

# 인공지능 기능성이 온라인 상점의 이미지와 지속사용의도에 미치는 영향 연구: 자원기반관점을 중심으로

## Effects of Artificial Intelligence Functionalities on Online Store'S Image and Continuance Intention: A Resource-Based View Perspective

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### 초 록

온라인 상점에서 인공지능 기술의 채택이 지속적으로 증가하는 중이다. 그러나 각 인공지능 기능이 온라인 쇼핑에 대한 소비자의 지속사용의도에 어떠한 영향을 미치는지 여부를 실증 분석한 연구는 거의 없다. 따라서 본 연구의 목적은 실증연구를 통해 온라인 상점의 지속사용 의도에 인공지능의 주요 기능이 미치는 영향을 이해하는 것이다. 특히 온라인 상점 자원으로써의 인공지능 기능이 자원 기반관점에서 온라인 상점의 차별성에 어떠한 영향을 미치는지에 초점을 맞추고자 한다. 또한 인공지능 기능과 지속사용의도 간의 매개 효과로서 온라인 상점 이미지를 고려하였다. 설문은 중국 소비자들을 대상으로 실시하였으며 분석 결과 온라인 상점에서 인공지능 기능의 존재가 자원 기반 관점에서 지속가능성에 긍정적인 영향을 미친다는 것을 알 수 있었다. 또한 인공지능 기능은 제품 및 서비스의 이미지에 긍정적인 영향을 미치며, 인공지능 기능에 의한 온라인 상점 사용 의도에 영향을 미치는 방식에 차이가 있음을 발견했다.

### ABSTRACT

The adoption of artificial intelligence technology is continuously increasing in online stores. However, there have been no empirical studies that examine whether each of the artificial intelligence functions affects consumers' continuance intent to shop online. This study aims to understand the effect of the main function of artificial intelligence on the continuance intention of online store via empirical analysis. In particular, we focus on how artificial intelligence as a resource affects the heterogeneity of online stores in terms of resource-based views. We also analyzed the mediating effect of online store's image (product and service) between artificial intelligence (AI) functions and continuance intention. The results suggest that the presence of AI function on online stores positively influence the continuance intention from the resource-based perspective. Furthermore, it was found that AI technology positively affects the image of a product and service. We also found that there was a difference in the way of influencing the intention to use online stores by AI functions.

**키워드** : 온라인 상점, 지속사용의도, 인공지능, 자원기반관점, 기업 차별성

Online Store, Continuance Intention, AI, Resource-Based View, Firm Heterogeneity

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea(NRF-2017S1A3A2066740).

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Received: 2020-03-28, Review completed: 2020-04-27, Accepted: 2020-05-11

## 1. Introduction

Given the advancements in artificial intelligence (AI) technology, various AI functions, such as speech or image recognition, intelligent recommender, and chatbots are actively being used as differentiating factors by online stores [41, 57]. There are several studies being conducted on AI users' intention to use these AI functions [46, 52, 84]. However, AI functions are varied from recognition, reasoning, learning, to various other functional aspects. Therefore, evaluation of AI as a whole is difficult. Note that, most studies, including those of AI-enabled services [100], are facing limitations such as not being able to separate AI functions into subcategories; moreover, they have focused on AI itself as the target of the evaluation. Several other studies have actively examined which AI function would affect intention to use such as personalization techniques [35], recommendation [99, 127], image recognition [135], and authentication technology [58]. Nevertheless, it is not enough to explain the overall introduction of AI or the intention to use AI with only one of the abovementioned AI functions because the experiences offered by each AI function are diverse. For example, if AI is divided into three categories of recognition, reasoning, and learning, there are differences in recognition methodology or algorithm for the recognition function depending on its targets such as speech recognition and image

recognition. Furthermore, there are various different methods to present the results of reasoning to consumers. The learning function can also contribute for the promotion of convenience and pleasure in shopping by having AI to learn consumers' buying patterns such as personalized recommendation. Unfortunately, very few empirical researches have been conducted on the effect of each AI function on consumers' continuance intention toward online stores.

Therefore, the aim of this study is to understand how the key AI functions implemented by online stores are affecting the online store visitors' continuance intention via empirical analysis. In particular, the study will examine how online store's AI functions affect each of the online store's image properties (product, service, and design). Furthermore, as customers adapt to services to the AI functions are added, service providers may consider implementing AI technologies (i.e., big data analysis, image recognition, and machine learning) as the firm's primary resources that will help separate themselves from other competitors [2]. Therefore, AI will be considered as a new resource that generates a firm's competitiveness as AI differentiates the way in which the firm builds its products and services [3]. Accordingly, the study will also attempt to explain the effects of AI functions on consumers' continuance intention toward online stores from resource-based views.

## 2. Literature Review

### 2.1 AI Functions in Online Stores

AI technologies are being successfully applied in most fields, including science, engineering, and education. Accordingly, online stores are aiming to offer a more “natural” experience to their users by adding AI-based components. AI functions can be divided into three categories of recognition, reasoning, and learning [109], and are used in online stores in the following ways.

First, the recognition function in AI is useful for improving online stores’ search function. Note that search cost may have a huge impact on consumer behavior [131]. Nevertheless, traditional, keyword-based search decreases accuracy, resulting in increasing search cost and leading to unpleasant user experience [5, 28]. To overcome such limitations of the keyword-based search parameters, speech recognition-based search has been proposed [20, 112]. After Hanson et al. [56] proposed a method with which you search websites via voice, various speech recognition-based search methods have been proposed using voice input by virtual agents for use in speech recognition in search-based products [112]. More recently, multimodal searching and customized speech feedback function have also been proposed [91].

Second, searching in online stores may use image recognition. Image recognition is advantageous because online store users’ deci-

sion to purchase is largely affected by the visual appearance of the product [113]. Therefore, “search” and “recommendation” function based on visual features in images has been proposed [15, 87], which offers a superior potential to the existing, text-based search [65]. Techniques used for image-based searching in online stores include computer vision [34, 119], CNN algorithm [70, 117], and the multimodal method [87].

Third, AI’s purchasing pattern learning function indicates that AI generates new knowledge related to purchasing patterns using consumers’ purchase history; moreover, such history is then used for realizing the recommendation function in online stores based on the learned purchasing patterns.

Fourth, a chatbot is a virtual service robot that can offer man-machine interaction [74, 134]. It is agent that combines natural language processing based text recognition and reasoning. Interestingly, a chatbot allows real-time interactions for obtaining information that is useful for shopping [55]; therefore, it strengthens the relationship between customers and the brand [48] as well as offers positive shopping experiences [66]. E-service agent, a type of the chatbots, is a personal helper that establishes a continuous relationship with important customers, helps customers to efficiently use their time, and offers a better understanding of the product’s performance [77, 93].

Finally, e-service agent offers a comparative shopping function. Because online stores

provide products in a considerably spread-out price range, information related to price comparison is crucial for online shoppers who are looking for the best deals. Not only can websites that are focused on price comparison reduce their efforts in finding information on products and services, they can also play a key role in changing price awareness. Furthermore, price comparison affects consumers' value recognition and consequent purchase decision. AI-based price comparison encourages customers to make faster purchasing decision and purchasing acts [14].

## 2.2 Resource-Based View

Resource-based view (RBV) is one of the most widely adopted theories in a strategic management [107], which assumes that a firm secures its competitive edge by generating values through resources [62]. These include a firm's assets, capability, process, knowledge and awareness [12], and they allow for the establishment and realization of competitive strategies. According to RBV [12], a firm achieves its continuous competitive edge and acquires efficiency compared to other companies via its unique resource binding [127]. RBV is based on resource heterogeneity (the resources owned by a firm may differ from its capability) and resource invariability (such a difference may be prolonged)[89]. A firm's resources contribute more toward its sustainable competitiveness if the resources are rarer,

more difficult to be replaced or imitated [11, 83].

IT has also considered as an important firm resource [7, 99] and the contribution that IT makes to the firm's value is explained using RBV [90, 126]. For example, Santhanam and Hartono [111] showed that IT resources could create a unique capability that leads to a competitive edge and improves the organization's financial performance. While IT resources produce more business effects in a stable environment compared to a dynamic environment, IT capabilities can generate more business effects in a dynamic environment [127]. IT resources and IT capabilities lead to IT supports for competitive strategies and core capabilities, which has a positive impact on a firm's outcomes. Companies with higher IT capability produce better outcomes [88]. According to Chen et al. [37], a firm with excellent IT capability achieves its unique, abnormal profits more than its competitors and can recover faster compared to other firms. However, studies have not agreed on how a firm creates heterogeneity or how it affects its competitive edge over other companies [27, 88].

## 3. Research Model and Hypotheses

<Figure 1> shows the research model proposed in this study. Using RBV as its basis, the AI functions that are added to an online

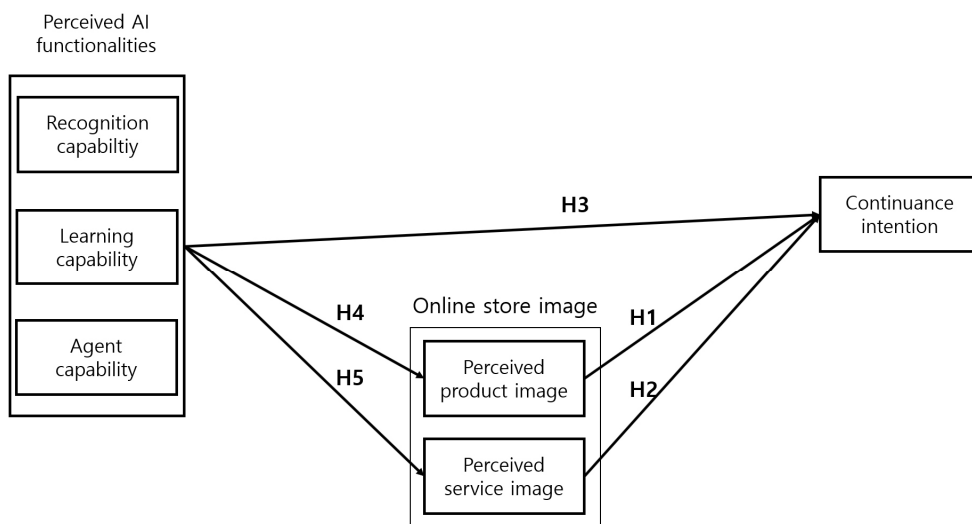
store shall be considered as the online store's tangible resources. Moreover, these resources produce an intangible resource called the image of the online store, which creates its heterogeneity from other online stores. In fact, it would have a positive effect on the online store's continuance intention. Continuance intention is consumers' intention to re-purchase products that they had previously purchased or their intention to repetitively use services that they had used before [22]. Because continuance intention in information system is a key performance variable [19], the continuance intention of an online store is defined as the state in which users tend to continue using a specific online store [6]. Furthermore, in terms of AI functions, the study considered some of the most widely used online store functions such as price comparison, speech recognition, chatbots, buying pattern learning,

and image searching. We excluded the recommendation function because it can be incorporated into comparative shopping, chatbots, or buying pattern learning [133].

### 3.1 Perceived Online Store Image as a Firm Heterogeneity

A store's image is categorized into perceived product image and perceived service image [64, 102]. Perceived product image or service image is regarded as a firm heterogeneity and significant factor of a consumer's cognition development [53]. Therefore, the perceived products and service images affect customers' evaluation of the firm that offers such products or services.

First, a perceived product image signifies the product components required for the product to perform functions that customers want



〈Figure 1〉 Research Model

such as price structure, quality, buyers' feedback on the product, and product design brand reputation [114]. It has been widely recognized that brand image is one of the most valuable assets for a firm [79] because it is recognized that the strong brand image that an online store possesses is valuable, guarantees uniqueness that other online stores do not have, and is a resource for an imperfectly imitable firm. Such value of the resource as a brand image is also valid for online firms such as e-retailers [40]. Thus, the product image in an online store will have a positive contribution to the online store's heterogeneity. For example, when a certain online store offers reasonable price for its products on display [116] and offers high quality products, i.e., the online store has good product images perceived, customers feel that it is differentiated from other shopping malls.

Furthermore, a store image has a direct and positive effect on the purchase intention [113, 132] and customer loyalty [25, 120]. Within the online store's context, customers prefer positive product images and want to revisit online stores with better quality products. In fact, online store visitors prefer the online store with a diverse range of products [82, 94], which will have a positive contribution to their continued intention to visit. In other words, customers' perceived image in online store products will affect the continued visit to the online store. Therefore, the following hypothesis has been established in this study.

H1: The positively perceived product image of an online store will have a positive effect on continuance intention.

Second, the perceived service image is a subjective thought created when an online store solves customers' inconvenience or complaints and helps customers use the store [102].

A service provider constantly enhancing its standard of service, creating a consistent, superior service image with its guests is a key service image that affects the differentiation, i.e., heterogeneity of the service [121]. In fact, because services have more diverse service provisions compared to products, two services are rarely identical [101]; moreover, it is easier to differentiate services from one another [118]. In particular, online stores allow more personalization, more diverse navigation routes, more cost-effective in creating backgrounds or atmosphere compared to offline stores so that service images will affect the differentiation of online stores.

Furthermore, a service image is known to affect revisits or continued intention to visit by promoting customers' loyalty [93], which is widely supported by the results from empirical studies in entertainment services such as tourism services [67], as well as educational services [71]. Moreover, service image is closely correlated to the image of the firm that offers such services [105]. For online stores, visitors experience the feelings of fun, joy, and relaxation while navigating online

stores [132]; therefore, their service images would not be considerably different from that of offline stores. Furthermore, online stores are intangible shopping spaces and, in addition to product information, most features of online stores are related to services offered by online stores, i.e., reaction speed, ease of use, quality of customer service, payment methods, shipping speed, safety in transportation, and after-sales service, are included in the service properties of online stores. Thus, customers' perceived overall quality of service offered by online stores will affect continuance intention [116]; therefore, this study established the following hypothesis.

H2: The positively perceived service image of an online store will have a positive effect on continuance intention.

### 3.2 Perceived AI Functionality as a Resource

Information technology from RBV has been considered one of the key resources that can promote a firm's financial performance [17; 111] and organizational agility [86]. IT can be divided into various types [18]; therefore, AI technology, as a type of IT, will contribute to a firm's performance. From the RBV perspective, the heterogeneity of a firm's resource affects its performance [17, 85]. Therefore, the heterogeneity of an online store based on IT helps differentiate the shopping mall

with AI functionality from those without it, thus maximizing consumers' continuance intention for the online store.

Various studies have introduced IT functionality as a type of capability, e.g., Cha et al. [32] showed that a perceived robot capability has a significant impact on the intention to use a robot. Moreover, microblogs offer various media capabilities that satisfy media users' requirements [127]. In particular, the time updating functionality, such as breaking news or status updates, in microblogs is one of their key capabilities [122].

In this study, we acknowledge that the AI functionality adopted by online stores these days there is an important IT capability. The perceived AI functionality is a subjective perception of online store visitors who are aware of the specific AI functions offered by the said online store. If visitors are not aware of or cannot find any AI techniques, although these techniques are being adopted by the online store, these AI functions will not have any effect on the visitor's attitude or evaluation toward the online store. Thus, the existence of certain AI functions in a certain online store was considered to be a subjective judgment in this study.

Our research model considers perceived AI functions and not AI functions, because the existence of such AI functions would have no relation to the visitors' satisfaction toward said functions or online store or continuation intention unless they are made aware of specific

AI functions implemented on the online store [32]. The under perception (true improvements in capability may not lead to perceived improvements) or over-perception (true improvements in capability may lead to additional perceived improvements that do not actually exist) that may occur is significant from the visitors' subjective evaluation of the online store.

### 3.2.1 Recognition Capability

Recognition capability, one of the core functionalities of AI, recognizes analog data, such as sentences, pictures, or speech from human beings, and understands their meaning. Recognition capability is measured by recognition accuracy, operability in various OSs, recognition speed for real-time recognition, recognition cost (need for high-quality microphone, recognition SW price, and computational power consumption), and multilingual support. Such recognition capability is used in various products and services such as healthcare [124], home appliances [103], and wearable devices [8] to contribute to the improvement of users' satisfaction.

#### 3.2.1.1 Speech Recognition

Speech recognition allows users to search products via voice. The content of the speech is identified through a server and the recognized results are used to search information. For example, GOME Electrical Appliances, the only Chinese online store that offers search

functionality through speech recognition, allows users to click on a microphone-shaped icon on the search window and say the product that they want to search and see the search result. In this process, the users do not need to type characters.

Note that users' search cost is the amount of time used by them to search products or services on the internet [10]. Smith et al. [115] showed that the reduction of search cost increases the efficiency of the internet market. A search engine's capability means the function that the search engine offers to improve the end users' convenience and effectiveness [28]. As one of the functionalities of search engines, speech recognition can affect the search performance and reduce users' search cost.

Speech recognition provides users with a unique product searching experience; therefore, it is believed to affect the perceived service image. Moreover, additional design, such as the microphone function on the side of the website, will promote users' interest and positive attitude and provide a positive contribution to the atmosphere attribute.

H3a: Speech recognition in online stores will have a positive effect on continuation intention.

H3b-c: Speech recognition in online stores will have a positive effect on shopping mall image, namely, the perceived product image (H3b) and perceived service image (H3c).



### 3.2.1.2 Search by Image Recognition

Search by image recognition is one of the primary AI methods used to acquire information from people. When consumers cannot provide accurate explanations on the product that they want to search, they can use the product's image, which is then sent to the site's large database for comparison. In this manner, users can identify products that they want and enjoy a convenient shopping experience. Furthermore, images are used in online stores' product listing so that the product search can become more convenient and efficient [30].

The type of search tasks given to users was identified to be a key factor in determining users' search behavior in the information search setting [24]. Complexity is an important dimension for measuring the differences among the search task types [60]. A simple task that is either based on a fact or can be completed has a known target response that the users want to find, whereas a complex task is generally based on research or open-ended questions [21]. If a search task is complex, the users can spend more time in revising questions, filtering information, and determining search results, which results in increasing the search cost. Note that search by image recognition allows users to directly search a product via images, which lowers the complexity level of the search and the search cost.

Product search by image recognition offers the appearance of a product and a key property

of the product information. It will also have a positive effect on the perceived product image. Moreover, by making the product search or selection process more efficient, it is expected to make a positive contribution toward the perceived service image. Furthermore, if the image recognition process is exposed outside and to consumers, it will positively contribute to the atmosphere attribute.

H4a: The speech recognition in online stores will have a positive effect on continuation intention.

H4b-c: The speech recognition in online stores will have a positive effect on the shopping mall image, namely, the perceived product image (H4b) and the perceived service image (H4c).

### 3.2.2 Learning Capability

From a capability approach, individual learning capability refers to the individuals' competencies and motivation to learn [23]. In AI, learning capability is AI's ability to produce new facts or knowledge based on a given fact that is acquired by AI. Learning capability is generally measured by error rates or learning times [36]. A popular learning function used by online stores is the learning of consumers' buying patterns.

#### 3.2.2.1 Learning of Buying Pattern

E-commerce sites have increasingly incorporated tracking technologies that can moni-

tor consumer behavior on their site [42]. The history of consumer behavior then becomes an essential resource of learning the consumer's buying behavior. In particular, AI's key functionality, which is applied to online stores, is to learn the buying pattern of a group [136], such as the character of a target customer [29], whose profile, including customer profiles, shopping mall visiting records, and customer feedback, is similar to those from the customer data. Therefore, for learning and knowledge discovery, supervised learning techniques [104] such as support vector machine [4] are often used.

Such a learning functionality of AI is designed to make online experiences more personal [137]. This indicates that AI's buying pattern learning makes it possible to expect users' more positive attitude toward product purchase. Furthermore, buying patterning learning makes the product selection process more efficient, leading to the improvement of service functionality. Therefore, the following hypotheses were established.

H5a: The buying pattern learning function in online stores will have a positive effect on continuation intention.

H5b-c: The buying pattern learning function in online stores will have a positive effect on the shopping mall image, namely, the perceived product image (H5b) and the perceived service image (H5c).

### 3.2.3 Agent Capability

Software agent is an intelligent program that can simulate human behavior and relationships and automatically and intelligently performs tasks [138]. Having the capability of intelligent and automated dialogs with users and problem-solving, software agents are used in a wide range of areas such as health-care [95] or e-learning [138]. Moreover, for online stores, software agents have been developed and are being used to offer price comparison or chatbot-based shopping support.

#### 3.2.3.1 Chatbot Functionality

Chatbot refers to the attempts of a computer program to simulate conversations between machine and human [80]. After ALICE [33] was implemented by Richard Wallace in 1995, chatbots have been developed further to help user's interact with e-commerce engines [74]. Companies, such as Google, IKEA, AirBnB, Facebook and Tesla, are increasingly relying on artificially intelligent chatbots. The artificial intelligence-powered chatbot uses big data to answer questions from online customers on a real-time basis. The chatbots can learn and improve themselves by remembering similar questions and various scenarios and keywords, which will then be added to its database and help it offer more natural and precise answers with time.

Because chatbots converse with customers just as humans do via texts, they can be inti-

mate [59] and ensure customer loyalty [96]. Moreover, intimacy is a key determinant for continuation intention [76, 97], and chatbots can show characteristics, which if acceptable to customers' preference can fulfill customer satisfaction and trigger intention to revisit [43].

In addition, chatbots in online stores can help customers have a better understanding of the performance of a product more efficiently [77, 93]. As chatbots recommend a product to customers, they can also provide information about the product (price, quality, and design). In particular, chatbots automatically retrieve product descriptions under the categories that are related to inquiry [75]. Thus, chatbots can contribute to the improvement of the product image exposed in online stores [54].

Furthermore, accuracy-related improvements, chatbots allow for the customers to have intelligent social conversations with virtual agents [51]. Interactions between a chatbot and customers is similar to that of sales staff, which affects customers' purchasing decision, saves time, and helps collect advice [61]. Thus, as they are adapted to customers' requests, chatbots reduce shopping-related uncertainty, make search of efficient information possible, as well as establish a positive customer relation. Note that various chatbot functionalities in online stores promote easy production selection and pleasant shopping experiences and thus improve the service image of the concerned online store. Therefore, the following hypoth-

eses have been established.

H6a: The chatbot functionality in online stores will have a positive effect on continuance intention.

H6b-c: The chatbot functionality in online stores will have a positive effect on the shopping mall image, namely, the perceived product image (H6b) and the perceived service image (H6c).

### 3.2.3.2 Price Comparison Functionality

The price comparison functionality of a software agent has a positive effect on the reduction of buyers' search cost and assists in the decision-making process by offering price comparison information that would rarely exist in physical retail shopping situations [28]. For price comparison, software agent uses AI functionalities such as case-based reasoning [72] or evolutionary algorithms [110].

Price comparison in online stores can have a positive effect on the shopping continuation intention. When customers access the online store's pages that have detailed explanations of the product, the website exhibits the product as well as other similar products based on the price comparison functionality. At this point, both the image of the exhibited products and their prices are shown, which becomes the basis for customers to have sufficient time to compare prices of the products and determine their purchase. Therefore, price comparison is considered a key tool in de-

termining the service quality of an online store [63]. Moreover, because customers with more market price information can possess higher maximum permitted price and higher acquisition value than those with less market price information [69], price comparison will increase the usefulness of the online store; therefore, customers will have intention to continue to visit the concerned online store. Furthermore, in addition to showing price comparison results, price comparison functionality also offers information on the trustworthiness of an online store, contributing to the promotion of customers' trust on the concerned online store. Note that customers' trust is a key factor in continuation intention [125]. Furthermore, price comparison functionality reduces the effort of customers who visit several web pages or websites, i.e., the search cost and transaction cost. Such effects of price comparison will result in improving users' continuation intention [81].

Price comparison shows cheaper prices for the same product, making the product seem to have a different image. At this point, because the lower price may also degrade the perceived product quality [47], it can have a negative effect on the product image. However, it makes the product a good deal, which will improve the product image [31]. Nevertheless, price comparison in online stores shows a lower price for the identical product that is not a used product; thus, the product image will not be degraded and it may rather be improved.

Furthermore, price comparison guides customers to products with higher usefulness, and a software agent with price comparison functionality is particularly perceived to be an online virtual guide of sort [73]. Moreover, in addition to price information, price comparison functionality offers prompt updates related to price, information dealing with the price, the graph of price trends, as well as the standard catalog in sequence, all of which are additional services that support and promote purchase of the product. All of these factors will contribute to the improvement of the online store's service image.

H7a: Price comparison functionality in online stores will have a positive effect on continuation intention.

H7b-c: Price comparison functionality in online stores will have a positive effect on the shopping mall image, namely, the perceived product image (H7b) and the perceived service image (H7c).

## 4. Method

### 4.1 Instrument Design

For this study, the variables that were used are based on the questions from previous studies, which were then revised according to the requirements of the study. The questions on the survey were measured by a seven-

point Likert scale (from 1 = Not at all to 7 = Very much so). After receiving the online questionnaire, the survey participants first selected the shopping mall that they would be evaluating. As we targeted residents in China, this study focused on the following Chinese online stores.

TMALL(天貓), JD.com(京東), Suning.com(蘇寧易購), Gome(國美在線), Vipshop(唯品會),

Amazon China(亞馬遜中國), Yihaodian(一號店), Dangdang(當當網), Jumei (聚美优品)

These online stores had at least one or more AI functions; consequently, the study selected functions of speech recognition, image recognition, customers' buying pattern learning, chatbots, and comparative shopping. The survey participants verified if they have visited any one of the above online stores, selected one of them, and responded to questions on the image of the online store, including the subjective perception of AI functionalities and continuation intention. To increase the response rate, the participants were provided with monetary compensation.

#### 4.2 Data Collection and Sample Construction

For the survey, we targeted users in their 20s and older in China who had experience of visiting online stores to verify the proposed model. The validity review of the contents of

the questionnaire was performed by two Ph.D- level experts on behavioral science, which showed no issues in the questionnaires. The data collection was performed for 12 days from September 14 to September 25, 2018, targeting Chinese adults over 20 years old who had visited online stores.

〈Table 1〉 Demographic Attributes of the Participants (n = 400)

	Item	Frequency	Ratio (%)
Gender	Man	201	50.2
	Woman	199	49.8
Age	20s	100	25.0
	30s	100	25.0
	40s	100	25.0
	50s	100	25.0
Academic background	High School	89	22.3
	Undergrads	25	6.3
	Graduate	209	52.3
	After Graduate	77	19.3
Occupation	Student	35	8.8
	Office	144	36.0
	Household	13	3.3
	Specialist	92	23.0
	Others	116	29.0
Visit frequency to online stores	TMALL	119	29.8
	JD.com	93	23.3
	Suning.com	91	22.8
	Gome	56	14.0
	Vipshop	22	5.5
	Amazon China	10	2.5
	Yihaodian	8	2.0
	Dangdang	1	0.3
	Jumei	0	0.0
Total		400	

A total of 415 questionnaires were returned, and after excluding 15 of them whose responses were insincere based on the review, 400 questionnaires were used for the final analysis because they were believed to have no significant response bias that would impede the study's generality. <Table 1> shows the demographic attributes of the participants. There was very little difference in the ratio between men (201; 50.2%) and women (199; 49.8%), and each of the age groups from 20s to 50s had 100 participants (25%). Note that 209 of them (52.3%) were university graduates and 144 of them (36%) were office workers.

## 5. Data Analysis and Results

We used SPSS 22.0 for the demographic analysis of the data and conducted a reliability and validity analysis of the factor analysis results of the measured variables using Smart-PLS. In this study, partial least squares (PLS) was used for the statistical analysis of the research model. Compared to the methods based on components, PLS is advantageous as it requires less restriction on the size of the sample and residual distribution. The collected data were processed using SPSS 22.0; moreover, for the reliability and validity verification of the measured items, Cronbach's alpha analysis and exploratory factor analysis were conducted along with multiple regression analy-

sis to analyze the causal relation between each of the knowledge-sharing activities.

### 5.1 Reliability and Validity

This study examined the reliability, convergent validity, and discriminant validity of the variables used in the measurement model. Reliability is the evaluation of the internal consistency that used the composite reliability (CR) value. Moreover, the internal consistency of the measurement questions was measured by the compound reliability.

To verify the reliability, the study acquired Cronbach's alpha and composite reliability (CR) values. Generally, if both values are 0.7 or higher, the internal consistency is believed to have been obtained [41]. Furthermore, if the average variance extracted (AVE) value is 0.5 or higher, the reliability conditions are believed to have been met.

Moreover, we used the VariMax orthogonal rotation method for the explorative factor analysis, which was performed for validating the measurement items, and the result showed a total of 12 factors for the questionnaires. The factor loading of all measurement items was 0.7 or higher, showing no issue with the validity of the measurement factors. Moreover, using confirmatory factor analysis, the convergent validity, reliability, and discriminant validity were analyzed.

If the cross loading of the measurement variables is 0.7 or higher, the convergent vali-

dity is recognized [41] and the analysis results showed that all factors comprising each variable satisfied the criteria. Using Cronbach's alpha and CR at or  $> 0.7$ , and the AVE at or  $> 0.5$ , the measurement variables are determined to be valid. As shown in <Table 2>, all measurement variables of the study showed 0.834 or higher for Cronbach's alpha value; 0.890 or higher for CR; and 0.731 or higher for the AVE value. This shows that there was no issue with the structural model analysis

Next, to evaluate the discriminant validity, the square root value of the AVE was considered, as shown in <Table 2>. The discriminant validity is considered to have been met if the AVE square root is  $> 0.7$  and exceeds the correlational coefficient between each variable [9]. The diagonal line in <Table 2> shows the square root of the AVE, which was higher than the correlational value between each variable, which was the rest of the matrix values. This shows that the study acquired the discriminant validity. Another method is to verify the cross-loading value [130]. The discriminant validity

is obtained if the loading value of the measurement items against each variable is higher than the cross-loading value. In this study, the factor loading of all measurement items exceeded the cross-loading of the same item, confirming the discriminant validity (see <Appendix B>).

We performed factor analysis to verify the validity of the construct for all measurement variables. The result showed that all factors were extracted equally as factors, which became the basis for confirmative factor analysis.

## 5.2 Hypothetical Testing

For hypothesis verification using the structural model, we used SmartPLS 3.0 to analyze the path coefficient, and we used the bootstrap technique to predict the path coefficient. By setting 5,000 bootstrap samples initially from 400 samples, the study verified the statistical significance. PLS uses  $R^2$  to evaluate the fitness of the structural model [50].  $R^2$  is

<Table 2> Discriminant Validity Analysis Results

	1	2	3	4	5	6	7	8
1. Price comparison	<b>0.779</b>							
2. Speech recognition	0.222	<b>0.761</b>						
3. Chatbot	0.359	0.195	<b>0.762</b>					
4. Buying pattern learning	0.286	0.235	0.321	<b>0.750</b>				
5. Image recognition	0.296	0.273	0.264	0.237	<b>0.750</b>			
6. Perceived product image	0.279	0.202	0.215	0.292	0.272	<b>0.757</b>		
7. Perceived service image	0.279	0.235	0.326	0.327	0.288	0.284	<b>0.729</b>	
8. Continuance intention	0.369	0.283	0.250	0.306	0.303	0.356	0.417	<b>0.766</b>

Note) The values in a diagonal line are the square root of AVE.

divided into high (over 0.26), mid (0.13 - 0.26), and low (0.02 - 0.13). The endogenous variable  $R^2$  included in the research model showed product property at 0.150, the perceived service image at 0.199, and shopping mall continuance intention at 0.302. The explanatory power of the endogenous variables, except shopping mall heterogeneity, was median or higher; therefore, the model was determined to be suitable.

As shown in <Figure 2>, all hypotheses were supported, except H7a, H3b, and H7b. Moreover, the product image and service image from an online store had a significant impact on the online store's continuance intention. Furthermore, AI functionalities applied to an online store, except chatbots, have a significant impact on continuance intention. While

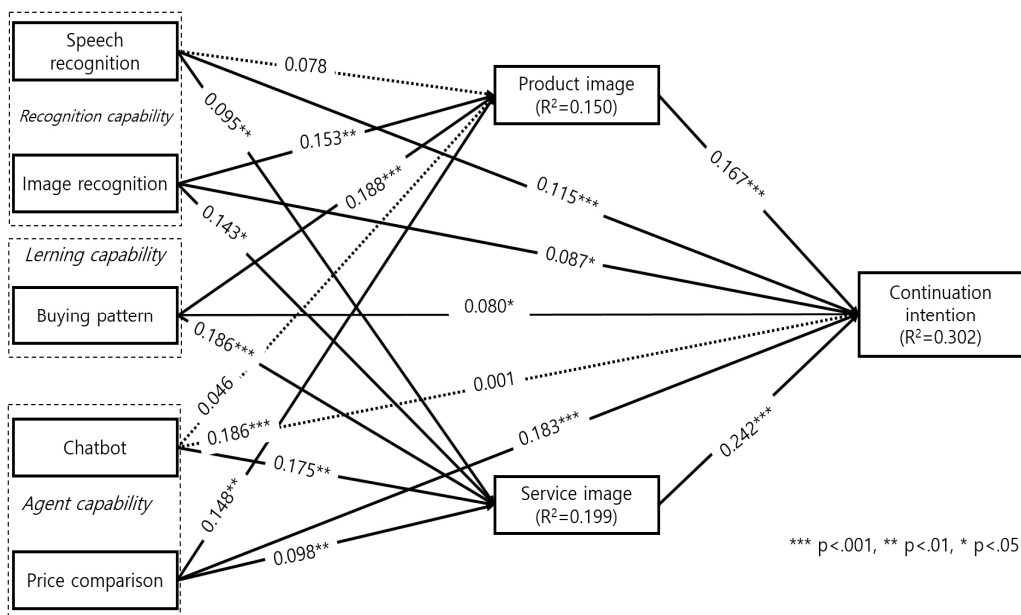
all AI functionalities had significant impact on the service image, chatbots and speech recognition were shown to not have a significant causal relationship with the product image. This indicates that not all property images in an online store are given a uniform role and these properties make different contributions depending on their roles and effects.

## 6. Discussion

### 6.1 Findings

The following key facts have been confirmed based on the results of this study.

First, the online store image, which had been considered a firm's resource, had a posi-



<Figure 2> Path Coefficient Analysis Result



tive effect on continuation intention such that the correlation between the existing shop image and continuation intention [25, 40, 89, 120] was shown to be valid online too.

Moreover, all AI functionalities, except chatbots, had a directly significant positive effect on continuation intention. In particular, price comparison, i.e., the agent's capability, had a significant effect on the continuation intention of all online stores. This realization can be supported by the fact that based on the socio-relational theory, people can feel a para-social relationship from the interaction with software agents, through which they form an intimacy with the online store and feel continuation intention [76].

Next, AI functionalities were shown to have different contributions in establishing the shopping mall's image. First, recognition functionalities have different effects on establishing the online store's image. Speech recognition, on the one hand, was shown to have no significant effect on the product image, although it did affect the service image. Speech recognition was either considered a service for comfortable shopping by contributing to the accuracy or efficiency in product search [28] or perceived to be a service that offered pleasant shopping experiences by allowing customers to have a dialog via voice and improve intimacy [123]. However, speech recognition did not affect the product construction or price setting in online stores. On the other hand, image recognition had a significant effect both

on the online store service image and on the product image. Because searching products that customers want not by text but by image provided a positive impact of alleviating the product search effort, it would provide different service image than other online stores that do not offer image search [30]. Furthermore, because customers can search similar products with images that they prefer, the image of the products, such as the shape or color, would be what they want. This will help the customers form a positive image toward the products from an image-based search.

Second, customers' subjective awareness of the buying pattern learning had significant impacts on both the product image and service image. Having recognized the adaptive change of the list of recommended products or online ads when they leave behind their visit history, customers might have felt that the AI were like a store worker who watches their wordings or behaviors and accordingly proposes products [137]. Therefore, it is highly probable that the recommended product list would be suitable to their preferences [136].

Third, price comparison had significant impact on both the online product image and service image because price comparison changes the price structure of products, makes a positive contribution to the product image [31], and contributes to the service image as the functionality plays a role of a virtual guide to visitors who are seeking price comparison [73]. However, chatbots, the identical agent

functionality, were shown to affect only the service image. Chatbots allowed reasonable conversations with customers [56], helped make emotional dialog possible [74], and made customers feel that they were interacting with a store worker with a unique character [43]. Such roles of the customer service in online stores were also shown in the results of this study [41]. Furthermore, the chatbot had a positive contribution to the shopping mall service by offering overall guidance to the parasocial use; however, this function did not have direct relations to the product image.

The study's results show that certain AI functionalities, such as IT resources, have a positive contribution to the formation of the online store image, which is another online store resource. This agrees with the study result that ICT affects the service quality of the product [39]. Moreover, such a result offers a better understanding of the effect of IT resources on customers' continuation intention, as well as on of the firm's outcomes. Therefore, certain AI functions as IT resources have direct impact on continuation intention, while other functions allow for marketing activities, such as price promotion, product exposure according to customers' preferences based on preferred image based search, or buying pattern learning, all of which affect the promotion of brand image and online store image [45, 120, 132]. In the end, they have an indirect impact on continuation intention.

## 6.2 Theoretical and Practical Implications

China's e-commerce market is growing as the world's largest, and interest in Chinese e-commerce platforms such as Tao Bao and Jing Dong is growing. At the same time, China, along with the United States, is one of AI's top two tech countries. Therefore, AI and e-commerce researchers and practitioners from all over the world, as well as South Korea, are likely to be interested, so we chose this region. These are the reason why we focus on Chinese online stores.

This study has three academic implications. First, most studies have only focused on technology adoption and have not focused on using continuance in the context of online store powered by artificial intelligence. This study fills the gap by focusing on the post-consumption phase. In particular, we developed an extended framework from the resource-based view in a sense that AI can be considered as an advanced information technology to address IS use continuance.

Second, the study analyzed the reasons for the positive effect of AI functionalities in online stores on continuation intention from the RBV perspective. Resource heterogeneity is the most basic condition of resource-based theory. It assumes that at least certain resource bundles and capabilities underlying production are heterogeneous across firms [12]. Resource heterogeneity, which is a basic

condition of entrepreneurship, can also result in heterogeneous outputs [68]. The entrepreneur's ability to convert AI technology into heterogeneous outputs makes the online store a superior choice over the market. Therefore, AI, as a key IT resource in online stores, has brought about resource heterogeneity, which causes online stores powered by AI to be heterogeneous compared to other online stores that do not have AI. Furthermore, product image and service image, which comprise a firm's image, which is another firm resource, were shown to have significant impact on a shopping mall's continuance intention. In fact, the store's image has a direct and positive effect on the purchase intention [113, 132] and customer loyalty [25, 120].

Third, there have been many studies that have reported that IT would affect service quality and help form a positive service image, resulting in influencing the performance of online stores [13, 26, 44] however, there has been little research on the correlation between IT and brand image. This study has shown that AI can have an effect on helping customers form a product image. This result will contribute to the promotion of the diversity in explaining the contribution of innovative IT, such as AI, to firms.

From the practical viewpoint, the following possibilities can be suggested from the results of the study. First, online stores where the diversity and quality of products are important should be developed and supplemented based

on price comparison, customers' buying pattern learning, and image recognition. If online stores focus more on service and user experience, they should also prioritize in developing and supplementing speech recognition and chatbot functionalities.

Second, this study has focused on customers' perceived AI functionalities. Even if certain AI functionalities are installed and customers do not recognize them, it would be same as those functionalities not existing. Thus, it would be advantageous to customers' evaluation of the online store or continuance intention if a suitable introduction to AI functionalities that are installed in online stores is given to customers such as that they can easily recognize them. For example, buying pattern learning is related to explainable artificial intelligence (XAI), which explains the results of the learning for customer's better understanding. However, there has been no successful implementation of XAI to online stores as a strategic resource. This study acts as an evidence to support the reason why XAI needs to be introduced to online stores.

Third, since China is particularly interesting for studying AI technology (given recent governmental supports for AI industry, namely, AI Rising), we have examined AI functionalities that have affected the online store image and continuance intention and have not targeted some of the most popular Chinese online stores. Based on this study's results, it can be determined which AI functionalities need

to be improved further. The results of this study indicate that because not all AI functionalities contribute to the online store image or continuation intention, different AI functionalities should be considered for establishing a differentiated online store. As shown in the comparison between the search by image or the search by speech recognition, AI techniques in the same category would result in different effects.

### 6.3 Limitations and Future Research Direction

In addition to theoretical and practical implications, the study has limitations that require further research in future. First, this study targeted online stores in China. Despite the growth of online stores in China and the strong pervasiveness of these stores in the world market because of the global presence of Chinese people, there are few studies that have analyzed the success factors of these online stores. Even with the importance of the application of Chinese data, there may be differences in cultures and attributes of online stores by age group. Therefore, it is difficult to generalize the results of this study to other cultural regions; hence, we should cautiously examine the results.

Second, for this study, we selected factors that would affect online stores' heterogeneity and continuation intention based on previous literatures and empirical researches, namely, the perceived product image, the perceived

service image, and the atmosphere attribute included in the online store image. Because of the considerable details included in the current manuscript, other measurable factors could not be included in the study. Therefore, future search should consider these other factors.

Third, this study did not consider the changes caused by customers' individual differences, which will inevitably affect the objectivity of the data. It is necessary to study this aspect by adding individual attribution factors and expanding the research model based on these factors. By introducing the adjustment of variables on personal information, future studies would be able to examine the effect of these variables more clearly.

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## 〈Appendix A〉 Measurement Items for Variables

Constructs		Item	References
AI functionalities	Price comparison	Price comparison at {online store} seems to be valuable to me.	Created
		Price comparison at {online store} is useful to me.	
		Price comparison at {online store} helps me, and therefore, it is an important function.	
		Price comparison at {online store} is beneficial to me.	
	Speech recognition	Speech recognition at {online store} seems to be valuable to me.	
		Speech recognition at {online store} is useful to me.	
		Speech recognition at {online store} helps me, and therefore, it is an important function.	
		Speech recognition at {online store} is beneficial to me.	
	Chatbot	Chatbot at {online store} seems to be valuable to me.	
		Chatbot at {online store} is useful to me.	
		Chatbot at {online store} helps me, and therefore, it is an important function.	
		Chatbot at {online store} is beneficial to me.	
	Buying pattern learning	Buying pattern learning at {online store} seems to be valuable to me.	
		Buying pattern learning at {online store} is useful to me.	
		Buying pattern learning at {online store} helps me, and therefore, it is an important function.	
		Buying pattern learning {online store} is beneficial to me.	
	Image recognition	Image recognition at {online store} seems to be valuable to me.	
		Image recognition at {online store} is useful to me.	
		Image recognition at {online store} helps me, and therefore, it is an important function.	
		Image recognition at {online store} is beneficial to me.	
Shopping mall image	Perceived product image	There are many products at {online store}.	Parasuman, 1995; Jarvenpaa and Todd, 1996
		The price of products at {online store} is reasonable in general.	
		The image of the product at {online store} is identical to the actual product.	
		The quality of the products at {online store} is good.	
		The products sold at {online store} are trustworthy.	
	Perceived service image	The response speed of {online store} is fast.	
		Shopping at {online store} is easy.	
		{online store} holds special events very often.	
		The customer service at {online store} is excellent.	
		The payment methods at {online store} are convenient.	
		Shipping at {online store} is fast.	
		Shipping at {online store} is safe.	
		The exchange/return system at {online store} is excellent.	
	Atmosphere attribute	At {online store}, it is easy to find products that I want.	
		The web design of {online store} is excellent.	
Continuance intention		At {online store}, it is easy to search products.	
		I am generally satisfied with {online store}.	Venkatesh et al., 2003; Verkasalo et al., 2010
		I think it was a good choice to use {online store} rather than the other online stores.	
		I will continue to use {online store} in future.	
		I will recommend {online store} to others.	



## 〈Appendix B〉 Reliability and Validity Analysis of the Measurement Model

Variable		Item	Factor loading	Cronbach's $\alpha$	CR	AVE
Perceived AI functionality	Price comparison	ACC1	.829	.785	.860	.606
		ACC2	.785			
		ACC3	.773			
		ACC4	.724			
	Speech recognition	AVR4	.815	.756	.846	.579
		AVR1	.764			
		AVR3	.763			
		AVR2	.697			
	Chatbot	ACB4	.792	.760	.847	.580
		ACB3	.789			
		ACB1	.761			
		ACB2	.702			
	Buying pattern learning	APP1	.794	.741	.837	.563
		APP3	.769			
		APP2	.731			
		APP4	.702			
	Image recognition	AIR4	.793	.740	.837	.563
		AIR3	.770			
		AIR1	.735			
		AIR2	.698			
Online store image	Perceived product image	SIP5	.770	.814	.870	.573
		SIP4	.768			
		SIP1	.760			
		SIP3	.758			
		SIP2	.729			
	Perceived service image	SIS3	.789	.874	.901	.532
		SIS7	.780			
		SIS2	.738			
		SIS1	.724			
		SIS5	.711			
		SIS6	.706			
		SIS4	.694			
		SIS8	.685			
Intention of continue using a shopping mall (continuance intention)		SUI3	.808	.765	.850	.587
		SUI4	.754			
		SUI2	.754			
		SUI1	.747			

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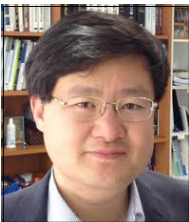
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