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Following the Flow: Exploring the Impact of Mobile Technology Environment on User's Virtual Experience and Behavioral Response

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Abstract

Although the increasing mobile technology applies in our daily lives, there remain questions that clearly illustrate the experience inspired by the mobile technology environment. It is theoretically and practically meaningful to systematically reveal how mobile technology generates users' virtual experience and, subsequently, the behavioral response. To fill the gaps, drawing on the Stimulus-Organism-Response model, this paper regards flow as the core experience based on the features of the mobile users' experience. The framework is that mobile technology will promote users' virtual experience, and in turn, affect their behavioral response. This study uses online survey data from 452 respondents. We employ the structural equation model based on the partial least squares method and further mediation analysis by the Sobel test to validate the research hypotheses. Our results show that the mobile technology environment has a significantly positive effect on users' purchase intention/return mediated by the virtual experience. However, the direct relationship between ubiquity and flow, as well as telepresence and intention to purchase/return, are not significant. Finally, a few theoretical and managerial contributions are also discussed.

Keywords: Mobile technology, Flow, Virtual experience, Behavioral response, Structural equation model

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1 Introduction

The increased popularity of mobile technology in recent years had dramatically changed the means of service operations and delivery in various industries like gaming, retail, restaurant & food delivery, banking & finance, video streaming, social networking & messaging, and travel. A report by App Annie [3] showed that over 80% of the 48 technology IPOs in 2018 on the top two stock markets (New York Stock Exchange and National Association of Securities Dealers Automated Quotation) had a mobile focus, and the mobile-focused companies made up 95% of aggregate valuations in 2018. In the retail market, the global time spent on shopping apps grew to 18 billion hours in 2018, up 45% from 2016. The Brick-and-Mortat retailers like Target, Walmart, and Nordstrom were leveraging mobile for accessible loyalty programs, point-of-sale payments, in-store efficiencies, product information, and purchase fulfillment. Mobile's on-the-go nature had enabled widespread growth in this type of user behavior. Globally, the average users spent over 3 hours a day in mobile apps in 2018, 12.5% of users' entire day. From the evolutionary perspective of the mobile market, many mature mobile markets had gone through their experimentation phase (i.e., mobile users discovering and experimenting with new apps) and adoption phase (i.e., mobile habits began to form, and users settled into their go-to apps). As markets entered the early stages of mobile maturity, the following was the ubiquity phase that was marked by increasing engagement and user spent as mobile takes over mindshare for users. Beyond the experimentation and adoption phase, which corresponded to a high download and usage, the ubiquity phase was the key stage of revenue for mobile-focused companies. Many mature markets, such as Japan, China, and the USA, were entering into their ubiquity and revenue stage. However, it was unknown for scholars and practitioners on how mobile technology enabled users' behavior and promoted the business success of mobile-focused companies in the ubiquity phase. It was theoretically and practically meaningful to determine and confirmed the implementation path to achieve mobile technological excellence performance.

Despite its great practical importance, there is limited research on how the mobile technological environment may affect users' behavioral responses, e.g., purchase intention. The booming development of mobile technology application has drawn considerable research interest in revealing mobile service adoption, continuance, and participation. For example, some researchers explore mobile commerce users' acceptance behavior in the Chinese cultural context [56]. And others analyze post-adoption beliefs in the mobile commerce continuance intention formulating strategies to retain their users [13]. Meanwhile, increasing studies coincidentally indicate that users' psychological experience acts as a vital factor in their mobile-focused behavior. Scholars explore mobile user engagement intention through motivations, perceived value, and satisfaction [93]. Researchers empirically examined service experience (including flow and engagement) as the mediating role between technical excellence and the continuance use of mobile value-added service [84]. But most studies choose purposeful engagement rather than voluntary flow as the psychological experience, which states a holistic psychological experience that people feel when they act with total immersion [13] and covers more unique features of mobile-focused service [37]. Meanwhile, there is a lack of research investigating the natural attributes of mobile technology striping off the specific industry characteristics like travel [20] and e-learning [74] to improve findings' generalization. Consequently, the question remains: what experiences are inspired by the mobile technology environment, and how does the process of mobile technology characteristics overflow users' experience and their subsequent behavioral response? To address the gaps, we propose the following research question (RQ).

RQ: How does mobile technology environment drive mobile users' behavioral response?

To answer this question, drawing on the stimulus-organism-response (S-O-R) framework, we select the flow as the core experience that mobile users attained based on their experience features. The frame is that mobile technology environment will generate virtual experience, which describes a psychological state including cognitive and emotional reactions [65] and further promotes users' behavioral response. Specifically, we summarize the characteristics of mobile technology environment as ubiquity, mobility, personalization, and localization divided by ubiquitous connectivity and contextual offer [49], and take telepresence and involvement as vital antecedents and components of the flow. Telepresence is a perceptual illusion of non-mediation and a sense of *being there* in the unique environment created by a medium [68]. We finally regard intention to purchase/return as users' responses to the virtual experience, which is mediated by satisfaction and perceived usefulness.

This study contributes to the existing literature in several ways. First, this study is among the first to focus on the mobile technology environment systematically and empirically verify the link between mobile technology characters and users' behavioral response, although prior research studies concrete features of mobile technology. Second, this study initially explores flow experience in mobile context with the ubiquitous mobile service, yet previous mobile technology-related research overlook well-developed antecedents (i.e., ubiquitous connectivity and contextual offer). Third, this study develops an experience-cognition process to untangle the mediation mechanism from the mobile technology environment to users' behavioral responses. Prior studies build the perception-experience-evaluation [18] process to unveil the reaction's mechanism of the organism under the stimulus-organism-response framework. Still, we take cognitive reaction of psychological experience as telepresence, involvement, and flow, which flow in turn positively affect users' internal cognition [28], namely perceived usefulness and satisfaction [79].

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We organize the rest sections of this study as follows. Theoretical background about mobile technology, flow experience, and stimulus-organism-response framework are reviewed in Section 2. Research hypotheses are developed in Section 3. Section 4 presents the research methodology, research model, and results of hypotheses testing. Section 5 concludes the research results, discusses the theoretical and managerial implications of this research, and puts forward its limitations and the directions for further study.

2 Theoretical Background

In this section, the theoretical background are stated as follows, including mobile technology and mobile commerce, flow experience, and the stimulus-organism-response model.

2.1 Mobile Technology and Mobile Commerce

With the excellent characteristics of mobile technology, it is an ideal tool for users to enable them to realize their needs anywhere and anytime. It, therefore, gives birth to mobile commerce (m-commerce). M-commerce is regarded as a subcategory of electronic commerce (e-commerce) [58]. But they differ fundamentally in business model and performance. Compared with e-commerce [67], researchers find that m-commerce has a better value-offering curve due to mobile technology's exceptional features, such as ubiquity, localization, and convenience [11]. Consistent with most of the prior research on the definition of m-commerce, we deem that m-commerce refers to the informational-based and transactional-based [9], [10] business activities that are actualized through mobile devices under the wireless environment [92].

Considerable researchers focus mobile user behavior based on the mobile technology environment and its technical characteristics. In [69], the authors propose that mobile business intelligence (M-BI) system quality characteristics (namely, accessibility, attractiveness, ease of use and flexibility) affect M-BI usage indirectly through engagement at the individual level. Some scholars state that accessibility and extended usage increased by the ubiquity of mobile touch screens can effectively enhance user engagement and satisfy individual preferences similar to the in-store experience [6]. According to technology acceptance model and innovation diffusion theory, researchers report the mobile technology features containing compatibility, perceived usefulness, cost, and perceived risk have a significant influence on driving m-commerce and willingness to use [52], [90]. As can be seen, prior researchers identify m-commerce application studied in recent years, such as mobile payment, mobile banking, and mobile shopping [24].

More recently, the virtual experience is frequently treated as an essential psychological mechanism to untangle mobile user behavior. Researchers adopt flow experience as a mediator between motivations and purchase intention to explore senior users' travel-related purchase intentions in the mobile context [43]. In contrast, others investigate the engagement intention of mobile travel application driven by design and performance attributes [20]. With the uninterrupted usage of mobile application enabled by mobile technology, many scholars firmly believe that the virtual experience (e.g., flow, engagement) should be intrinsically core factor in continuance intention and valued-added service [84].

As such, the majority of existing studies on the mobile technology characteristics pay attention to broad constructs such as perceived ease of use and perceived usefulness, which apply to general information technology besides mobile. But they have not shed light on the natural attributes of mobile technology exactly. Benefit from the high uniformity between mobile technology characteristics and users' virtual experience, we employ the mobile technology characteristics as technology environment determinants (namely, ubiquity, mobility, personalization, and localization) to explore the users' virtual experience, especially the state of flow, and their subsequent behavioral responses in the mobile-focused environment.

2.2 Flow Experience

The origin of flow can be traced to Csikszentmihalyi [13], who defines it as the holistic experience people feel when they act with total involvement. Flow is a continuous construct ranging from none to intense [80], which describes a psychological state that is characterized by intrinsic enjoyment and optimal experience [55]. When people enter flow state during a service encounter [85], they tend to absorb in what they are doing, lose the sense of time and self, and shift into the experience that irrelevant perceptions and thoughts are filtered out [13]. Furthermore, the facilitators of flow are proposed by its concept and features. Researchers claim four-channel flow models which represent four different mental states depending on the level(i.e., high and low) of skills and challenges, namely, anxiety, apathy, boredom, and flow, and the flow occurs only when both skills and challenges are high [12]. In particular, Obada sums up the facilitators of flow experience, such as clear and distinct goals, actions merging with awareness and immediate feedback, high concentration on the task, high level of control, a balance between the available skills of the individual and the task challenges [60].

On account of the flow's breadth and complexity, researchers deem that a multidimensional view of flow can best capture the meaning of this construct [25], [41]. Based on the application of human-computer interactions, researchers discuss the characteristics of concentration and enjoyment [22], while other scholars apply a different

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operational definition of flow experience that comprises four dimensions as control, attention focus, curiosity, and intrinsic interest in the same application situation [89]. The additional dimensions of flow in online environment include loss of self-consciousness, self-reinforcing, interactivity, and distortion of time [59].

The concept of flow is conceptually associated but not identical with the construct of peak experience [23] and engagement [20]. The peak experience is all or nothing, which is different from flow experience that varies in intensity [83]. The former is a polar attribution (i.e., peak or valley), while the latter is a continuous process [23]. The engagement has been deemed as a subset of the flow, and flow is in a more passive state and without user control [61], [88]. Flow is partially overlapped with the concept of engagement. Researchers argue that engagement shares some attributes with flow, such as focused attention, feedback, control, interactivity, and intrinsic motivation [61]. Differently, flow involves intrinsic motivation, requires sustained, long-term focus, and loss of awareness of time and self, yet engaging experience may occur with nonvoluntary use of a system in the multitasking and dynamic network environment [61].

The concept of flow has drawn growing attention in several research fields, including social psychology, organizational behavior, marketing, service management, and information systems. The flow is initially introduced into online environments by Hoffman and Novak on network navigation experience in 1996 [25]. And it has been applied to user behavior and continuance usage in information system combining with classical behavioral theory [96]. As such, considerable researchers' perspective has been transformed from initial acceptance to continuous experience, and their concerns have been switched from online behavior to mobile behavior.

Few studies have examined whether and how mobile technology continually overflow virtual experience and its outcomes of the experience. Given the fact that limited empirical studies are available to reveal the psychological mechanism of virtual experience behavior of mobile technology, it is necessary to extend the extant literature by proposing an integrated model to clarify how technology attributes affect users' virtual experience in the mobile environment. This study focuses on the characteristics of flow on control, attention focus, curiosity, and intrinsic interest. It also considers the mobile technology environment as antecedents, as well as considers telepresence and involvement as mediators to explore the users' virtual experience in mobile situation.

2.3 The Stimulus-Organism-Response Model (S-O-R)

According to the S-O-R model, various aspects of the external environment act as a stimulus that collectively affect people's internal psychology states, which, in turn, drive their attitudinal and behavioral responses [54]. Researchers explore the different influences of environmental stimulus on the users' behavior such as technological environment [2], functional attributes [20], and social factors [95]. The internal psychology states refer to cognitive and affective reactions of the stimulated organism, including perceptions, experiences, and evaluations [54]. The response includes the attitudinal and behavioral intention of user behavior [18].

The use of the S-O-R model as an overarching theory is appropriate for this study for two reasons. First, given the critical roles of technological features and virtual experiences in influencing users' behavioral attitude in the mobile environment, the S-O-R framework offers a parsimonious and structural manner to examine the effects of technological features as an environmental stimulus on users' virtual experiences and their intention to buy or return through mobile service. Second, previous studies extensively deem that the S-O-R model is appropriate in explaining the technological environment as a stimulus affecting users' behavioral responses [2], which are mediated by their psychological experiences. For example, researchers reveal that the process of the technological and spatial environment in the virtual world as a stimulus impacts the participants' virtual experience and subsequently affects their response (intention to buy virtual goods) [2]. Other researchers apply the mobile apps design features, and apps performance attributes as a stimulus to drive behavioral engagement on mobile travel apps by the experiential-cognitive mediation process [20].

3 Hypothesis Development

In this section, the research hypotheses are developed as follows, including mobile technology environment as stimulus, experience-cognition process as organism, and intention to purchase or return as response.

3.1 Mobile Technology Environment as Stimulus

Ubiquity is one of the most essential characteristics of mobile service [62]. It's convenient to access transaction, service, and gripping content anytime, which emphasizes temporal and spatial flexibility [63], [77]. Whenever and wherever a sudden emotion or requirement stimulates the users, they could instantly reach and realize it using their mobile devices [36].

Telepresence used to be regarded as virtual reality through mediated communication connecting different reality networks [47]. Some researchers directly point out that ubiquity is synonymous with omnipresence [87]. The global online environment inhibits the perception of telepresence because of the limit of the wired networks. Still, mobile

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technology can significantly facilitate telepresence by releasing spatial and temporal constraints, which could free the natural mood and requirement for remote users [78]. In other words, the online environment generates telepresence since it establishes a long-distance connection. Yet the mobile technology ulteriorly promotes telepresence by breaking the temporal and spatial restrictions that are the pivotal elements of ubiquity. That is, mobile technology enables users to experience telepresence thanks to its temporal and spatial flexibility. Therefore, we propose the following hypothesis:

H1a: Ubiquity is positively associated with telepresence.

The ubiquitous feature of mobile technology also has some associations with the experience of flow. The mobile application is so convenient that users can access service easily whenever and wherever they are, and they can control the reachable goals and enjoy convenient service. By contrast, if users encounter service unavailability or interruption, their experience will be negatively affected [97]. More concretely, researchers propose that perceived ubiquity strongly and directly influenced flow since the characteristics of ubiquity can bring virtual experience to mobile service users such as distortion of time, positive affect and mood, and continuous usage [62]. In short, ubiquitous features bring ubiquitous experience that will boost users' positive emotions and enjoyable effects and further produce flow experience. Therefore, we propose the following hypothesis:

H1b: Ubiquity is positively associated with the flow.

Mobility in the mobile technology environment can be regarded as "being mobile" [39]. It depicts humans' independence from geographical constraints. A few researchers expand the research perspective of mobility from geographical space to social space, such as the mobility of social context [39]. One of the most significant obstacles of telepresence is achieving the sense of "being there" [57]. At the same time, the mobility of mobile technology can help users to attain mobile connections and create a sense of telepresence. Meanwhile, mobility in mobile technology also emphasizes interaction in social live fields. Scholars consider the telepresence as a critical factor for remote users as a mean for interactive activities against geographical and social distance, which is also used in business and medical settings [71]. That is, mobility could help remote users to increase the feelings of *being there* (i.e., telepresence). Therefore, we propose the following hypothesis:

H2a: Mobility is positively associated with telepresence.

Mobility promotes continuous interaction, which means users can control the interactive object freely. Users will not be interrupted due to geographical constraints and acquire continuously focused attention. On the other hand, based on the above discussion, extended mobility emphasizes social lives beyond geographic independence. Therefore, mobility facilitates social interaction and generates intrinsic interest, which is the key stimulus of flow experience. Researchers find a definite link between individual mobility and positive attitude in mobile payment services since it makes an excellent fit with a mobile lifestyle, providing a means to pay for goods and services in virtually any life situation [75]. Mobility makes it possible for users to gain constant interaction through their mobile devices. For example, users can browse the good's information at home, workplace, or on their way to the metro station. With a high level of control and immediate feedback, users generate flow experience due to the continuous geographical and social interaction from the mobile services' mobility. Therefore, we propose the following hypothesis:

H2b: Mobility is positively associated with the flow.

Personalization is a unique and fundamental characteristic of mobile technology. It reflects the degree to which information is tailored to meet the individual user's needs [15]. In the mobile technology environment, the ubiquitous connectivity reflects response ability and speed while contextual offer manifests product/service relevance and elaboration [49]. Personalization promotes product/service offered by enterprises to match users' needs and wants in mobile technology context on a small segment of homogeneous users, even an individual. Personalized service help m-commerce fulfill the value-added process through transforming and segmenting overloaded information into needed information.

Involvement is defined as a person's perceived relevance with an object based on inherent interests, needs, and values [94]. It is also used to study stimulus objects such as product advertisements and purchase situations. The involvement construct is mostly served as a mediator in online user behavior, as reported by [26] [33] [66]. Researchers identify three major antecedents to facilitate involvement, namely, the characteristics of a person, stimulus, and situation [82]. This study focuses on the personal nature of involvement and examines how personalized service can affect users' involvement in the mobile environment. The concept of involvement that refers to inherent interests and needs coincide with the personalization, which matches one's innate wants. In the mobile environment, individuals perceive involvement when they engage in personalized objects to fulfill their intrinsic motivations and needs. Therefore, we propose the following hypothesis:

H3a: Personalization is positively associated with involvement.

The focused attention and inherent interest consist of important antecedents of flow experience. Users pay more attention to personalized information than public information [70]. They are demanded to determine which is valuable

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information for them among the overflowing advertisement, which becomes more difficult with the explosive growth of information [44]. Thus, they concentrate on the contents only when they received customized content. The targeted message can cause the focused attention and the interest and desire of the audience, resulting in flow experience [61]. Therefore, we propose the following hypothesis:

H3b: Personalization is positively associated with the flow.

The famous first law of geography points out: "All things are related, but things close to the geographical distance are more relevant than things far away from the geographical distance" [81], [91]. The most direct transformation of mobile technology is the flexibility of using location, and the location is tidily available thanks to wireless location technology. The most extensive application and studies about localization are location-based services (LBS) [21]. According to prior studies, we find that localization shows the position and area where you are, which benefits from the mobile location technology. Thus, at your current location, you could easily acquire the surrounding information due to mobile technology.

When users receive local information, they may be more interested in it. That means the information they probably get is closer to what they want (not only intimate geography but also close preference). Equally, users can gain relevant information, which will produce a more connective point with their location [47]. As the original characteristics of mobile technology, localization has some overlapping with other mobile features. One of the antecedents of the involvement is the situation, while the localization emphasizes where you are and what your surroundings are. Researchers find positive effects between mobile location-based retail apps and affective involvement [73], which in turn leads to downloading and using the apps [40]. So, the ability of localization of your mobile device can promote the interests in what you are involving. Therefore, we propose the following hypothesis:

H4a: Localization is positively associated with involvement.

Numerous studies explore the positive relationship between location-dependent service and users' experience [34]. Some scholars document that visual localization directly results in hedonic perceptions, which including individual experience of agreeable, delightful, enjoyment, and pleasure [34]. The individuals might emerge virtual experience when the localization service is properly following with them. In the mobile environment, the closest service information in geographic location can be recommended to users to decrease the sense of strange and generate a feeling of control [87]. Collectively, benefited from the location-based relevant information, it's easy to resonate with mobile service, which helps users to keep focused attention and breed flow experience. Consequently, there is a positive link between localization and flow experience. Therefore, we propose the following hypothesis:

H4b: Localization is positively associated with the flow.

3.2 Experience-Cognition Process as Organism

Besides the direct effect of mobile technology features on the virtual experience of flow, we also claim that mobile technology features are likely to form flow experience through telepresence and involvement indirectly. Respectively, telepresence has a mediating effect between flow experience and the mobile technology features of ubiquitous connectivity, including ubiquity and mobility [25], while involvement also plays a mediating role between flow experience and the mobile technology features of contextual offer with personalization and localization [8], [35].

The sense of telepresence can boost users' flow experience in a mobile environment by a sense of concentration and enjoyable feeling. Researchers argue that people who experience a sense of telepresence concentrate more on their virtual world activities so acutely that there is scarce attention left to immerse anything else [2]. As a vital factor of flow in the online environment [25], telepresence arises a powerfully immersive experience. Since the mobile service can afford users an increased feeling of telepresence, it is possible that users will focus on their information and produce a sense of control to the virtual environment. Some researchers state that the optimal experience of flow is enhanced by telepresence in social media use that flow experience contains five dimensions: enjoyment, concentration, challenge, control, and curiosity [32], [68]. As the telepresence generated by mobile technology heightens online users' sense of reality regardless of the physical environment, they taste the feel of joy and gratification as well as create the virtual experience of flow. Therefore, we propose the following hypothesis:

H5a: Telepresence is positively associated with the flow.

Involvement shows a motivational state (extrinsic and intrinsic) that affect the focus of attention and comprehension processes as well as behavioral intention [8]. The users who are involved in their activities will heighten their focused attention and intrinsic interest and have more possibilities to experience a sense of flow. Researchers, through affective and cognitive involvement analysis, show that the users who were involved would have more positive online experience due to the enhanced interest [30]. Accordingly, we expect that the involved mobile users would have more likelihood to feel the virtual online experience, namely, flow, and meanwhile moderate contextual offerings, including localization and personalization, with flow experience. Therefore, we propose the following hypothesis:

H5b: Involvement is positively associated with the flow.

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Perceived usefulness and satisfaction mediate the relationship between flow experience and behavioral intention. We try to explain that from two perspectives. We attempt to explore the transformation mechanism from technology performance to the experience performance from the research framework. The transformation mechanism reflects the socialization value of mobile technology since mobile technology renders service experience, transforming the usefulness and satisfaction of the performance of mobile technology to the focusing contents. This experience is not a conceptual substitution but a transmission of feelings. With a practice perspective, we reveal the detailed psychological mechanism of mobile users from flow experience to behavioral response. It's the core conversion process that a company cares about and finally achieve business purpose or value.

The users who experience flow may feel that they get more utility (i.e., perceived usefulness) for mobile technology usage [38], [48]. A few researches reveal the effect of flow on perceived usefulness, satisfaction, and loyalty in mobile instant messaging [1]. They further report that the focused attention, as a part of the flow, will influence users' perceived usefulness [1]. When a user's attention is absorbed in a object, he will have greater possibilities to affect the feeling of usefulness [76]. The users who perceive flow experience will feel its usefulness due to the perceived utility and attracted attention. Therefore, we propose the following hypothesis:

H6a: Flow is positively associated with perceived usefulness.

Some researchers summarize two perspectives of satisfaction in the mobile service context: transaction-specific and cumulative perspectives [86]. The transaction-specific aspect of satisfaction means the degree of satisfaction regarding a specific transaction in a particular situation. In contrast, the collective views of satisfaction are users' overall evaluation of their experiences with a specific entity, such as a service delivery system, vendor, or service provider. We adopt satisfaction from a cumulative perspective that users' satisfaction is defined as emotional response according to users' overall evaluation of their expectations and experiences derived from their virtual experiences with a mobile service.

Flow experience is an essential component in understanding user satisfaction [64]. Researchers state that the environment may influence the users' experience, producing a setting in which they can enjoy their activities with satisfaction, and flow is a typical element of experience [7], [82]. The experience of flow can attract users, debase price sensitivity, and subsequently influence their positive attitudes and behaviors [27]. As such, flow experience can cause an emotional response and further arouse user satisfaction due to the virtual experiences of mobile service. Therefore, we propose the following hypothesis:

H6b: Flow is positively associated with satisfaction.

Perceived usefulness also plays a crucial role in strengthening satisfaction. Satisfaction is the users' accumulated feelings to mobile service, which is developed through multiple interactions with providers [1]. That is, the feelings of usefulness caused by repeated interaction will accumulate into feelings of satisfaction. Prior research indicates that the perceived usefulness that is related to utilitarian value has a positive effect on users' satisfaction and increases the likelihood of using the service [72]. In line with prior studies, we gain that there is a strengthening relation from perceived usefulness to satisfaction. Researcher shows that perceived usefulness is expected to be the most significant expectation affecting users' post-acceptance feelings, i.e., satisfaction [5]. Therefore, we propose the following hypothesis:

H6c: Perceived usefulness is positively associated with satisfaction.

3.3 Intention to Purchase or Return as Response

The telepresence experience acts on an individual's behavior in the mobile situation [76]. Researchers document that telepresence mediates the relationship between information system quality and the users' intention to reuse smartphone-based augmented reality [42]. The users, who immerse themselves in the vendor's product and service, means they assign their cognitive resource to the vendor's product or service. Hence the users will produce more tendency to purchase their focused products or services. Even if the users didn't make a purchase decision immediately, they are more likely to review their previous traces when they produce a similar requirement again. Some scholars also report that telepresence has a positive effect on user's purchase decision to Virtual Reality (VR) technology, mediated by satisfaction, brand loyalty, and word of mouth [46], [79]. Consequently, in the mobile environment, as a weightily and influentially psychological experience, telepresence has a positive effect on the intention to purchase or return. Therefore, we propose the following hypothesis:

H7a: Telepresence is positively associated with intention to purchase/return.

Involvement is used as a mediator in user behavior research [46]. There are a few categories of involvement, such as situational and enduring involvement, affective, and cognitive involvement [53]. High cognitive involvement indicates that users are actively handling product information and are engaged in the information gathering. And high affective involvement will positively enhance emotional feelings and influence the shopping outcomes of satisfaction and intention to return [17]. We employ the integrated concept as a unique construct instead of a differentiating notion. Accordingly, we look forward that a high level of involvement will heighten product recognition and have a

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positive effect on users' intention to return to achieve the purchase behavior. Therefore, we propose the following hypothesis:

H7b: Involvement is positively associated with intention to purchase/return.

Following previous literature, the perceived usefulness is used as intermediating role usually, along with subsequent attitude and behavioral intention [29]. The classical Technology Acceptance Model (TAM) define that perceived usefulness is a belief that using the technology will enhance his/her job performance, and it theorizes that the user's behavior intention relies on perceived usefulness and perceived ease of use [38]. There are also numerous supporting documents about the relationship between perceived usefulness and behavioral intention [1], [74]. For instance, some researchers suggest that the users who perceive usefulness when shopping on the online website will be likely to revisit the website and purchase from it [14], [45]. That is, the users who perceive usefulness to the vendor's product or service will have a greater willingness to reaccess the product or service, and purchase them. Therefore, we propose the following hypothesis:

H7c: Perceived usefulness is positively associated with intention to purchase/return.

The satisfaction from the flow experience will promote users' intention to purchase or return. Researchers find that overall satisfaction with the website quality will increase the likelihood of purchase on its support platform [29]. The users, who experience the feeling of flow, will perceive satisfaction with the vendors' mobile service, and purchase their product or service. On the other hand, the perception of satisfaction has a significant impact on the general situation of purchase intention. Research shows that satisfaction, as an intermediary, has a positive effect on the purchase of virtual reality technology [46]. In a word, the users perceive satisfaction with the vendor's product or service, meaning that users recognize its value and generate purchasing intention, or return to satisfy their desires in order not to miss their satisfactory goods. Therefore, we propose the following hypothesis:

H7d: Satisfaction is positively associated with intention to purchase/return.

As the above-proposed hypotheses relationships among the constructs, we present the overall research model in Figure 1.

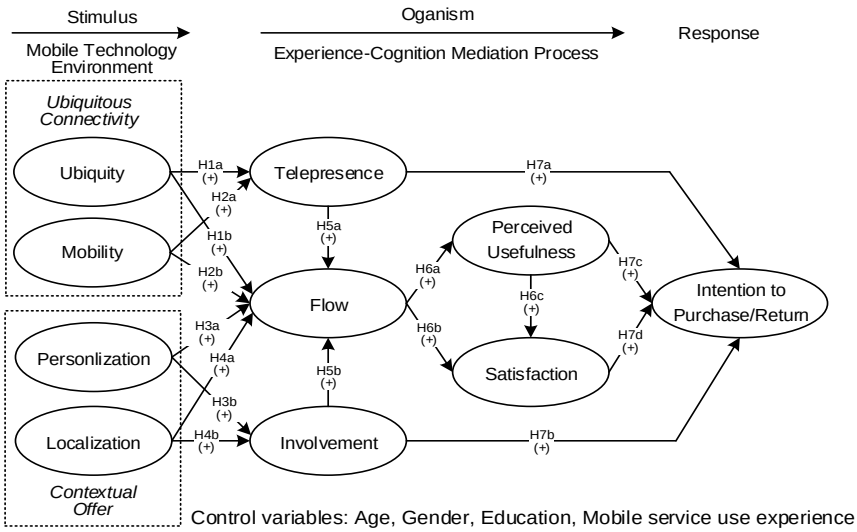

Figure 1: Research model

4 Research Methodology

In this section, research methodology are reported as follows, including measurements, data collection and samples, measurement model, common method bias testing, hypotheses testing, and results of mediation analysis.

4.1 Measurements

We conduct the main variables as first-order reflective constructs with multiple items adapted from prior studies and adjust to fit in our research context. All indicators are measured with a seven-point Likert scale ranging from *1=strongly disagree* to *7=strongly agree*, except the demographic variables are measured with single-items measures. We select five control variables in the research model, including the respondents' age, gender, education,

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and mobile service use experience to control individual differences to obtain a reliable conclusion. The prior experience refers to the number of times they purchased each month via the mobile service.

A two-way translation is conducted to ensure readability and no-loss of information since our survey is carried out in the Chinese situation. A bilingual scholar who is proficient in both English and Chinese first translated the items to Chinese. Another professional translator performs a back-translation from Chinese to English. The difference in wording is recognized and discussed. The draft version of the questionnaire is sent for a pilot test by 60 college students at a university, and only minor modifications are made to the expression of some items. The final version is used and distributed for data collection. The items measuring each construct are summarized in Appendix A.

4.2 Data Collection and Samples

We conduct an online survey for data collection to receive a wide range of responses and filter out the participants who have no internet experience. The questionnaires are randomly put into several online social communities and groups that are non-overlapping synchronously, to collect data more efficiently. The backstage operator relies on one of the biggest online survey platforms in China. To encourage participation, the respondents who complete the questionnaire can get a cash reward of 1 CNY (about USD 0.16) in the form of online red packets supported by mobile online payment and extremely popular in China. And a brief introduction for this data collection is also included. For example, we use the content in the formal questionnaire's description, that is, *mobile service (such as mobile apps or applet for shopping, travel, tickets, etc.),* to depict the mobile service concretely. We take about three months (September to November 2017) to complete the data collection. Finally, we remove the careless responses (i.e., straight-line responding questionnaires and missing on one or more measurements). A total of 452 valid responses from 32 provinces in China are collected after excluding those responses (the valid response rate is 92.2%).

Of the 452 respondents, 221 are male (49.01%), and 231 are female (50.99%). A vast majority of the respondents (85.65%) are between 18 to 30 years old. 75.5% of them are holders of bachelor degree or above. Nearly half of the respondents (44.37%) have the shopping experience two to four times a month. Particularly, 94.04% of the participants finish the questionnaire via their mobile devices, such as a smartphone or tablet.

4.3 Measurement Model

Since the first-order measurements are reflective constructs, the reliability and validity of the measurement model are examined by confirmatory factor analysis (CFA). As shown in Table 1, reliability is firstly assessed based on Cronbach's alpha and composite reliability score. The Cronbach's alpha (α) is ranged from 0.804 to 0.915, validating the high internal consistency. The minimum value of composite reliability (CR) is 0.869, exceeding the recommended threshold value of 0.7 [19]. These results indicate the high reliability of the measurement model.

Table 1: Results of confirmatory factor analysis

Construct	Indicator	Loadings	α	CR	AVE
Ubiquity	UBI1	0.849	0.876	0.907	0.709
	UBI2	0.819			
	UBI3	0.803			
	UBI4	0.894			
Mobility	MOB1	0.887	0.850	0.909	0.769
	MOB2	0.864			
	MOB3	0.879			
Personalization	PER1	0.881	0.804	0.869	0.630
	PER2	0.866			
	PER3	0.792			
	PER4	0.604			
Localization	LOC1	0.847	0.834	0.898	0.747
	LOC2	0.833			
	LOC3	0.910			
Telepresence	TEL1	0.802	0.806	0.870	0.626
	TEL2	0.796			
	TEL3	0.785			
	TEL4	0.781			
Involvement	INV1	0.865	0.873	0.905	0.656
	INV2	0.826			
	INV3	0.813			
	INV4	0.832			
	INV5	0.704			

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Table 1: continuation

Flow	FLO1	0.852	0.876	0.908	0.663
	FLO2	0.780			
	FLO3	0.814			
	FLO4	0.818			
	FLO5	0.806			
Perceived Usefulness	PEU1	0.841	0.860	0.892	0.676
	PEU2	0.784			
	PEU3	0.734			
	PEU4	0.918			
Satisfaction	SAT1	0.857	0.890	0.923	0.749
	SAT2	0.844			
	SAT3	0.885			
	SAT4	0.876			
Intention to Purchase/return	IPR1	0.897	0.915	0.934	0.740
	IPR2	0.880			
	IPR3	0.873			
	IPR4	0.852			
	IPR5	0.796			

Note: All factor loadings are significant at $p < 0.05$.

To assess convergent validity, the average variance extracted (AVE) and factor loadings of items associated with each construct are tested. Table 1 shows that the AVE values range from 0.626 to 0.769, exceeding the recommended value of 0.5 [20]. The most of the factor loadings are above 0.7, except for the PER4 that is 0.604, but it is still acceptable as many scholars relaxed the value to 0.5 [2]. We then examine that the square root of the AVE for each construct is larger than the correlation coefficients with other constructs, and calculate the cross-loadings to assess the discriminant validity of the measurement model [20]. As shown in Table 2, all of the diagonal elements in bold, ranging from 0.791 to 0.877, are larger than any other inter-construct correlation coefficients. The loadings of each construct are also larger than any other assigned constructs. Therefore, the convergent validity and discriminant validity of the measurement model are confirmed.

The fitness of measurement model are evaluated by various statistics such as normed chi-square/degrees of freedom(χ^2/df), comparative fit index (CFI), Tucker-Lewis index (TLI), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), root mean squared error of approximation (RMSEA), and standardized root mean squared residual (SRMR). As shown in Table 3, The chi-square and degrees of freedom are 689.757 and 573, respectively, and the χ^2 is 1.204(<3.00). All of the other fit indices are within the proposed threshold [20].

Table 2: Construct correlations and discriminant validity

	Mean	SD	UBI	MOB	PER	LOC	TEL	INV	FLO	PEU	SAT	ITP
UBI	4.927	2.367	**0.842**									
MOB	5.108	2.430	0.603	**0.877**								
PER	4.811	2.242	0.493	0.525	**0.794**							
LOC	4.912	2.169	0.551	0.576	0.547	**0.864**						
TEL	4.710	2.429	0.461	0.441	0.479	0.509	**0.791**					
INV	5.027	2.127	0.471	0.546	0.535	0.529	0.516	**0.810**				
FLO	4.943	2.017	0.449	0.476	0.521	0.504	0.501	0.627	**0.814**			
PEU	5.025	2.193	0.451	0.496	0.475	0.526	0.495	0.571	0.575	**0.822**		
SAT	5.084	2.005	0.463	0.513	0.502	0.532	0.455	0.587	0.597	0.632	**0.865**	
ITP	5.271	2.080	0.439	0.504	0.494	0.473	0.411	0.557	0.532	0.581	0.630	**0.860**

Note: SD denotes standard deviation. The diagonal elements in bold italics are the square roots of the average variance extracted (AVE). The off-diagonal elements are the correlations between constructs. All correlations are significant at $p < 0.01$.

4.4 Common Method Bias Testing

Since the same respondents provide each of the item's information at the same measurement environment, it's likely to cause common method variance (CMV) and bring confusing and misleading research conclusion. Harman single factor test is used to examine the statistical test method, for defects of test deviation and lack of sensitivity [51]. We apply the potential error variable control method. To avoid its limitation, we take on the CMV as a potential variable and compare the goodness of fit between the model without the common method factors (without CMF) and with common method factors (with CMF) [86]. As seen in Table 3, the differences between with CMF and without CMF are not obvious. It indicates that the CMV doesn't pose a severe threat in this study.

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Table 3: The fit indices of the CMV

Fit statistics	Without CMF	With CMF	Recommended range
χ^2(df)	689.757 (573)	742.465 (563)	NA
χ^2/df	1.204	1.319	<3.00
CFI	0.992	0.988	>0.90
TLI	0.989	0.983	>0.90
GFI	0.929	0.925	>0.90
AGFI	0.894	0.886	>0.80
NFI	0.957	0.954	>0.90
RMSEA	0.021	0.027	<0.06
SRMR	0.057	0.056	<0.08

4.5 Hypotheses Testing

The structural model is tested by a structural equation model based on partial least squares (PLS-SEM) in R language known as the *plspm* library. Firstly, the structural model is represented by constructing a lower triangular matrix. Then, the latent variables correspond with the imported data sets by the *list* function. Finally, the parameters of the model to be verified are set by *plspm* function, and the operation results are obtained by the *summary* function. The Maximum Likelihood algorithm is also implemented to test the structural model, and the results are consistent with the results shown here. Figure 2 depicts the principal path coefficients and *p*-values and explains endogenous variables' variances (R^2) for the structural model. The Mediation effect is also tested by the Sobel test in Table 4.

As seen in Figure 2, fifteen of the seventeen path in the research model are supported. Ubiquity is positively associated with telepresence (β= 0.422, p < 0.001), supporting H1a, but the hypothesis suggesting the relationship between ubiquity and flow (i.e., H1b) is not supported (β= -0.03, p not significant). As for telepresence (β= 0.279, p < 0.001) and flow (β= 0.307, p < 0.001) are positively affected by mobility, supporting H2a and H2b. As expected, personalization is positively associated with involvement (β= 0.453, p < 0.001) and flow (β= 0.079, p < 0.01), H3a and H3b are supported. The significant effect of localization on involvement (β= 0.373, p < 0.001) and flow(β= 0.08, p < 0.01) offered support for H4a and H4b. Telepresence have a positive impact on flow (β= 0.134, p < 0.001), supporting H5a, but telepresence is not found to have an expectedly positive influence on intention to purchase/return(β= -0.003, p not significant), not supporting H7a. Involvement is significantly associated with flow (β= 0.453, p < 0.001) and intention to purchase/return (β= 0.133, p < 0.01), both H5b and H7b are supported. Flow is found to have a strongly impact on perceived usefulness (β= 0.8, p < 0.001) and satisfaction (β= 0.822, p < 0.001) , while perceived usefulness is positively associated with satisfaction (β= 0.486, p < 0.001), supporting H6a, H6b, and H6c, respectively. Finally, the positive effects of perceived usefulness (β= 0.341, p < 0.001) and satisfaction (β= 0.474, p < 0.001) on intention to purchase/return are also confirmed, indicating hypotheses H7c and H7d are supported. Overall, approximately 45 percent (0.449) of the variance in telepresence, 80 percent (0.803) of the variance in flow, 60 percent (0.603) of the variance in involvement, 64 percent (0.64) of the variance in perceived usefulness, 76 percent (0.76) of the variance in satisfaction, and 80 percent (0.796) of the variance in intention to purchase/return are explained by the antecedent (exogenous) variables.

4.6 Results of Mediation Analysis

We find out that the direct path of the research model is weaker than its impact on the indirect way from the value and saliency of path coefficients, as seen in Figure 2. To further test whether virtual experience and user cognition play mediation roles between mobile technology environment and final users' behavioral response, we conduct mediation analysis by adopting the Sobel test [20]. The results of the mediation analysis reported in Table 4 show that all of the mediation relationships are established. The virtual experience, including flow, telepresence, and involvement, mediate the mobile technology environment and user's behavioral intention. Meanwhile, the user cognition consisting of perceived usefulness and satisfaction mediate the flow experience and users' behavioral intention.

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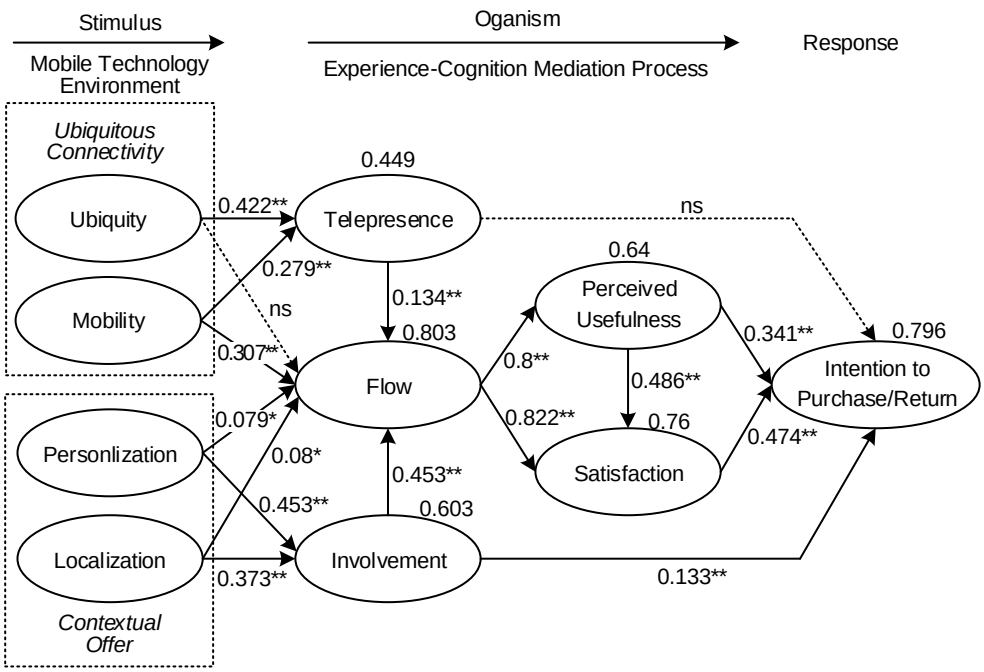

Notes: * $p < 0.01$; ** $p < 0.001$; ns represent not significant.

The effect of control variables:
(1) The influence of age, education level, and mobile use experience on flow experience is not significant. The age (β = -0.298, p = 0.002) and income level (β = 0.189, p < 0.01) significantly affect flow experience. The total of approximately 5 percent (0.053) variance in flow experience are explained by the control variables.
(2) The influence of age and mobile use experience on intention to purchase or return is not significant. The age (β = -0.339, p < 0.01), education level (β = -0.167, p = 0.013), and income level (β = 0.165, p = 0.005) significantly affect intention to purchase or return. The total of approximately 5 percent (0.05) variance in intention to purchase or return are explained by the control variables.

Figure 2: Results of the structural model

Table 4: Results of mediation analysis

Mediation path	Coefficient	SE	z-value	*p*	Mediation effect exists
Ubiquity-->Telepresence-->Flow	0.288	0.029	9.719	<0.001	Yes
Mobility-->Telepresence-->Flow	0.230	0.025	9.366	<0.001	Yes
Personalization-->Involvement-->Flow	0.448	0.032	13.858	<0.001	Yes
Localization-->Involvement-->Flow	0.436	0.031	13.909	<0.001	Yes
Flow-->Perceived usefulness-->Intention to purchase/return	0.393	0.034	11.627	<0.001	Yes
Flow-->Satisfaction-->Intention to purchase/return	0.495	0.036	13.758	<0.001	Yes
Involvement-->Flow-->Perceived usefulness	0.393	0.043	9.045	<0.001	Yes
Telepresence-->Flow-->Satisfaction	0.533	0.037	14.477	<0.001	Yes
Note: One-sided *p*-value are computed.					

5 Discussion and Implication

In this section, the discussion and implication are stated as follows, including discussion of findings, theoretical implications, managerial implications, limitation and future research, and conclusion.

5.1 Discussion of Findings

First, we identified the mobile technology outcomes with ubiquitous connectivity and contextual offer on users' virtual experience and subsequent behavioral response. The results confirmed that ubiquitous connectivity, including mobility and ubiquity, and contextual offer consisting of personalization and localization, were important antecedents driving the users' behavioral response. The mobile technology enabled users to access mobile service without being interrupted by external factors, and they can make a decision at anytime and anywhere with arbitrary requirements.

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Second, the direct relationship between ubiquity and flow, as well as telepresence and intention to purchase or return, were not confirmed. However, the mediation relationship by telepresence and user cognition (perceived usefulness and satisfaction) were strongly supported, which verified the mediation effect of the experience-cognition process laterally. The unremarkable association between ubiquity and flow could be explained that being connected continuously was associated with stressors, e.g., invasion of privacy, and role ambiguity [4], which decreased the experiential reaction of flow. Due to the mature mobile technology, telepresence had been an essential service for users. It was hard to form differential perception for them presently, similar to effect, without affecting the intention to purchase/return.

Third, this study then revealed the mediation mechanism of the experience-cognition process. With the immediate association via telepresence discussed above, the results confirmed the experiential reaction of mobile technology as telepresence, involvement, and flow, and the subsequent response of flow experience on users' cognition to mobile service, namely perceived usefulness and satisfaction. It was consistent with [2], [84], [95], who chose the antecedents of experience like perceived personalization, stability, and interactivity, and selected virtual experiences like intense joy, social support, and social presence on the basis of the respective research context.

Fourth, we employed flow as the core psychological experience to unveil mobile users' pivotal determinants. Previous scholars studied similar concepts to flow, such as peak experience, engagement, immersion, and intense joy. The commercial strategy that followed the users' flow could optimize their experience, even overflowed, and exceeded their expectations. There might be a misunderstanding for firms that they could obtain a benefit only when the users recognized them formally. Our results also suggested that the positive user cognition, i.e., perceived usefulness and satisfaction, mediated the flow experience and behavioral intention, which was irrelevant to firms' products but with user' good experience to mobile service. Furthermore, the positive user cognition would promote users' experiential perception, realize value transformation, and enhance business competitiveness.

Lastly, as for the control variables, results show that the age and income level significantly affect flow experience, which means the users who have higher income and lower age perceive the flow experience more clearly. We also get the conclusion that the age, education level (Education level is slightly significant), and income level significantly affect intention to purchase and return, which means the users who have lower age, higher income level, and lower education level are more inclined to purchase.

5.2 Theoretical Implications

One significant contribution of our study is the development of a mobile technology experience model, which is beyond the concept of mobile technology adoption. To the best of our knowledge, this study is among the first to reveal mechanisms are driving technical experience in the mobile area. Many prior studies about m-commerce mainly focus on the mobile features as ubiquity or discuss users' perceptions, such as trust [50] and satisfaction [16], [49]. We integrate the mobile technology characteristics, which are classified by ubiquitous connectivity and contextual offer, and explores its economic performance. This study finds a value-added path from excellent mobile technology to behavioral performance mediated by virtual experience, releasing users' natural preference.

This study adds new insights into flow experience literature by exploring its antecedents in the mobile technology environment. Most of the prior researches regard flow experience as the balance of challenges and skills according to the original definition of flow [12]. We take on the mobile technology environment as the antecedents of flow and suppose telepresence and involvement as a mediation role, which enriches the forming conditions of flow experience and offers a new perspective to experience research.

Furthermore, our study enhances the existing literature by bridging the technical excellence and user behavior through the intervening mechanism of virtual experience. A few scholars unveil the relationship between the technology environment and behavioral intention bridged by service experience [84]. A user's involvement with the products sold by a Web-based company can affect the users' experience and behavior. But there remain research margins in the mobile arena to recognize its shifting mechanism. We employed the S-O-R framework to investigate how the mobile technology characteristics (i.e., ubiquity, mobility, personalization, and localization) impact the virtual experience and, subsequently, the intention to purchase or return. That expands prior research in the mobile arena, which has mainly focus on the global online environment and provides the research foundation for studying mobile and economic behaviors.

5.3 Managerial Implications

Our findings also contribute to practice. Our results advise mobile-focused companies to enhance their mobile service coverage via diverse connectivity to strengthen their mobile commercial service breadth as these attributes can significantly influence users' telepresence with the service. For instance, although mobile network operators provide the underlying technical support, the companies can open their official account and set up adaptive service on the mobile social media platform, such as Twitter, Wechat, Facebook, and provide real-time dynamic and up-to-date products or services to catch users at anytime from anywhere. They can break the temporal and spatial

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constraints, and connect their users in more scenarios to enhance the smoothness of service and realize unbounded experience.

Similarly, our results advise practitioners and recommender system developers to provide a matched product/service via contextual offer in order to strengthen their mobile commercial service depth as these attributes can significantly influence users' involvement with the service. The personalized recommendation is an ideal marketing strategy of most businesses for the buyer's market context, which emphasizes providing different products or services for different users. The application of mobile technology can better help enterprises succeed in understanding their users by capturing their localized situation and personalized preferences. Mobile-focused companies can provide suitable products or services to their users by applying and developing mobile technology features at the right time and place by adaptable means.

Moreover, our study suggests that mobile-focused companies should develop experience-oriented mobile service strategies to promote user consumption and user stickiness since the psychological experience is an essential process of mobile users' organism reactions. Mobile service is not just a channel for making companies connecting with their users, but also a powerful tool enabling users to do what they want to uncontrollable flow. The convenience of the mobile environment would further increase the degree of users' flexibility. Mobile technology is a double-edged sword for companies. As the saying goes: *You can get a user to relax while also losing her/him easily.* This study shows that one of the best marketing strategies in the m-commerce context is *following the flow*. Companies should adequately take advantage of mobile technology features to improve their users' experience and gain a more significant competitive advantage.

5.4 Limitation and Future Research

Although this study provides some valuable implications for both researchers and practitioners, several limitations of this study should be taken into account before generalizing its findings. First, we consider control variables as prior experience, age, gender, education based on demographic variables. But there may be other factors to be controlled. Future researchers can use extra controls to establish a more reliable conclusion. Secondly, this paper takes on mobile technology features as ubiquity, mobility, personalization, and localization classified by ubiquitous connectivity and contextual offer. Some additional concepts similar to these can be employed, such as convenience, accessibility, and immediacy. Future research can replace or add these features to examine the applicability of this model. Future studies can also extend our model to specific mobile purchase behavior or validate its moderators of experience.

5.5 Conclusion

Our results suggest that mobile technology features, including ubiquitous connectivity and contextual offer, affect the virtual experience of users applying mobile service, which, in turn, affect their behavioral intention. Specifically, regarding ubiquitous connectivity, we find that ubiquity and mobility have a significant impact on telepresence, mobility has a significant positive effect on flow. Still ubiquity has a non-significant effect on flow. Both personalization and localization have a significant impact on involvement and flow, respectively. Telepresence and involvement have a significant impact on flow. Involvement has a significant impact on intention to purchase or return. However, telepresence is found to have a non-significant influence on intention to purchase or return. And the satisfaction and perceived usefulness have a strong mediation effect between flow and intention to purchase or return. The results show that the virtual experience (i.e., telepresence, involvement, and flow) as the effluence of mobile technology characteristics plays an influential role in users' perception (i.e., satisfaction and perceived usefulness) and their subsequent behavioral responses (i.e., intention to purchase or return). Especially due to the kernel role of flow experience, *following the flow* can be the optimum strategy to give full play to the advantages of mobile technology characteristics and achieve excellent market effects.

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Appendix A: Measurement scales (Strongly Disagree/Agree,1-7 scale)

Ubiquity [Adapted from Lee 2005; Jung et al. 2015]
UBI1 I can access to the mobile service anytime.
UBI2 I can access to the mobile service anywhere.
UBI3 Mobile service makes the required information easy to access.
UBI4 Mobile service enables me to order products or service anywhere and anytime.

Mobility [Adapted from Kim et al. 2010]
MOB1 I can use mobile service anytime while I'm strolling.
MOB2 I can use mobile service anytime while I'm shopping.
MOB3 I can use mobile service anytime while I'm traveling.

Personalization [Adapted from Zhang et al. 2014; Srinivasan et al. 2002]
PER1 I feel that the mobile service is getting to know my specific needs.
PER2 I feel that the mobile service enables me to order products or service that are tailor-made for me.
PER3 The advertisements and promotions that mobile service providers send to me are tailored to my situation.
PER4 This mobile service makes me feel that I am a unique user.

Localization [Adapted from Xu et al. 2009]
LOC1 With the mobile service, I am able to get up-to-date information or services whenever I need to.
LOC2 With the mobile service, I am able to access the relevant information or services whenever I need to.
LOC3 With the mobile service, I am able to get just-in-time information or services wherever I want to.

Telepresence [Adapted from Novak et al. 2000; Animesh et al. 2011]
TEL1 I forget about my immediate surroundings when I use the mobile service.
TEL2 I forget where I am when I use the mobile service.
TEL3 After ending the mobile service, I feel like I come back to the *real world* after a journey.
TEL4 Using mobile service creates a new world for me, and this world suddenly disappears when I stop using it.
TEL5 When I use the mobile service, the world generated by the sites I visit is more real for me than the *real world*.

Flow [Adapted from Animesh et al. 2011; Lee et al. 2007]
FLO1 When conducting mobile service, my attention is focused on the activity.
FLO2 When conducting mobile service, I feel in control.
FLO3 When conducting mobile service, I find a lot of pleasure.
FLO4 I feel curious when interacting in the mobile service.
FLO5 I am absorbed in the interaction in the mobile service.

Involvement [Adapted from Mcquarrie&Munson 1992; Zaichkowsky 1994]
INV1 I think some of the information in the mobile service is important to me.
INV2 I think some of the information in the mobile service is relevant to me.
INV3 I think some of the information in the mobile service means a lot to me.
INV4 I think some of the information in the mobile service is of concern to me.
INV5 I think some of the information in the mobile service is appealing to me.

Perceived usefulness [Adapted from Koufaris 2002]
PEU1 Using mobile service can improve my shopping performance.
PEU2 Using mobile service can increase my shopping productivity.
PEU3 Using mobile service can increase my shopping effectiveness.
PEU4 I think mobile service is useful.

Satisfaction [Adapted from Wang et al. 2004; Fang et al. 2016]
SAT1 My choice to shop by mobile service is a wise one.
SAT2 I am satisfied with the purchases by the mobile service.
SAT3 I am satisfied with the products or services offered by this mobile service.
SAT4 I feel delighted by the mobile shopping experience.

Intention to purchase/return [Adapted from Pavlou 2003; Jiang et al. 2011]
ITP1 Given the chance, I would consider shopping using the mobile service.
ITP2 I am willing to purchase products or service via this mobile service.
ITP3 I expect my use of this mobile service for purchase to continue in the future.
ITP4 In more and more situations, I'm shopping on a mobile service.
ITP5 I might return and continue access products or services although I left at last time.