantage, complexity, compatibility, observability, and trialability (Wei, 2018; Rogers, 2003). In short, an individual's perception of the innovative characteristics of a personalized recommendation news app affects an individual's intention to use it. In addition, Tan (2016)'s research on personalized recommendation news apps found that these apps have completed the accumulation of massive users, and the next step is to accumulate users and increase user stickiness. In general, the relationship between personalized recommendation news apps and users' persistent usage intentions is a topic worthy of research. To determine the relationship between the innovative characteristics of the personalized recommendation news apps and user's continued use intentions, the specific objectives are as follows:

- To determine the relationship between the relative advantages of the personalized recommendation news apps and the user's continued use intention.
- To identify the relationship between the compatibility of the personalized recommendation news apps and the user's continued use intention.
- To explain the relationship between the complexity of the personalized recommendation news apps and the user's continued use intention.
- To analyze the relationship between the observability of the personalized recommendation news apps and the user's continued use intention.

Literature Review
Personalized Recommendation News App
App, the full name of Application, refers to a third-party application for smartphones. From its birth to the present, news has changed several media, from the traditional news era of newspapers and TV broadcasting to the portal era, the search engine era, to the current era

of accurate and personalized news recommendations. Users' acquisition of information from the Internet has gone through three stages: the era of portal websites, the era of search engines, and the era of personalized recommendations today (Zhou, 2018).

Personalized recommendation is the process of classifying and categorizing information that users may be interested in using filtering technologies and providing users with personalized services in the form of recommendations (Gao, 2017). A personalized recommendation system in a news platform can recommend news information to users based on viewing history, geographic location, and user interest groups. Due to the intelligence and convenience of personalized recommendation systems, many researchers and organizations are keen on doing theoretical research and commercial applications.

Toutiao App

Toutiao App, one of the leading news distribution platforms on China's mobile Internet, is a typical representative of personalized news recommendation system applications (Ding & Xia, 2022). Toutiao App has an average monthly active user scale of over 200 million and an average daily active user scale of 120 million, ranking at the forefront of the industry with an absolute leading-edge (iiMedia Research, 2019).

The researcher searched for the keyword "Toutiao" on academic and journal websites and discovered that the research on Toutiao App is primarily focused on three subjects. The first theme is a reflection on the Toutiao App's features and development model, as well as what traditional media and other mobile news applications may learn from it. The second topic is a discussion of copyright issues. The third is research on the Toutiao App's recommendation mechanism and content generation mechanism based on the personalized recommendation algorithm. Of course, some researchers have undertaken research on Toutiao App user behavior, such as Tan (2016); Mo(2020), who discussed the use and satisfaction of Toutiao App users. According to the existing literature, research on the innovative characteristics of a Toutiao App and user retention behavior based on personalized recommendation systems is a relatively new research issue. This study chooses Toutiao App for empirical research to investigate the relationship between Toutiao App's innovative characteristics and users' continued intention to use it.

Diffusion of Innovation Theory

The diffusion of innovation (DOI) theory was first introduced by Rogers in 1983 and DOI theory is a key concept in this study. The theory has been widely used to evaluate the adoption of information systems and technologies (IS/IT) (SHIH, 2008). For Rogers (2003), the innovation-decision process involves five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. Figure 1 below illustrates this process.
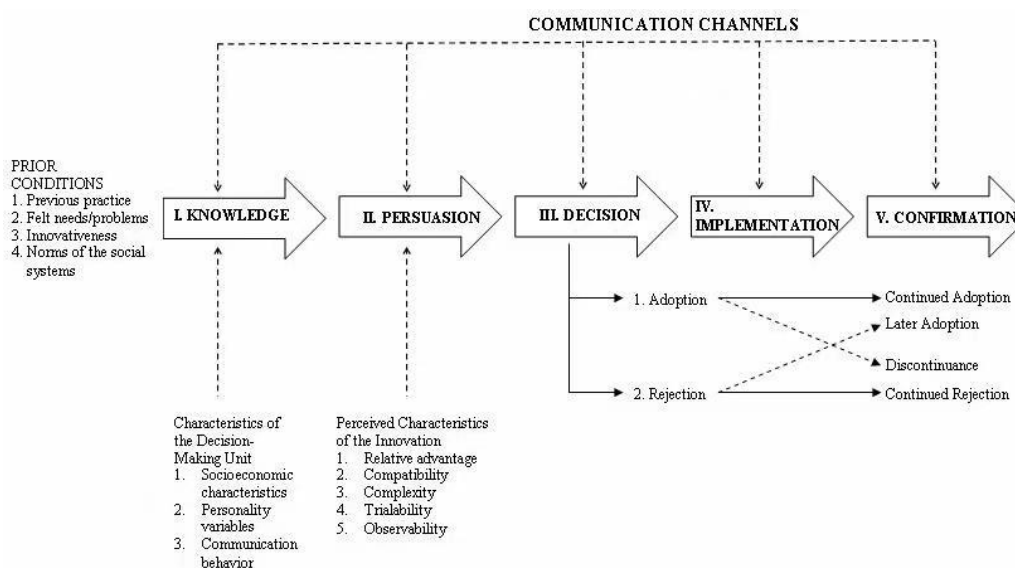
Figure 1. A Model of Five Stages in the Innovation-Decision Process

DOI theory regards user perception of a system as acceptance of an innovation (Tan & Li, 2020). DOI theory, according to Karahanna et al (1999), refers to how users' attitudes toward an innovative product are generated, how this leads to an eventual decision to adopt or reject it, and how the characteristics of the innovation fit into this process. In other words, individual attitudes toward or against innovation are crucial in influencing individual decisions and, as a result, whether users continue to adopt it (Wei, 2018). Individuals examine the relative advantages, complexity, compatibility, trialability, and observability of innovations while shaping their attitudes about innovation/persuading individuals to use innovations (Rogers, 2003).

Innovative Characteristics
Rogers (2003) described the innovation-diffusion process as "an uncertainty reduction process". The degree of uncertainty about the function of innovation affects individuals' perceptions and beliefs about innovation (Sahin, 2006). Such perceptions and beliefs can influence an individual's adoption or rejection of innovations. In the persuasion stage, Rogers (2003) proposes attributes of innovation, which can help reduce the uncertainty of innovation. Innovation attributes include five characteristics of innovation: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability (see Figure 1). The perceived characteristics of innovation are important predictors of adoption rates, and 49-87% of the variance in innovation adoption rates can be explained by these 5 characteristics (Rogers, 2003). Hence, it is reasonable to explore the continued adoption of personalized recommendation news using these 5 innovative characteristics. Moreover, for Rogers (2003), the relative advantage is the strongest predictor of innovation adoption rates.

Relative Advantage
Rogers (2003) defines relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes". In their study, Yang et al (2019) defined relative advantage as the fact that when users use mobile library apps, this emerging library service method is superior to other options and brings substantial benefits to users. The research results show that the relative advantage has a significant impact on the willingness to continue to use, and the path coefficient is 0.176. When using the library app to provide help

to users to a certain extent, it will promote users to continue to use. Relative advantage is also an important determinant of online shopping users' continued intention to pay with WeChat mobile. Convincing users to continue using mobile payment apps takes into account its relative advantages compared to other forms of shopping (Mensah, 2019).

Compatibility

Compatibility, that is, "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003). The consistency of innovation with existing values, various previous practical experiences, and the needs of users all provide the basis for the compatibility of innovative things (Zhang, 2012). Greer and Murtaza (2016) argue that any web initiative planning to implement personalization should ensure that the personalization features are compatible with users or potential site users. Tan and Li (2020) pointed out that compatibility is the main factor affecting the willingness of users to continue to use virtual academic communities. They recommend strengthening user application developers when designing various versions of their applications to ensure that these applications are compatible with users' existing habits and to enhance continued use.

Complexity

Rogers (2003) defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". SHIH (2008) showed that complexity had a strong and negative impact (-45.1%) on persistent use intention. Arguably, a portal that is not easy to use creates a barrier to continued adoption by users. In some studies, complexity and ease of use are considered to be similar, and studies often choose to define the ease of use positively (Yang et al., 2019; Zhang, 2012). The research of Yang et al. (2019) also showed that ease of use has a significant positive impact on users' willingness to continue to use library apps, with a path coefficient of 0.226. It is worth noting that the survey research by Li et al. (2018), found that ease of use cognition failed to effectively predict college students' intention to adopt mobile news clients in the future, and the correlation strength did not reach a significant level.

Observability

Rogers (2003) defines observability as "the degree to which the results of an innovation are visible to others". Zaltman et al (1973) pointed out that if the results of innovation can be easily observed and effectively stimulate discussions with family members, relatives, friends, neighbors, and colleagues around the adopter, innovation is more likely to be accepted or diffused. A study by Liao and Lu (2008) demonstrated that observability does not significantly affect the continued use of e-learning website users. Kapoor, Dwivedi, and Williams (2013) conducted a study on the adoption intention of Interbank Mobile Payment Service (IMPS), and they found that observability was not a significant determinant of consumers' intention to use IMPS, and the effect was not significant.

Trialability

According to Rogers (2003), "trialability is the degree to which an innovation may be experimented with on a limited basis". It's worth noting that this study looked at users' continued usage, which means users already have experience with Toutiao App, so the study excluded trialability as a factor.

Continued use Intention

The main dependent variable in any IS persistence intention study is the intention to continue using. According to Bhattacharjee (2001), the intention to continue using is defined as "the individual's subjective tendency to continue using a new medium". The study of sustained use is intended to explain the reasons for repeated use of information systems by users. Individuals form personal support/disapproval attitudes based on perceptions of innovation characteristics, and in the final stage of the innovation-decision process, subsequent continued adoption or discontinuation occurs (Roger, 2003). Many previous studies of various mobile information technologies have identified substantial links between innovative characteristics and the intention to continue using.

Scholars have verified the impact of innovative features of things on users' continued use behavior from different directions, although the degree of impact and results are different. But these studies have served well in research in the field of mobility and innovation theory. In the field of personalized recommendation news, there are few kinds of literature on its innovative characteristics and users' continuous use, but you can refer to this related literature for further research.

Future Perspectives of Mobile Journalism

The development of the mobile information market must conform to the user-centered paradigm in the era of new mobile media (Li et al., 2018). Based on the investigation of personalized recommendations, it is advantageous for mobile news client developers and service providers to discover and comprehend the shortcomings of current news application innovation on user perception and experience, adjust their user experience mechanism, and have certain reference significance for market promotion and development strategies. In the face of strong competition in the mobile news market, the actual retention rate of users has become a critical problem for enterprise sustainability. The ability to effectively increase users' intent to continue using personalized recommendation news apps ensures the future development of such products (Tan, 2016). The research on the continuous use intention of personalized recommendation news applications can help news organizations improve user engagement, frequency of use, retention of existing users, and core competitiveness of such news applications. Of course, this research has time constraints, and future research can include some new aspects to keep up with the changes and suit people's requirements.

Conclusion

While the previous study has provided significant insights into the elements that influence IS/IT users' continuous use, we have explored little regarding the continuing use of personalized recommended news. As a new phenomenon, personalized recommendation news apps are undergoing ongoing and quick development. Both personalized recommendation technology and news apps that have included this technology are currently attracting market and consumer attention. According to the diffusion of innovation theory, the innovation characteristics (i.e. relative advantage, compatibility, complexity, observability) of personalized recommendation news applications will be IV and the continuing use intention will be DV. This study will help media and news firms understand how the innovation of their product/technology affects user to use. As a result, news organizations will improve their personalized recommendation systems based on analysis of user interests and browsing habits, among other things, and develop mobile news apps

tailored to the needs of users, allowing them to truly enjoy a "Thousands of people, thousands of faces" news service.

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