Review of Theories Applied in Artificial Intelligence Service

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Abstract: This paper mainly combs the literature of core publications in the field of Artificial Intelligence Service. It summarizes customer behaviour in the context of service intelligence and discusses the changes of the traditional theory of service marketing under the background of artificial intelligence. Firstly, the connotation of artificial intelligence service in the existing literature is sorted out, and the concept of artificial intelligence service are deeply discussed. Secondly, the theoretical system of artificial intelligence service field is summarized and sorted out. This paper provides directions for future research in order to promote better application of artificial intelligence services in practice.

1. Introduction

With the rapid development of artificial intelligence and mobile Internet, artificial intelligence services appear in the form of vending machines, shopping mall artificial intelligence guide robots, artificial intelligence customer service and other forms in social life. The emergence of artificial intelligence services has greatly reduced the labor cost in the service industry, and at the same time has greatly increased the efficiency and quality of services. Digitization and intellectualization have become the core force and key driving factor for enterprises to enhance their competitiveness. For the service sector, AI has been applied to several service sectors, including sales, education, communications, health and social services, and tourism, according to the World Trade Organization's Bureau of Statistics and Bureau of Information Statistics (SISD) Classification table of International Trade in Services. These shifts will change service marketing strategies, business models, and customer behavior.

This paper mainly combs the literature of core publications in the field of marketing. It summarizes customer behavior in the context of service intelligence and discusses the changes of the traditional theory of service marketing under the background of artificial intelligence. Firstly, the connotation of artificial intelligence service in the existing literature is sorted out, and the concept, application, advantages and disadvantages of artificial intelligence service are deeply discussed. Secondly, the theoretical system of artificial intelligence service field is summarized and sorted out. This paper provides directions for future research in order to promote better application of artificial intelligence services in practice[1-3].

2. Concept of AI service

Service is an operation model in which users obtain commodity consultation offline and through purchasing commodities. How to define AI services has always been the focus of academic research. This paper argues that the concept of Internet knowledge payment can be understood from the aspects of e-commerce, behavioural science and knowledge management:

(1) From the perspective of electronic commerce, AI service is a process in which users communicate or perform a series of operations to obtain products or information through AI robots or programs in order to obtain specific information. In this view, the essence of AI services is the exchange of information over the network, it is the exchange of information or commodity and value between commodity producers and commodity consumers. Looking at the number of repeat visits to AI services by Internet users, that is, to describe and judge the transaction activities using its material wealth or information acquisition services.

(2) From the perspective of behavioral science, AI service is the consulting and consumption behavior of online or offline users on product information and services. Specifically, it includes information acquisition and consulting behavior in the early stage of consumption, information processing in the middle stage of consumption, commodity purchasing behavior, after-sales treatment in the late stage of consumption, and product consumption experience evaluation behavior: 1) The late stage of AI service determines the user's satisfaction with AI service and whether it will be reused and visited. The early stage of AI service is the basic stage when consumers implement inquiry behavior in order to obtain product information and related services. 2) The middle stage of AI service is the process from receiving commodity information to making a decision whether to purchase commodity or information. 3) The late stage of AI service determines the user's satisfaction with AI service and whether it will be reused and visited. The convenience or value obtained by the customer from the AI service process will be presented in the later satisfaction evaluation[4-7].

(3) From the perspective of marketing, AI services are a convenient and low-cost way to capture customer preferences and shopping habits, how to make good use of AI services, to provide users with better shopping experience and more accurate product marketing strategies, which is the big question marketers are thinking about when it comes to AI services.

3. Theories Applied in AI Service

Scholars have made various discussions on the mechanisms that affect customers' attitude or acceptance behavior toward AI. This article will summarize and sort out the main viewpoints of the academic circle, which are divided into technical dimension, social dimension and individual dimension.

3.1. Theories of Technical Dimension

The theories of the technical dimension include technology acceptance model, perceived control, neglect of uniqueness, the degree of adoption of robotics, etc.

(1) Technology Acceptance Model, TAM

According to the Technology acceptance model (Davis, 1989), perceived usefulness and perceived ease of use affect users' attitudes toward and acceptance of new technologies. Among them, perceived usefulness reflects the degree to which users believe that the technology is conducive to improving their work and life efficiency, that is, the efficiency that users perceive when using the new technology is improved compared with the original technology; Perceived ease of use reflects how easy users think it is to use the technology, which means the time or effort cost

to use the technology[8-12].

Some scholars have pointed out that the improvement of ease of use and usefulness and its consistency with social norms have a positive impact on customers' acceptance of AI services (Schepers & Wetzels, 2007), which means that increased usefulness and ease of use are positively correlated with user acceptance of AI services. Individual users are often willing to adopt new technology to change their habits when it can improve their experience and use efficiency (Zhou et al., 2010).

At present, most empirical studies on people's adoption of artificial intelligence technology are based on the Technology Acceptance Model (TAM). However, only based on the usefulness and ease of use of the two dimensions of the model can not deeply verify the exact impact of AI services on consumer psychology and behavior. Therefore, some scholars have proposed the Integrated Technology Acceptance Model (UTAUT) based on the core content of the eight theories, such as social cognitive theory and rational Action theory, which contains four core determinants: performance expectation, effort expectation, social influence and convenience. Performance expectation refers to the degree to which the individual feels that using the system will help the job. Effort expectation is the amount of effort an individual must put into using the system. Social influence refers to the degree to which an individual feels the influence of the group around him or her. Convenience refers to the extent to which individuals feel that the organization supports the use of the system in terms of related technologies and equipment. It should be noted that the integrated technology model is based on the technology acceptance model to carry out more dimensions and in-depth analysis. It is the same as the technology acceptance model, which is the user's personal feelings.

According to the theory, the performance expectations of AI, such as perceived usefulness and perceived ease of use, as well as internal and external factors, such as effort expectation and social influence when using AI, determine the user's willingness to use AI in tasks. At the same time, gender, age, use experience and other characteristics play a moderating role.

Using more dimensions in this model to explore the factors that affect customers' attitude or acceptance behavior toward AI is conducive to a deeper study of customer behavior under the background of AI. However, the number of studies using this model is still small. At the same time, some researchers have pointed out that there are problems in applying classical TAM or UTAUT to AI without modification (Flandorfer, 2012). Because these classic models were developed in the context of technologies that were more than a decade old, the "new" technologies they discussed (i.e., instant messaging, telecommuting, etc.) were nowhere near as transformative as AI (Deng Shichang, 2022)[13-17].

(2) Control

Control comes from the interaction between people and the surrounding environment. The process of control is the process of assigning personal will to the object of control. According to the theory of customer perceived control, customers need a sense of control in service contact, which is an important driver of customer satisfaction and usage behavior. Customer perceived control includes behavior control, decision control and cognitive control. Perceived control is a subjective belief that has nothing to do with external environment and is related to psychological ownership (Atasoy & Morewedge, 2018).And it proved to be more important in identity-related tasks (Leung et al., 2018).

Studies have shown that AI services affect and threaten users' perceived control (Jörling etc., 2019), for example, the instability of new technologies reduces users' sense of control. The user's perceived data capture experience during human-computer interaction may challenge the user's sense of control over the ownership of personal data. Some users may even feel the loss of control over their privacy due to the overly accurate recommendation, so as to give up

consumption(Davenport etc, 2020).In addition, users' desire for control also varies according to their cultural background, for example, Easterners' perceived desire for control is lower than Westerners'(Bellisa & Johar, 2020)[18-22].

In AI services, the main strategy to maintain customer cognitive control is information transparency. The transparency of AI service information refers to how well consumers know the information used by AI service providers when using AI services, that is, how well consumers know the information used by AI. Studies have shown that AI will eventually affect user acceptance due to privacy and security issues(Grewal et al., 2020 and Du Jiangang, 2022).Therefore, the standard of AI information transparency is conducive to the establishment of dependencies(Ji Dongmei, 2022).Some scholars have shown in their research on the improvement of trust by AI service information transparency that AI information transparency has a significant positive promoting effect on customer fit(Yang Zhiyong, 2022).The more transparent a service is, the more users will know what information the enterprise has about users and how that information will be used. The more transparent and easy to interpret the service, the more users will be inclined to use the service (Shin, 2020).

Therefore, in the context of AI service, AI information transparency can provide users with more information under the condition of low perceived control, so that users can improve their willingness to use it. For a customer who is not familiar with AI system, information transparency can make him know the usage status of the collected information, so as to enhance his perception control of AI services and be more willing to use AI intelligent services. Transparent behavior of artificial intelligence can maximize social welfare and shoulder social responsibility (Xiao Hongjun, 2022).

Some studies believe that the improvement of perceived control will effectively drive customers' consumption behavior, and also have an important impact on customers' attitude and acceptance of AI (Du Jiangang, 2022).Therefore, how to effectively improve the perceived control of users and enhance the initiative and sense of control experienced by users in human-computer interaction is also an important direction of the following research.

(3) Uniqueness neglect

Human beings constantly emphasize individual uniqueness, which is about how humans perceive and portray their differences from others, and ultimately distinguish themselves from others. Everyone has different consumption levels and habits, and consumption can be used as a way to separate ourselves from others. Users began to pursue individuation, and their needs such as reflecting personal taste through products became increasingly prominent (Liu Yufei, 2018).As a result, automation products may not work well when users feel their personal uniqueness is threatened.On the one hand, some scholars have pointed out that artificial intelligence has brought a positive impact on users' perception of uniqueness. For example, user demand-oriented AI services should be provided (Dong Liangguang, 2017), the potential needs of users should be mined, and problems should be solved for users based on scenes (Yin Bin, 2017),personalized and customized solutions should be created for users, which can make consumers feel that their personal needs are more deeply understood. When the service of artificial intelligence meets the needs of users, the higher the acceptance of users will be (Du Jiangang, 2022).However, on the other hand, due to the consistency of content implantation algorithm, service-oriented artificial intelligence cannot show the heterogeneity of services (Wirtz et al., 2018).And uniqueness neglect is the psychological driving force for consumers to resist medical artificial intelligence services (Longon et al., 2019).The more unique consumers perceive themselves, the more resistant they are to medical AI services[23-28].

It should be pointed out that the current personalized intelligence technology is still in the homogenized large-scale personalized technology stage (Wu, 2018).On the AI research and

development, the future will based on the unique mechanism of neglect, emphasis on artificial intelligence to personalized to meet user requirements, such as multivariate cross-media Tesco database construction, demand characteristics of the mining system (Liu Yufei, 2018), reduce the uniqueness of the users feel neglected, in order to enhance the user acceptance of artificial intelligence.

(4) Degree of robotics adoption

From the degree of robotics adoption (DRA) of enterprises (Xiao and Kumar, 2021). It is proposed that employee acceptance of robots (EAR) and user acceptance of robots (CAR) jointly affect DRA. Among them, EAR is affected by enterprise characteristics, employee characteristics and robot characteristics, while CAR is affected by user characteristics.

Some scholars believe that with the great changes in the three vertices and three edges of the service triangle (namely, enterprises, employees and customers, external marketing, internal marketing and interactive marketing),it is necessary to strengthen the research on other reactions caused by customers' contact with AI services, such as employee anxiety about losing their jobs, the lack of emotional transmission ability of machines may lead to the lack of interactive marketing and so on (Du Jiangang, 2022).

In the future, we need to pay more attention to the impact of the application of artificial intelligence services on the original employees in the service industry, and how can companies organize to make their employees more effective at working with AI. At the same time, it should be noted that enterprises still need to pay attention to developing talent, such as optimize the curriculum design of talent training, improve the business capacities of practitioners and so on (Liu Yufei, 2018).

3.2. Theories of Social Dimension

Theories of the social dimension include trust, warmth and competence, and compassion and empathy.

(1) Trust

In this theory, trust is defined as the willingness of whom trusts the other party and willingly in a weak position because of the expectation that the other party will take actions which are important to him, without considering the ability of supervision or domination. Trust is an important factor in maintaining a sticky relationship. If users lack trust in a service, they will be less likely to use it. In other words, trust is a strong determinant of service usage (Gefen et al., 2003).In the traditional service marketing concept, trust has a positive impact on improving customer loyalty and customer fit (Cao, 2009).But in research on AI services, lack of trust is often cited as a major barrier. People often exhibit "algorithm aversion" and a low tolerance for errors in algorithms. The higher the trust of users, the more inclined they are to use the system (Lin, 2014).

The external manifestations of artificial intelligence (such as appearance image, etc.) directly affect users' impression on it (Du, 2022).Some scholars believe that anthropomorphism is a factor that promotes trust (Duffy, 2003; Richards & Bransky, 2014),and the more human-like AI is, the more likely it is to be trusted and accepted by users. Meanwhile, when the degree of anthropomorphism is high, customers can feel its cognition and capacity better (Yang, 2022).But at the same time, some studies show that anthropomorphism has an inverted U-shaped relationship on users' intention to use (Zhang & Wang, 2022).On the one hand, if a user correlates human rational thinking and emotions with the robot, they will understand the robot's capacity better, because people think that is more like human appearance of virtual objects is considered to have more to make decisions and more trustworthy (Gong, 2008).In other words, when the robot's appearance is similar to human, the user may have a higher acceptance for it. However, on the other hand, due to

the "uncanny valley effect", robots which are too human-like may bring potential fear, insecurity and distrust (Gray & Wegner, 2012).Therefore, the current research has pointed out that the anthropomorphic is the concept of diversification (Yu & Xu, 2020).We can based on a habit of human that associated animals with certain properties, such as dogs with loyalty and fox with cunning the cunning fox. We can make the appearance of robots look like animals who gotten a high degree by human, which will improve the user's trust and emphasized the high capacity at the same time (Deng, 2022).

In addition, some scholars pointed out that users' privacy data can be desensitized by establishing a perfect security prevention system and strengthening access control, so as to provide a stable environment for users and guarantee user privacy to improve user's trust (Fan, 2021).

(2) Warmth and competence

In terms of content, social judgment has two basic dimensions: enthusiasm and ability (Fiske et al., 2007).The enthusiasm dimension mainly reflects personal characteristics, such as positive aspects (friendliness et al.) and negative aspects (fraud et al.).The ability dimension mainly includes traits related to ability status, such as positive traits (self-confidence et al.) and negative traits such as (stupidity et al.) (Zhang & Wang, 2011).When a person is rated highly on the enthusiasm dimension and has high competence, people will have a better attitude towards him.

When this judgment is applied to AI, it is different from the judgment of people. On the one hand, AI is essentially a robot developed for utilitarian purposes such as more accurate computing requirements, so its ability seems to be more important than enthusiasm. On the other hand, robots that are more human-like will be considered by consumers to be more suitable for establishing emotional connections, thus increasing thermal emotions. However, anthropomorphic robots affect enthusiasm judgment, but do not affect people judgment for its abilities. For example, based on command compliance theory and social exchange theory, the politeness of robots will adversely affect patients' compliance, and a high level of politeness may not improve the effectiveness of robot medical treatment (Lee et al., 2017).And once the robot becomes too enthusiastic or too human-like, the Valley of Terror effect will occur, which will eventually lead consumers to reduce their willingness to use it[29-31].

Also, some scholars have pointed out that the perception of "high ability and low enthusiasm" of will affect someone's attitude towards others. Once people think that someone is "high ability and low enthusiasm", they will think that he deserves respect, but it is not worth loving and relying on him. Therefore, people not only hope to take advantage of the high ability of AI, but also want to maintain an emotional distance from AI (Deng, 2022).And in the perception of "high ability and low enthusiasm", if the group is consistent with people's stereotype of it, the effect of the stereotype will trigger a more violent response (Yang, 2019).

(3) Sympathy and empathy

Compassion and empathy are important aspects that affect the customer experience, but at present, it also are the two human qualities that machines lack most (Du, 2022), so how to improve the compassion and empathy of artificial intelligence services has become a technical challenge.

Compared with artificial intelligence robots, consumers are more likely to believe that real human employees will sympathize with and understand them. For example, in the medical industry, people are very resistant that artificial intelligence issues medical advice and cares for patients. So artificial intelligence services are often only used to deal with daily tasks, and the main responsibility for patient care belongs to human doctors (Khanna et al., 2020). If customers know that dialogue partners are not human, they will make a rude response and the purchase volume will decrease (Luo et al., 2020).

In the future, we can study how to enhance the compassion and empathy of artificial intelligence, how to show more compassion and empathy, and what attributes of robots can make consumers feel

more real compassion and empathy. In addition, attention can also be paid to how to take remedial actions when customers feel the lack of artificial intelligence's compassion and empathy.

3.3. Theories of Individual Dimension

Theories of individual dimensions include spiritual intuition, perceived risk and individual innovation.

(1) Theory of Mind

Mind is a key element in distinguishing human beings from other non-human entities. Scholars put forward the theory of Mind, which attributes the Mind to two dimensions: agency (the ability to analyze and inference) and experience (the ability to experience and empathy).If people feel that the perceived object lacks any of them, especially in the experience dimension, people will deny that he is human, thus refusing to interact with him on an equal footing (Gray, 2007; Waytz, et al., 2010).

From this theory, people may think that AI is not worthy of human beings at a same spiritual level (Waytz & Norton, 2014). People still prefer to associate AI with "activity" rather than "sensibility", believing that AI is suitable for work that requires ability such as high-precision computing. But people cannot accept AI to engage in work that needs "sensibility" such as patient care. Scholars point out that people may tolerate AI being more dynamic than human beings, but they will retain "sensibility" as a unique human trait. Although AI has breakthroughs and developments in the technology of perceiving and responding to emotions, people still believe from the bottom of their heart that robots do not have human emotions. Even many scholars believe that AI cannot simulate human emotions. For example, the love of human cannot be replaced by machines (Li Feifei,),and AI cannot simulate the creativity of human beings (Zhong Yixin, 2016).People refuse to have a deeper emotional communication with robots, which affects people's attitudes and acceptance of AI.

However, some scholars have found that children interact much more actively with AI. Kids often regard robots as their friends and have more emotional interactions with AI. The younger kid, the more active human-computer interaction. Some scholars interpreted the users' mind of AI as a stereotype (Deng Shichang, 2022), and pointed out that stereotypes are formed for the following reasons. First, because the technology was not mature at the birth of AI, the experience of human-computer interaction in the early stage was unpleasant. Second, the mass media in society have long described AI as a machine has highly intelligent but lacks emotions (Cheng Lin,2020),which have greatly affected people's attitudes towards AI.

How to promote human-computer interaction and break stereotypes in the future is a direction worth studying. At present, some scholars believe that the more frequently users use AI products, the easier it is to break this stereotype and establish a quasi-friendly relationship with AI (Deng Shichang, 2022).

(2) Perceived risk

When purchasing, consumers cannot predict the purchase result and the probability of the result, and consumer behavior may produce unsatisfactory results. Therefore, scholars define the uncertainty of users' perception of the result as perceived risk and emphasize that perceived risk is a risk that people are subjective aware of (Bauer, 1960). Perceived risk can be divided into several dimensions according to the situation, including functional risk, privacy risk, economic risk, and psychological risk.

Perceived risk has been proved to have an impact on the willingness to use. When users perceive that the use of a new technology or service may cause losses, perceived risk will occur, and perceived risk will further affect the willingness to use (Zhang Min and Yang Lule, 2016), and ultimately reduce the willingness to use. Therefore, in the future, it is necessary to further study

how to reduce the perceived risk of consumers and improve the willingness of users to use, such as increasing the certainty of results or reducing the degree of loss of results.

(3) Personal Innovation Theory

Individual innovation is a characteristic of individuals, which refers to their ability to adapt to and accept new things. Scholars put forward the Personal Innovation Theory of Information Technology (PIIT), defined individual Innovation variable as the willingness of individuals to try new technologies, and applied it in the study of Technology acceptance (Agarwal R et al., 1998). Since individual innovation will stimulate the curiosity of users and make them more likely to accept new technologies, individual innovation directly affects the willingness to adopt technologies (Rogers E M, 1997). Individuals with higher innovation are more willing to try and use new technologies, and the higher the degree of new technologies, the higher the willingness to use them (Aharony N, 2013). Scholars therefore believe that innovation is an important psychological factor affecting customers' use of AI services (Xu Xinyu, 2014). Some scholars also believe that individuals with strong self-efficacy of technology use (that is, a person believes in his or her ability to use new technology) are more likely to enjoy the process of human-computer interaction (Deng Shichang, 2022).

4. Conclusions

In general, artificial intelligence has brought great impact to both service researchers and practice circles, and the relevant theories about service also need to be re-examined. Moreover, digitalization and intelligence have become the core strength and key factor for enterprises to improve their competitiveness. How to make artificial intelligence truly serve enterprises and customers will be a severe test for management departments and service-oriented enterprises.

In view of this, this paper systematically sorts out and reviews the current literature related to AI service marketing research from two aspects. Firstly, this paper briefly summarizes the connotation, application fields of artificial intelligence in the service field. Second, we summarize the existing theories from technical dimension, social dimension and individual dimension, in order to provide directions for future research.

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