Does need for cognition matter in voice shopping adoption? Testing the mediating role of perceived technology usefulness and individual-technology fit

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Abstract:

Voice shopping is a newly evolving e-commerce channel, which is high in demand among consumers. Since factors affecting consumers' voice shopping adoption in tourism and hospitality are still in their infancy, this study aims to investigate the influence of individuals' need for cognition on voice-based travel services acceptance. Based upon an analysis of 215 survey responses, this study finds perceived technology usefulness and individual-technology fit as a causal chain mediates the relationship between need for cognition and intention to adopt voice-based travel services. This study provides new insights related to utilizing voice-based travel services in the field of consumer behavior.

Keywords: Individual-technology fit; Need for cognition; Voice shopping

1. Introduction

Voice technology has changed the way individuals search for information online. This speech recognition technology allows users to search through speaking, instead of typing terms in a text field (Kraus, Reibenspiess, & Eckhardt, 2019). A user's commands through voice for playing music, setting reminders, placing online shopping orders, and checking information can now be interpreted by that technology, which generates an appropriate response for the user (Sciuto, Saini, Forlizzi, & Hong, 2018). It is estimated that half of all Internet searches will be completed through voice assistants by 2020 (Maney, 2017). Comscore (2017) also forecasts that over 50% of all searches will be done by voice by 2020. The statistics show that 58% online adults have used voice search in early 2019 (Voicebot.ai, 2019). The rise of Amazon Alexa, Apple HomePod, Google Home, Alibaba Tmall Genie and many others suggests that voice assistants will be the central development of future retail.

Besides altering consumers' information search behavior, the advent of voice technology is expected to transform consumers' shopping behavior. Standard desktop searches may show that users are simply looking for information by delivering mass results, while voice search aspires to allow users to refine the search process based on exactly what they are looking for (PhocusWire, 2019). Voice travel services have the power to enhance the overall travel experience by providing highly relevant results, and they have already impacted how travelers are searching and booking their next holidays. According to OC&C Strategy Consultants (2018), voice shopping is expected to grow to a USD 40 billion market by 2022.

Defined as the act of purchasing products from online retailers by giving voice commands to voice assistants (Mari, 2019), voice shopping method will not only minimize transaction costs for consumers but also provide them with unprecedented convenience. A voice assistant can help consumers navigate through many alternatives. The algorithms of voice technology can learn how to make purchase decisions by analyzing consumers' choice criteria. Several travel retailers have already launched voice-enabled travel services on Amazon Alexa. For example, Expedia and Kayak services on Amazon Alexa can now allow consumers to search and book flights, hotels and rental cars as well as keep track of flight status updates through voice commands.

As voice shopping is rapidly becoming a focal point in both academic and industry research because of its swift adoption and disruptive potential in buying dynamics, researchers call for future studies to focus on voice technology (Dawar & Bendle, 2018). However, to the best of our knowledge, research on factors affecting the adoption of voice shopping in tourism and hospitality is still in its infancy. To fill this knowledge gap, the present study aims to identify factors affecting the intention to adopt voice-based travel shopping services.

Specifically, the purpose of this study is to investigate the influence of individuals' personality in information processing (i.e., level of need for cognition) on the adoption intention of voice-based travel services. Two influential variables, perceived technology usefulness and individual-technology fit, which are firmly proved as determinants in the technology acceptance literature (e.g., Parkes, 2013; Speier & Venkatesh 2002) are also added to the research model. The relationship of individuals' need for cognition and voice-based travel services adoption intentions will be explained through a mediation model, which includes perceived technology usefulness and individual-technology fit as mediators. This study introduces the idea that the intention to adopt voice-based travel services should be affected by individuals' need for cognition, the individual-technology fit and perceived technology usefulness with the voice technology.

In the following sections, the direct impact of need for cognition on intention of adopting voice-based travel services as well as the indirect impact through perceived technology usefulness and individual-technology fit will be firstly discussed. The method section will then explain the questionnaire design and data collection. The subsequent sections will describe the data analysis and the findings. The last two sections will present the conclusions, implication and limitation of this study.

2. Literature Review

2.1 Need for Cognition

Need for cognition refers to people's tendency to participate in problem-related information processing when forming an attitude toward cognitive tasks (Cacioppo, Petty, & Chuan, 1984). According to the elaboration likelihood model (Petty & Cacioppo, 1986), individuals with high level of need for cognition may follow the central path and form attitudes on the basis of in-depth processing of product related information. On the contrary, individuals with low level of need for cognition are more susceptible to contextual cues and heuristic information processing (Diamantopoulos, Arslanagic-Kalajdzic, & Moschik, 202020; Zhang, Gursoy, & Xu, 2017). In other words, consumers who have high level of need for cognition pay close attention to relevant alternatives based on reliable evidence (Cacioppo, Petty, & Morris, 1983).

Traditional desktop search provides a large evaluation set to consumers as its high media richness and text efficiency (Hong, Thong, & Tam, 2004). While voice-based travel services use auditory interfaces, this kind of shopping method reduces the negative impact of an

overwhelming amount of information (Maity & Dass, 2014). Compared with desktop shopping, voice shopping provides more relevant and personal recommendations for consumers. This shopping method may reduce the risks by providing recommendations with high quality.

Individuals with high level of need for cognition tend to conduct more intensive information processing instead of seeing more information. The combination of cognitive operations used, rather than the amount of information, determines individuals' effort (Verplanken, 1993). Since consumers with high need for cognition will spend more effort into information processing to find relevant evidence and information to support their decisions (Cacioppo et al., 1984) and voice shopping can provide more effective, accurate and relevant information to help people with high cognition to process information well, it is reasonable to suggests that consumers with higher level of need for cognition tend to have more positive attitudes toward intention to adopt voice-based travel services. Thus, we assume:

H1: Need for cognition is positively associated with consumers' intention to adopt voice-based travel services

2.2 Mediating Role of Perceived Technology Usefulness

Perceived technology usefulness refers to the degree that consumers think voice shopping technology will improve transaction performance (Chiu, Lin, Sun, & Hsu, 2009). Ajzen and Fishbein (1980) suggests that perceived usefulness is positively related to future behavioral intention, directly or indirectly through its impact on people's attitudes. Reasoned Action Theory and Technology Acceptance Model (Davis, 1985; Fishbein & Ajzen, 1977) suggest that individuals' attitude towards technology is an individual's evaluation of an object. Individuals' positive attitudes will increase the intention to use the technology. Chiu et al. (2009) suggest that customers' perceived usefulness is positively associated with online shopping loyalty intention. The findings in the technology acceptance studies indicate there is a significantly positive correlation between perceived usefulness and technology acceptance.

Though no literature directly shows that need for cognition is related to perceived usefulness of voice-based travel services, evidence shows that need for cognition is significantly associated with online shopping attitude (Marie-Odile & Jean-Charles, 2016). For example, Hung, Cheng, and Hsieh (2015) demonstrate individuals' personalities (e.g., cognitive style, computer self-efficacy and involvement) have moderating effects on the relationship between incentives and attitudes of online buying. It is, therefore, reasonable to postulate that:

H2: Perceived technology usefulness has a direct and positive effect on consumers' intention to adopt voice-based travel services

H3: Need for cognition has an indirect and positive effect on consumers' intention to adopt voice-based travel services through its influence on perceived technology usefulness

2.3 Mediating Role of Individual-Technology Fit

Individual-technology fit is defined as the extent to which technology features meet the needs of individuals' problem solving (Liu, Lee, & Chen, 2011). This concept/construct was developed from task-technology fit theory (Goodhue, 1995), which emphasizes the match of the task requirements and the technical capabilities to support task completion (Fuller & Dennis, 2009). Individual-technology fit occurs when technology satisfies an individual's needs or preferences.

Individual differences are proved to have an impact on technology usage (Burton-Jones & Hubona, 2005; McElroy, Hendrickson, Townsend, & DeMarie, 2007). In the context of voice-based travel services, the logic is that the higher level of individuals' need for cognition, the more likely they will get involved in searching for relevant information and evaluate alternatives when making decisions (Cacioppo et al., 1984). Thus, it can be assumed that people who have high level of need for cognition are more possible to acknowledge individual-technology fit. According to the cognitive cost and benefit perspective, individuals are influenced by how well technology operates. Individuals can perceive whether a technology is fit for their information processing style and choose technology on that basis (Goodhue, 1995). Individuals may weigh costs and benefits before choosing a strategy for processing information in decision making.

The fit between technology and individuals may affect individuals' attitudes toward that technology (Parkes, 2013). Individual-technology fit is proved positively influence technology usage (Speier & Venkatesh, 2002). A study conducted by Wu and Chen (2017) proves that individual-technology fit has a positive impact on perceived ease of use, which then has a positive impact on perceived usefulness and technology usage. Accordingly, the literature about individual-technology fit proves that people who are fit with the technology features will have a higher acceptance intention than people who are less fit. Therefore, it is reasonable to argue that people who perceive a good fit with the voice-based travel services will be motivated to use this technology. Therefore, this study posits the following hypotheses:

H4: Individual-technology fit has a direct and positive effect on consumers' intention to adopt voice-based travel services

H5: Need for cognition has an indirect and positive effect on consumers' intention to adopt voice-based travel services through its influence on individual-technology fit

2.4 Perceived Technology Usefulness and Individual-Technology Fit as a Causal Chain

The assumptions regarding H3 and H5 are limited, in that need for cognition indirectly influences adoption intention through its impact on either individual-technology fit or perceived technology usefulness in isolation. The following question is whether one mediator affects the other. It may be more reasonable to say that the individual-technology fit depends, at least in part, on the perceived usefulness of the technology. That is, individuals with a high level of need for cognition is more likely to perceive usefulness with the technology. When the perceived usefulness with the voice-based travel services is high, they will be more likely to peruse a fit with voice-based travel services, which in turn has a positive impact on the intention to adopt voice-based travel services. Technology acceptance literature and individual-technology fit literature are not competing with each other to understand technology adoption. Instead, they represent serial influences in a causal chain to explain consumers' technology usage.

As described above, perceived technology usefulness and individual-technology fit are both implicated in the relationship between need for cognition and voice-based travel services adoption intention. Research shows that these two factors are interrelated. This argument is supported by the study of Speier and Venkatesh (2002), in which indicated that perceived fit is related to technology perception. Thus, we postulate H6 and explore a multiple mediation model (see Figure 1):

H6: Need for cognition has an indirect and positive effect on consumers' intention to adopt voice-based travel services through its influence on perceived technology usefulness and individual-technology fit in serial.

Figure 1. Conceptual model
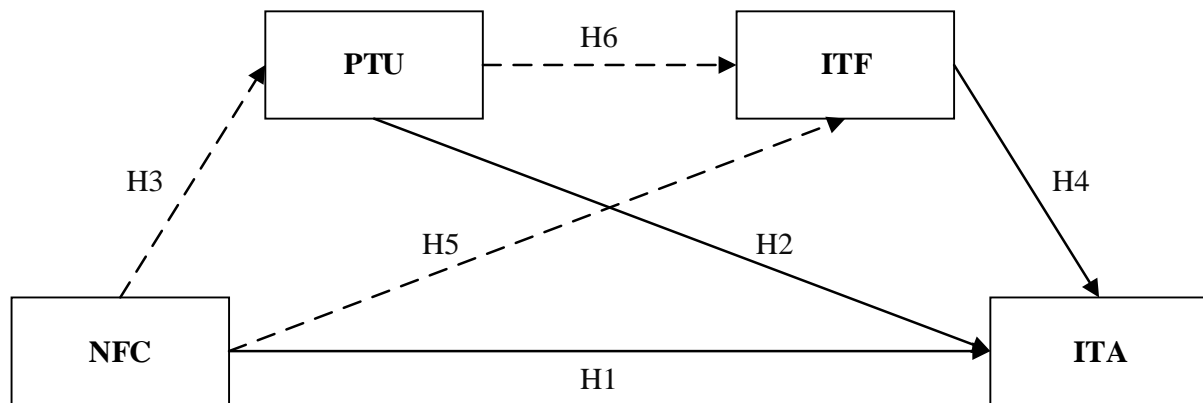
Note: NFC=Need for cognition; PTU=Perceived technology usefulness; ITF=Individual-technology fit; ITA=Intention to adopt voice-based travel services; Dotted lines denote effects; Solid lines denote direct effects.

3. Methodology

3.1 Questionnaire design

This study developed a questionnaire with three sections to collect the data for testing the hypothetical model. The first section introduces what voice-based travel shopping services is and how voice-based travel shopping services work to the participants. The second section of the questionnaire designs questions about the main constructs of the hypothetical model. The third section includes questions soliciting demographic information about the participants. The items measuring need for cognition, perceived technology usefulness, individual technology fit and intention to adopt voice-based travel services were adapted from the existing literature.

Need for cognition was measured based on the scale of Zhang et al. (2017) were used. Eight items were assessed on a 7-point Likert-scale (1: strongly disagree – 7: strongly agree; α=0.916). Perceived technology usefulness was measured using a four-item scale adapted from Kraus et al. (2019). Participants had to rate the items on a 7-point Likert scale (1: strongly disagree – 7: strongly agree; α=0.844).

Individual technology fit was measured using two items borrowed from Kraus et al. (2019) and Yu and Yu (2010). Participants had to rate the items on a 7-point Likert scale (1: strongly disagree – 7: strongly agree; α=0.868). To measure intention to adopt voice-based travel services, the scale as described by Agag and El-Masry (2016) was used. The scale consists of three items, measured on a 7-point Likert scale (1: strongly disagree – 7: strongly agree; α=0.928).

3.2 Data collection

Before the main data collection, a pretest was conducted to check the clarity of wording used in the survey. Based on the results of the pretest, the questionnaire was revised accordingly. The main data collection was conducted in December 2019, and the participants were recruited via Amazon Mechanical Turk. The target respondents were those who have purchased at least one travel product online in the past. A total of 215 participants provided valid responses. Table 1 summarizes respondents' profiles.

Table 1. Respondents' profiles

		Frequency	Percentage
Gender	Male	132	61.4%
	Female	83	38.6%
Age	20-29	90	41.9%
	30-39	82	38.1%
	40-49	28	13.0%
	50-59	10	4.7%
	60 or above	5	2.3%
Education Level	High school	15	7.0%
	Diploma/Higher diploma	19	8.8%
	Bachelor's degree	117	54.4%
	Master's degree or above	64	29.8%
Voice-based services experience	Yes	190	88.4%
	No	25	11.6%

4. Results

A mediation analysis was performed to test the relationship between need for cognition and voice-based travel service adoption intention and both the role of perceived technology usefulness and individual-technology fit as mediators. The model was estimated using the PROCESS macro for SPSS (Hayes, 2017).

As predicted, the direct effect of need for cognition on voice-based travel service adoption intention was significant (H1 was supported). H4 stated that individual-technology fit has a direct and positive effect on voice-based travel services adoption intention. As shown in Table 2, the standardized regression coefficients between individual-technology fit and voice-based travel services adoption intention were significant. Therefore, H4 was supported.

H2 stated that perceived technology usefulness has a direct and positive effect on voice-based travel services adoption intention. However, the results presented in Table 2 do not support this hypothesis. Thus, H2 was rejected.

Table 2. Regression results

	Model 1 ITA		Model 2 PTU		Model 3 ITF		Model 4 ITA	
	B	t	B	t	B	t	B	t
NFC	0.48	7.96***	0.43	6.87***	0.19	3.85***	0.07	1.99**
PTU					0.65	13.09***	0.07	1.60
ITF							0.80	17.22***
R^2	0.22		0.18		0.57		0.80	
F	63.43		47.24		139.92		283.72	

Note: $p < 0.01$***; $p < 0.05$ **

NFC=Need for cognition; PTU=Perceived technology usefulness; ITF=Individual-technology fit; ITA=Intention to adopt voice-based travel services

The indirect effect was tested using bootstrapping procedures with 5000 estimations. According to Hayes (2017), an indirect effect is considered significant if the bootstrapping confidence interval does not include zero. The total effect is 0.62, the direct effect is 0.09. As shown in Table 3, individual-technology fit was a significant mediator for the relationship between need for cognition and voice-based travel services. As such, H5 was supported.

Table 3 also shows that need for cognition has an indirect and positive effect on consumers' intention to adopt voice-based travel services through its influence on perceived technology usefulness and individual-technology fit in serial. H6 was accepted. However, we found no evidence of perceived technology usefulness mediating the relationship between need for cognition and voice-based travel services (H3 was rejected).

Table 3. Bootstrapping mediation test results

	Effect	Boot SE	Bootstrap 95%CI		Relative effect
			LL	UL	
Indirect Effect	0.53	0.08	0.38	0.69	85.94%
NFC à PTU à ITA	0.04	0.04	-0.04	0.13	6.49%
NFC à ITF à ITA	0.20	0.07	0.06	0.33	32.43%
NFC à PTU à ITF à ITA	0.29	0.07	0.17	0.44	47.02%

Note: NFC=Need for cognition; PTU=Perceived technology usefulness; ITF=Individual-technology fit; ITA=Intention to adopt voice-based travel services

5. Discussion and Conclusion

5.1 Discussion

A direct relationship was found between need for cognition and voice-based travel services adoption intention. The relationship between need for cognition and voice-based travel services adoption intention was partially explained by the extent to which consumers feel the individual-technology fit and perceived technology usefulness. This finding confirms literature on the importance of need for cognition in determining consumers' intention to adopt voice-based travel services. These results have made an important contribution to the technology acceptance literature, as they point out the potential reasons for the relationship between need for cognition and voice-based travel services adoption intention.

The results of serial mediation framework prove that need for cognition influences voice-based travel services adoption intention through its influence on perceived technology usefulness and individual-technology fit in the causal chain. It should be noted that perceived technology usefulness alone does not mediate the relationship between need for cognition and consumers' intention to adopt voice-based travel services. This finding is in line with the idea that consumers' feeling fit is associated with perceived technology usefulness (e.g., Speier & Venkatesh, 2002) and suggests that consumers who satisfy with the technology demonstrate more willing to perceive a good fit with technology as a result of increased intention to adopt voice-based travel services. This finding is significant because previous studies have shown that individual-technology fit and perceived technology usefulness are related and have an

important impact on the willingness to adopt voice-based travel services, although no prior research has considered the joint role of these two factors in this relationship.

An additional major finding is that perceived technology usefulness mediating the relationships between need for cognition and voice-based travel services is not significant. We speculate that the non-significant relationships found can be explained as follows. It is possible that voice-based travel services are new to consumers at this stage and many consumers may have not used this technology to buy travel products yet. Though consumers feel the technology is easy to use and the results provided by the technology are useful for them, they may still do not feel this voice-based travel services fit their habits and personality to search information and make travel products purchase decisions. Because voice shopping only provides consumers with several recommendations based on the algorithm and consumers stated needs, while desktop shopping provides large amount of information to consumers and consumers can make trade off by themselves. For example, though the recommendations provided by the voice-based travel services are good or the transaction process of the services fluently, consumers are still not likely to use voice-based travel services in the future, they think how voice-based travel services work is not fit for their need for cognition style for searching information and evaluating choices. Then, they will not be willing to use voice-based travel services.

Overall, the findings of this study shed light on the potential role of perceived technology usefulness and individual-technology fit as a serial causal mechanism for some technology acceptance related literature, while indicating that (a) adoption intention of voice-based travel services may vary depending on individuals' need for cognition and (b) the relationship is perhaps more complex than previously identified mechanism explaining technology adoption, as both perceived technology usefulness and individual-technology fit can be two mediators to explain technology acceptance mechanism in serial.

5.2 Implications and limitations

This study generates new insights related to the utilization of voice-based travel services in the realm of tourism and hospitality. Understanding the underlying mechanism of voice-based travel services adoption will suggest ways in which suppliers can best utilize voice shopping. For example, the findings would suggest whether consumers think voice shopping method is fit for their consumers' information search and decision making processes. If this is true, suppliers should consider ways to enhance the feeling of individual-technology fit when using voice-based travel services in decision scenarios.

This study has limitations that could be addressed in future research. First, this study mainly focuses on the influence of consumers' personality on voice-based travel services, while other adoption models consider the factors from different aspects (e.g., social influence). Future research may consider integrating other adoption models and exploring consumers' adoption intention further. Second, the generalizability of the study results may have been limited due to the small sample size and sample characteristics. For example, considering the sample characteristics, whether respondents have past experience of voice technology usage may influence their attitudes on voice shopping. Future studies may consider exploring the impact brought by consumers' past voice technology experience.

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