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EMPIRICAL ARTICLE

The effects of interaction behaviors of service frontliners on customer participation in the value co-creation: a study of health care service

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Abstract This research explores the roles of various interaction behaviors of service frontliners in activating customer participation and creating customer value in the context of health care service. Based on the data of 285 paired patient–physician cases of serious chronic diseases, the analysis revealed that individuated, relational, and empowered interactions expressed by a service frontliner play a critical role in activating customer participation, leading to a higher level of perceived value; while ethical interaction has a direct-only impact on perceived value. These results imply that frontliner interaction can be further broken into participation-activating interaction and value-enhancing interaction. Both of which eventually lead to the improvement of customer value.

Keywords Value co-creation · Customer participation · Frontliner interaction · Health care service · Vietnam

1 Introduction

Health care is a human transformative service that aims to create uplifting changes and improvement in the well-being of customers (Anderson et al. 2013; Bitner et al. 2014). In health care service, customers (i.e., patients) play an essential role in determining the effectiveness of the outcome (McColl-Kennedy et al. 2012; Nambisan and Nambisan 2009). In this regard, there has been a shift in the view of the customer's role from a passive receiver of the service (i.e., medical treatment) to a partner in the service process (Bodenheimer et al. 2002). In this partnership,

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service frontliners (i.e., physicians) are experts about diseases and customers are experts in their own lives and conditions. The collaboration and interaction between frontliner and customer would be critical for the successful service outcomes (Bitner et al. 1997; McColl-Kennedy et al. 2012). Owing to this feature, health care is considered as one among the typical examples of the service co-creation and value co-creation between a service firm and its customers (Dıáz-Méndez and Gummesson 2012; Nambisan and Nambisan 2009) and a fertile field for research (Berry and Bendapudi 2007).

Because interaction requires the effort of both sides during the service, customer participation becomes a very important issue. However, prior studies in health care service shows a variation in customer participation level (Cegala et al. 2007; Street et al. 2005; Zainuddin et al. 2013). Moreover, some studies have pointed out that many customers do not participate properly (Gallan et al. 2013). They may obstruct the co-creation process by their dysfunctional participative behavior (Chan et al. 2010), defective behavior (Greer 2015), or inappropriate behaviors (Seiders et al. 2015). These ineffective participation behaviors may be attributed to some key characteristics of health care service. Health care customers are usually under physical and emotional stress of illness, pain, anxiety, fear, and uncertainty of the outcome. For them, this is the service they need but may not want, which is inherently personal but not private (Berry and Bendapudi 2007). These features may inhibit the willingness and appropriateness of customer participation in the service process (Hibbard 2009; Gallan et al. 2013).

Given the importance of customer participation and the inherent attributes of health care service, it is important for service providers to help customers overcome those obstacles and become effective participants in the service. To this end, firms need to motivate customers and to help build their capabilities to perform appropriate participative behaviors (Payne et al. 2008). These initiatives of the firm should be implemented mainly in the service encounter by service frontliners (i.e., physicians), because value is co-created mostly through the integration of resources and interaction between service provider and customers in the service joint sphere (Grönroos and Voima 2013; Gummesson and Mele 2010; Vargo et al. 2008). Therefore, frontliner interaction behavior is assumed to play an important role in helping customers be an effective co-creator. This issue is even more worthy to be explored in health care service because in the interaction between the two sides, health care frontliners are also often in stress while customers are ill, fearful, and anxious (Berry and Bendapudi 2007; Collins et al. 2007).

Several studies have attempted to provide insights into the concept of customer participation in value co-creation (Alam 2011; Bitner et al. 1997; Hong and Lee 2015; Nambisan and Nambisan 2009; Ordanini and Parasuraman 2010; Ramaswamy and Gouillart 2010). However, few studies have clearly analyzed the role of service frontliners in activating customer participation in the value co-creation process (Grönroos and Voima 2013; Seiders et al. 2015). Particularly, research to provide insights into the mechanism of interaction behaviors of frontliners and customers to co-create value in health care is scant (Gaur et al. 2011; Smith 2013).

In this context, the purpose of this research is to investigate the effects of various interaction behaviors of service frontliner on customer participation and how both of

which together co-create value. By investigating this mechanism of interaction between the two sides, this research contributes to one of the developing trends in the focus of service research which has moved from differences of goods and services to commonalities and interdependencies, from the supplier's value chain to the balanced centricity in the network of value creators (Polese et al. 2014), and from the static approach to the dynamic approach to service research (Tronvoll et al. 2011). The empirical context for this study is the health care service provided to patients of serious chronic diseases in Vietnam.

The rest of this paper is organized as follows. The next section presents the theoretical background of key concepts, which is followed by the development of proposed hypotheses. Research method is then reported which is featured by a dyadic approach to data collection. Data analysis, result discussions, and implications are made up the final sections of the paper.

2 Theoretical background

This section provides a brief review on value co-creation in health care service. It then presents the conceptual clarification on the three key concepts in this study, including customer participation in value co-creation, service frontliner interaction, and customer-perceived value. Within each concept, the definition and key attributes are presented first. Then, the concept dimensions and/or components follow.

2.1 Value co-creation in health care service

In general, health care is a transformative service which is characterized by several dissimilarities with other services. The idiosyncratic features of health care service include customer's state of fear and stress of illness, customer's need but not want, customer's reluctance to co-produce, knowledge asymmetry between customers and service professionals, personal-but-not-private service, whole-body service, customer's risk of being harmed, service frontliner's stress (Berry and Bendapudi 2007).

Extant literature shows that the majority of studies in health care service have emphasized the importance of value co-creation through customer participation and interaction. Particularly, Engström (2012) asserts that patient participation in health care service provides several benefits but customers' illness limits their participation. Choi and Kim (2013) show a positive relation between interaction quality and customer satisfaction. Chahal (2010) finds that health care frontliner's behaviors such as caring attitude, friendliness, helpfulness, responsiveness significantly influence the patient–physician interaction to co-create value, leading to customer satisfaction and recommendation. Gallan et al. (2013) conclude that the levels of patient participation increase when their relative affect levels become more positive, and that both which help improve perceived quality of the service and customer satisfaction.

In regards to the problem of information asymmetry between customer and service frontliner, Prahalad and Ramaswamy (2002) point out a trend that health

care customers nowadays use internet to learn about diseases and treatment options. When in the direct interaction, they are more participative in asking questions and choosing treatments. This helps them to be more knowledgeable, which significantly affects the co-creation relationship. This customer trend also leads to a suggestion of a shift in research focus from information sharing to interpretation scheme sharing, ultimately up to value co-creation (Barile et al. 2014). In the same vein, Elg et al. (2012) develop a model for patient learning and co-creation in health care which focuses on understanding the process of patient co-creation and different mechanisms through which physicians can learn from patients. Moreover, Andersson et al. (2007) discuss how mobile technologies can provide information for customers which help facilitate patient involvement in the co-creation of value. Gaur et al. (2011) find the positive effect of doctor's communication skills such as listening and explaining behavior on patient's confidence in doctors. Zainuddin et al. (2013) find that customer resources jointly co-create functional and emotional value for customer. In terms of the antecedents and consequences of co-creation, Voorberg et al. (2015) indicate that more focus has been on antecedents and less on outcomes of service co-creation.

However, due to the aforementioned features of health care service, the patterns of customer co-creation in health care are diverse. Nambisan and Nambisan (2009) analyze consumer co-creation activities and propose four models of value co-creation in health care namely, partnership, open-source, support-group, and diffusion. With the same focus, McColl-Kennedy et al. (2012) explore the different styles of customer co-creation of value namely, team management, insular controlling, partnering, pragmatic adapting, and passive compliance. Another research stream has tried to broaden the scope of value co-creation in health care by taking a multi-actor perspective. For instance, Black and Gallan (2015) suggest a network view of value co-creation based on value-creating interaction styles. Pinho et al. (2014) develop the value co-creation concept which involves many actors and indicate that how value co-creation for each actor depends on his/her own actions and the actions of others in a complex set of interaction and interdependencies.

Although previous works provide some insights of the value co-creation in health care service, the issue of how the interaction behavior of one actor (e.g., physician) affects the interaction of the other actor (e.g., patient) has not been explored to a full extent. Moreover, most research has taken one-side view only. That is, data were collected from either service providers or customers. Research based on the view from both sides of interaction, which is characterized by dyadic data, is scant. In terms of research methodology, it is found that the majority of prior works in the field are inclined toward conceptual analysis and case study. There have been only a handful of research works employing quantitative method with large-sample sizes. This is also consistent with the remarks by Hardyman et al. (2015) and Voorberg et al. (2015).

2.2 Customer participation

Customer participation in a service is defined as a customer's behavior related to the creation and delivery of service offerings (Auh et al. 2007; Mustak et al. 2013).

Under the service dominant logic perspective, service is described as a process of a firm doing things in interaction with its customers (Grönroos 2006, 2008; Vargo and Lusch 2004). Therefore, customer participation is an integral part of the production of a service to co-create value. This participation is imperative in health care service, because the service frontliner cannot effectively deliver the service outcome if the customer does not do something in the service process (Seiders et al. 2015). Several studies have indicated that customer participation occurs only in the joint sphere of the service where occurs the collaboration and interaction between a firm and its customer occurs (Grönroos and Voima 2013; Gallan et al. 2013; Jaakkola and Alexander 2014). In this collaboration, both the firm and the customer apply resources to the service interaction to acquire benefits (Cova et al. 2011).

In terms of the dimension of the concept, various approaches have been found in the literature. Some scholars considered customer participation as a unidimensional construct (Groth 2005; Auh et al. 2007; Yi et al. 2011). Others suggested it as multidimensional one (Kelley et al. 1990; Ennew and Binks 1999; Claycomb et al. 2001; Uzkurt 2009). In order to capture various facets of this concept, the current study adopts a multidimensional approach. Particularly, it is based on Yi and Gong's (2013) conceptualization, which refers customer participation in all behaviors necessary for a successful service co-creation. Accordingly, customer participation includes four interrelated components, namely information seeking, information sharing, responsible behavior, and personal interaction.

Information seeking is defined as customer behavior to actively look for information about the features, procedures, and roles of the service, particularly what customers are expected to do and how to perform those tasks (Yi and Gong 2013). In health care, customers can seek information about the service by asking other people (physicians, nurses, or other patients), reading onsite instructing documents, or observing the behavior of experienced customers (Morrison 1993).

Information sharing refers to the act of giving information to service frontliners (Yi and Gong 2013). In the service process, sharing information is important as it enables service employees to produce the exact service that meets customer's particular needs (Bitner et al. 1997; Ennew and Binks 1999). From the resource integration view, information sharing is to contribute the customer's knowledge resources to service production (Grönroos and Voima 2013; Gummesson and Mele 2010). In health care service, customers share information through telling frontliners about their current conditions, symptoms, or the disease's history and treatment, and expressing their preference to specific therapies and procedures (Gallan et al. 2013). However, owing to the physical stress of pain and anxiety, not all customers practice this behavior at the same extent (Berry and Bendapudi 2007).

Responsible behavior refers to customer collaborative activities occurring in the interaction sphere that are required for the completion of the service (Yi and Gong 2013). Responsible behaviors are to accomplish in-role duties and responsibilities of customers. In health care service, responsible customer behavior of customer can be observed through activities like cooperating with the physician's diagnostic efforts (Gallan et al. 2013), positioning the body rightly following the instructions of the radiographers to obtain a chest screen, or taking medicines as prescribed (Zainuddin et al. 2013).

Personal interaction refers to interpersonal relations between customers and service frontliners such as courtesy, friendliness, and respect (Yi and Gong 2013). This component is not included in the current study. According to Makarem and Al-Amin (2014), health care service is a knowledge-based professional service. In this service, customers are much inferior to service frontliners in terms of professional knowledge. Thus, the interaction between customer and service frontliner is similar to the traditional relationship between lower-level employees and managers in command-and-control organizations (Lengnick-Hall and Sanders 1997). Consequently, it is reasonable to assume that courtesy, friendliness, and respect are always in place during the personal interaction between customers and frontliners in this specific study.

In short, the current study observes customer participation via three reflective dimensions, namely information seeking, information sharing, and responsible behavior. These behaviors facilitate the service firm and its customers to learn more about each other, which then enable them to integrate their resources in a more effectively and efficiently manner (Cegala et al. 2007; Gallan et al. 2013; Gummesson and Mele 2010).

2.3 Service frontliner interaction

Grönroos (2011) defines interaction as "mutual or reciprocal action where two or more parties have an effect upon one another" (p. 244). In a service creation context, provider–customer interaction emphasizes that two or more parties are in contact with each other in the joint sphere of the service. Through these contacts they have opportunities to influence one another's processes. Ivanova-Gongne (2015) further explains that the term interaction is understood as the interplay between the service frontliner and the customer by the expression of attitude, voice, and gesture. This interaction is an attribute of short-term mutual exchanges leading to long-term relationships.

In the context of this study, service frontliner interaction is seen as those expressions performed by a physician in the interplay with a patient. Grönroos (2011) explains that through the development of interaction, the frontliner creates opportunities to engage her/himself with customers' practices, and to influence them and their outcomes. The interactive processes of two actors merge into one integrated process, in which the frontliner operates as an integrated part of the customer's process, and vice versa. It is this integration where both actors are active and directly influence each other.

Prior studies have suggested that the core aspects of interaction are informational exchange and social exchange (Bagozzi 2006; Ballantyne 2004), which are fundamental for service and value co-creation (Fyrberg and Jüriado 2009). Recently, Karpen et al. (2015) have suggested a comprehensive framework of a service firm's interaction with customers to co-create value. They argue that to be an effective co-creator of service value, firms must possess various interactive capabilities. These capabilities are then manifested in six corresponding interaction behaviors of the frontliners. They include (1) *Individuated interaction*—behavior aiming to understand individual customers' unique contexts, their preferences, and

expected outcomes; (2) *Relational interaction*—behavior to improve social and emotional connections with customers in the service process; (3) *Ethical interaction*—behavior to reflect a fair manner toward customers in the service context; (4) *Empowered interaction*—behavior to empower customers to utilize their skills to shape the nature and content of exchange in the service process; (5) *Developmental interaction*—behavior to assist customers in developing their knowledge, competence, and skills; and (6) *Concerted interaction*—behavior to facilitate coordinated and integrated service processes with individual actors (in this case, among frontliners).

Among these six components, developmental and concerted interactions are not applicable in this specific study of serious chronic disease patients. In chronic disease, there is often a significant distance (dual-sided knowledge asymmetry) in the professional knowledge of physician and patients (Gallan et al. 2013). This knowledge distance, coupled with the illness situation of customer, would substantially inhibit the learning capability to develop customer's knowledge and competence (Cohen and Levinthal 1990). Consequently, developmental interaction is not relevant in this specific study. Similarly, concerted interaction refers to the interaction among individual employees in the service provider side to coordinate their efforts and resources. Although Karpen et al. (2015) consider this component as important in the integration of resources for value co-creation, it is not the interaction with customers. For these reasons, developmental interaction and concerted interaction are not included in further investigation in this study.

2.4 Customer-perceived value

Customer-perceived value is defined as the overall assessment of the trade-off associated with customers' experiences based on the perceptions of what is received and what is given (Zeithaml 1988). This concept has received much attention in marketing because it has always been considered the fundamental basis for all marketing activities (Holbrook 1994). Some scholars have indicated that perceived value is an effective substitute for customer satisfaction, which has produced repeated inconsistent results (Whittaker et al. 2007; Keiningham et al. 2014). Grönroos (2008) explained further that value is not only determined at the end of the service process, but emerges during its usage as well. Thus, the assessment of service perceived value must encompass both gets-gives and process-outcome facets.

Given this view, this study adopts the process-outcome approach to customer-perceived value (Lin et al. 2005; Grönroos 1982), which consists of process value (or functional value) and outcome value (or technical value). Outcome value refers to the final benefits that a customer perceives at the conclusion of the service compared to the inputs that the customer has spent, whereas process value refers to the positive experiences that a customer perceives during the co-creation process (Grönroos 1982). A review of prior studies on customer-perceived value following this approach shows that outcome and process value are often investigated simultaneously as two dimensions of the higher-order customer-perceived value (Hau and Thuy 2012; Lin et al. 2005).

3 Proposed hypotheses and model

Following the theoretical background of the key concepts in the study, this section provides the analyses and justifications for the proposed hypotheses, followed by the proposed research model.

3.1 Frontliner interaction and customer participation

The following analyses provide justifications for hypotheses on the impact of frontliner interaction on customer participation in the health care context. This is done by showing how individuated interaction, relational interaction, ethical interaction, and empowered interaction affect customer participation through information seeking, information sharing, and responsible behavior.

3.1.1 Individuated interaction

Health care is basically a personal service, which is featured by customized solutions to an individual customer (Berry and Bendapudi 2007). Once a frontliner addresses individuated interaction aiming to understand an individual customer' unique contexts and personal preferences, a signal is sent to the customer that his/her information inputs are required for the best possible treatment and outcome. The expectation of a better outcome would form a positive attitude that motivates participation behavior through information sharing (Bitner et al. 1997). Prior empirical studies in health care show that the physician's effective (task-oriented) questioning is a critical attribute associated with patient participation (Zolnierek and DiMatteo 2009). In particular, Eldh et al. (2006) report that patients participate actively when they are asked and listened to, or they think they are regarded as an individual, not a disease or an object. In contrast, they lose their motivation to participate when their description of symptoms is not taken seriously by the physician. Similar attitude occurs when patients feel what they tell is not taken as important as the medical test results, or when the treatment is established in advance, irrespective of their own story. On this basis, the following hypothesis is proposed:

H1 A service frontliner's individuated interaction has a positive impact on customer participation in health care service.

3.1.2 Relational interaction

Interaction is relational in nature (Vargo and Lusch 2004). It helps establish strong social relationship and practices (Auh et al. 2007; Hibbert et al. 2012). And social practices are the key to mutual understanding (Giddens 1984), which drives the perception of trust (Seiders et al. 2015; Bonaccio and Dalal 2006). Trust, in turn, is an established predictor of customer participation through information sharing and adherence behavior (Schwartz et al. 2011; Van Swol and Sniezek 2005). Likewise, Ahn and Rho (2014) suggest that relationships with customers create trust, which leads to customer cooperation and active participation.

Exercising relational interaction also provides chances for frontliners to express empathy and personal concern to customers (Zolnierek and DiMatteo 2009). This interaction helps improve social and emotional connections with customers in health care who are often in stress and need social and emotional support. Consequently, these socio-psychological expressions of frontliners make customers feel more confident and psychologically comfortable and keep them engaging in participation (Eldh et al. 2006). Moreover, Lengnick-Hall et al. (2000) indicate that the more pleasant and positive the social environment is, the more likely customers would be to collaborate in the service process. In aggregation, it is hypothesized that:

H2 A service frontliner's relational interaction has a positive impact on customer participation in health care service.

3.1.3 Ethical interaction

Ethical interaction addresses a fair manner toward customers in the service process. Fairness and respect are indicators of integrity which is the foundation to develop trustworthiness of the frontliner (Mayer et al. 1995). In health care, Eldh et al. (2006) explain that physicians' trustworthiness and confidence can be built as they share relevant and non-misleading information during discussion, or are willing to clarify any potential risks associated with certain types of treatment, or do not reveal any intention to intrude upon patient's privacy. Because health care is a service of credence, patients' trust in physician is very critical to motivate their cooperation. Once they trust the physician, they could be motivated to contribute and ensure successful cooperation during treatment process (Eldh et al. 2006). Therefore, it is hypothesized that:

H3 A service frontliner's ethical interaction has a positive impact on customer participation in health care service.

3.1.4 Empowered interaction

When using a service, each customer has a certain degree of resources such as knowledge and skills that can contribute to the service process (Grönroos 2008). Service co-creation requires customer to participate and contribute their resources. However, this contribution can occur when the service frontliner shows empowered interaction behavior by providing opportunities and encouraging customers to interact (Prahalad and Ramaswamy 2000). Otherwise, they are not confident and hard to initiate their ideas because frontliners are usually the ones having professional expertise and controlling the interaction (Seiders et al. 2015).

In health care service, Eldh et al. (2006) found that patients actively participate when they are asked to give opinion, allowed to discuss with the physician to find solutions, set dates for visits according to patient's own plan, or allowed to decide the treatment option they prefer, etc. In fact, in the new paradigm of chronic disease management, physicians' role has shifted to helping patients in making decision on their treatment options to achieve the treatment goal through consultancy, recommendation, and assistance (Funnell and Anderson 2004). This is certainly

done through empowered interaction with patients. On the above basis, the proposed hypothesis is:

H4 A service frontliner's empowered interaction has a positive impact on customer participation in health care service.

3.2 Customer participation and perceived value

The justification for the proposed effect of customer participation on perceived value is based on the notion that customers are the contributor and integrator of resources in the service co-creation process (Vargo and Lusch 2004; McColl-Kennedy et al. 2012). In other words, the effective participation is expected to increase the perceived value through chances that more benefits are attained and needs are fulfilled, although participation also requires more customer resources being utilized (Bitner et al. 1997; Lengnick-Hall et al. 2000).

In health care service, customers seek information to clarify service requirements and to understand their roles in the service process, helping them become more integrated into this process (Kelley et al. 1990; Kellogg et al. 1997; Yi and Gong 2013). With adequate information, customers would feel more confident, understand the procedure to better prepare for it, and go through the process with less anxiety (Bitner et al. 1997). Moreover, customer participation may take the form of information sharing, which includes expressing opinions, stating preferences, and exploring options (Cegala et al. 2007). As customers provide accurate information and honestly answer all treatment-related questions, the service frontliner can be more efficient in doing their job, understand their particular needs and effectively perform the service. These increase the chance to the better service outcomes and benefits (Mills et al. 1983). Additionally, the knowledge and information transfer would enable the frontliner customize the service option to best fit the customer's personal conditions, thus help them to optimize their resources contributed to the service process. Finally, customer participation would mean undertaking responsible behavior such as accepting advice and fully adhering to the mandatory duty (Yi and Gong 2013). Once customers perform their duties and responsibilities satisfactorily, they would be more cooperative and the service would likely be successful, increasing the perceived value.

Empirical evidences about the positive effect of customer participation on customer satisfaction, perceived value or loyalty are also found in recent studies. For example, Auh et al. (2007) indicate that patient co-production (i.e., participation) has a positive effect on attitudinal loyalty. Gallan et al. (2013) find that patient participation has a significant effect on the perception of service quality, leading to patient satisfaction. Hau and Thuy (2015) show that patient participation has a positive effect on both process and outcome components of perceived value. Su et al. (2015) find evidence on the important role of customer participation in co-creating experience value. Thus, it is hypothesized that:

H5 Customer participation has a positive impact on customer-perceived value.

In order to fully understand the mechanism of service frontliner–customer interaction to co-create value, this study also tests the extent to which frontliner

interaction (or at least some of its components) has a direct impact on the perceived value of the customer. This insight is worth to explore because the success of a highly interactive service like health care is very much depended on the interaction and collaboration between the two sides (Berry and Bendapudi 2007; Gallan et al. 2013). Therefore, the following hypothesis is proposed:

H6 Customer participation mediates the impact of (a) individuated interaction, (b) relational interaction, (c) ethical interaction, and (d) empowered interaction on perceived value.

3.3 Research model

Based on the analysis above, the research model is developed and presented in Fig. 1. In this model, each of the four components of frontliner interaction (i.e., individuated interaction, relational interaction, ethical interaction, and empowered interaction) is hypothesized to have a positive effect on customer participation. Participation is then proposed to have a positive effect on perceived value. Customer participation is operationalized as a second-order construct which is reflected by three components, i.e., information seeking, information sharing, and responsible behavior. Perceived value is also a second-order construct being reflected by process value and outcome value. The dotted path is to test the mediating role of customer participation on the effect of frontliner interaction on perceived value.

4 Method

To test the model and proposed hypotheses, this study adopted a quantitative approach in which data were collected by means of a large-sample survey. The empirical setting and research design are to be reported in the following sections.

4.1 Empirical setting

The empirical setting for this study was the health care service in Vietnam. Vietnam is an emerging economy in the South East Asia, which has been witnessing a steady growth of the service sector from 31 % of GDP in 2007 to 44 % in 2014. Among various services contributing to the growth of the service sector, health care is a human transformative service which plays a key role in the improvement of living standards in the country (Alejandro et al. 2012). Being an Eastern Confucius country, Vietnamese cultural values are likely to affect consumer value perception and behaviors. Particularly, Vietnam scores high on power distance, which implies that people accept a hierarchical order in which everybody has a place and which needs no further justification (Hofstede 2015). In the physician–patient relationship, this feature is reflected through the inherent inequalities in communication and the submissive attitude of patient when dealing with physician. Patients expect to be told about what to do and physician is perceived as a "benevolent autocrat" (Hofstede 2015). It is these features that make Vietnam a suitable setting for theory testing, given the fact that most

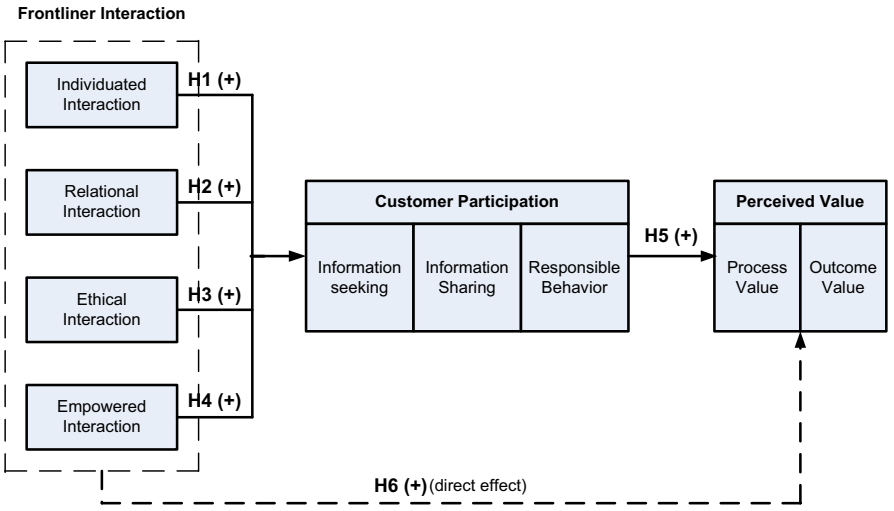

Fig. 1 Service frontliner interaction, customer participation, and perceived value

of the existing research has been undertaken in developed and industrialized countries, while non-western developing countries can also be natural laboratories to test theories and to derive generalizations (Burgess and Steenkamp 2006).

Among several types of health care, this study focused on physicians and patients of serious chronic diseases. Serious chronic diseases refer to long-term medical conditions that are generally progressive, which often cause disability and death. Some examples of chronic diseases include cardiology, hypertension, diabetes, asthma, and hepatitis. Serious chronic diseases are also the major cause of premature adult deaths in many parts of the world (Lynn and Adamson 2003). Patients of serious chronic disease are usually under prolonged stress of illness, fear, and anxiety. Normally, they need to be under a life-long medical treatment by a health care service, in which they need to meet physicians repeatedly. On the service provider side, physicians in Vietnam are also in stress of overloaded and risky professional work. On average, there are only 21 hospital beds for 10,000 citizens in Vietnam, as compared to WHO standard of 33 beds, or 86 beds in Korea or 140 beds in Japan. At many big hospitals, one physician has to work with 80–90 patients a day on average (Nguyen 2012). These features imply a huge challenge to the direct interaction between physicians and patients in the health care service.

4.2 Research design

Data were collected from both sides of the interaction, physicians and patients of serious chronic diseases, using a two-part structured questionnaire. The interviews were at outpatient departments of 59 public and private hospitals in Ho Chi Minh City, the biggest city in Vietnam. For each case, we first approached and interviewed a patient based on the convenience sampling method. In the interview, we asked about his/her participation behaviors and perceived value, and requested

him/her to indicate the physician's identification (e.g., name or room number). Then we approached the physician, normally at the break time or at the end of the work shift. The questionnaire section for the physician was about his/her common-practice interaction behavior toward patients in general, not referring to any specific patient (see Table 2). This data collection technique was deemed appropriate because the current study focused on exploring how the variation in physician interaction behavior across different physicians causes variation in the participation behavior of different patients (Kenny et al. 2006). The questionnaire was first prepared in English language. It was then translated into Vietnamese via a translation and back-translation process (Hambleton 1993). This procedure was undertaken by two university academics. After comparing the two English versions, mismatches were discussed and adjustments were made on the Vietnamese version. Pretest was also conducted by means of interviews with five patients in order to refine the wordings of questionnaire items.

The scales (see Table 2) measuring physician interactions were based on Karpen et al. (2015) and consisted of 15 items reflecting four components (individuated interaction—3 items, relational interaction—4 items, ethical interaction—4 items, and empowered interaction—4 items). Patient participation was measured by 11 items reflecting three dimensions (information seeking—3 items, information sharing—4 items, and responsible behavior—4 items), which were adapted from Yi and Gong (2013). Patient-perceived value including outcome value and process value was measured by 8 items, which were adapted from Sweeney and Soutar (2001) and Aliman and Mohamad (2013). All scales were in the form of 5-point Likert type.

5 Results

The following sections report the sample characteristics, the refinement of measurement scales, the test of common method variance, and the result of structural model estimation and hypothesis testing.

5.1 Sample characteristics

A total of 285 dyadic cases were collected and qualified for data analysis. The sample characteristics are presented in Table 1. The statistics presented in this table show that the sample covers a variety of respondents in terms of disease, frequency of visit, gender, and age group of patient and physician. Thus, the sample is deemed appropriate for further analysis.

5.2 Validity and reliability of measures

Firstly, a joint exploratory factor analysis (EFA) was applied to all scales together for a preliminarily assessment of dimensionality, convergent, and discriminant validity. The results indicated that the factor structure fully matched the design and each item loaded mainly on its designate factor. However, two items measuring relational interaction and empowered interaction must be eliminated due to low

Table 1 Sample characteristics

Hospital type		Disease	
Public	62 %	Cardiology	13 %
Private	38 %	Hypertension	14 %
Frequency of visit		Diabetes	09 %
First time	11 %	Asthma	16 %
Twice a month	45 %	Hepatitis	14 %
Once a month	33 %	Combined	21 %
Once per 2 months	11 %	Others	13 %

Patient	Physician			Patient	Physician			
	Male	Female	Total		25–35	36–45	Above	Total
Gender				Age group				
Male	24 %	19 %	43 %	35 or below	3 %	5 %	5 %	13 %
Female	29 %	28 %	57 %	36–45	7 %	9 %	6 %	22 %
Total	53 %	47 %	100 %	46–55	5 %	11 %	6 %	22 %
				56 or above	11 %	22 %	10 %	43 %
				Total	26 %	47 %	27 %	100 %

loadings (below 0.45) on their designate factor. The factor loadings of the 32 remaining items ranged from 0.513 to 0.976.

Next, confirmatory factor analysis (CFA) was conducted to examine the full measurement model which included nine first-order constructs and their respective items. The test for normality showed that kurtosis values of 32 items ranged from −0.790 to +1.482 and skewness values ranged from −0.818 to +0.289, which indicated a slight deviation from normal distribution (Kline 2011). In this case, maximum likelihood (ML) was still an appropriate estimation method because the parameter estimates would exhibit minimal bias compared to other methods (Bollen 1989). The measurement model was refined further by eliminating 7 more items which had significant covariance of the error terms. The CFA of the refined measurement model resulted in satisfactory fit indices: Chi-square = 325.65; dF = 239; GFI = 0.917; CFI = 0.975; TLI = 0.969; RMSEA = 0.036. The HOETLER index of 241 was above the threshold value of 200, indicating that the sample size was large enough for this analysis (Byrne 2001). As presented in Table 2, factor loadings of items ranged from 0.69 to 0.92, and AVE of scales ranged from 0.570 to 0.717, which were all above 0.50, indicating satisfactory convergent validity. Correlation coefficients between pairs of constructs ranged from 0.170 to 0.681. The squares of which were well below the AVE of respective scales (see Table 3), indicating discriminant validity of scales. Composite reliabilities were from 0.726 to 0.883. Thus, the measurement scales of concepts were satisfactory in terms of reliability, convergent validity, and discriminant validity.

Table 2 Scale items and loadings

Item wording	Std. loading
Individuated interaction (CR = 0.769 AVE = 0.625)	
I make an effort to understand patients' illness progress in detail	0.81
I ask to learn about patients' personal situation (resources, lifestyle, etc.)	0.77
I seek to identify patients' personal expectations (*error covaried*)	*Eliminated*
Relational interaction (CR = 0.818 AVE = 0.602)	
I try to establish rapport with patients	0.69
I make patients feel at ease during the interaction	0.82
I try to encourage two-way communication with patients	0.81
I show my interest in engaging patients into the process (*low EFA loading*)	*Eliminated*
Ethical interaction (CR = 0.726 AVE = 0.570)	
I do not try to take advantage of patients (*error covaried*)	*Eliminated*
I do not try to mislead patients in any way	0.77
I do not put my own benefits over patient's benefits (*error covaried*)	*Eliminated*
For all patient (social class, wealth, etc.), I respect them the same	0.74
Empowered interaction (CR = 0.733 AVE = 0.580)	
I am open for patients to contribute idea in treatment to suit their own situation	0.71
I allow patients to choose one among the treatment options I offer	0.81
I allow patients to participate in the process in the way they want (*error covaried*)	*Eliminated*
I let patients interact with me in their preferred way (*low EFA loading*)	*Eliminated*
Information seeking (CR = 0.883 AVE = 0.717)	
I ask friends or relatives about the physician	0.87
I ask others patients about their treatment experience with the physician	0.74
I often seek information about the disease to prepare myself for the treatment	0.92
Information sharing (CR = 0.850 AVE = 0.586)	
I clearly describe my health status/symptom with the physician	0.75
I provide the physician with information about my personal situation	0.81
I do not manipulate information when being asked	0.72
I openly answer all off the physician's questions	0.78
Responsible behavior (CR = 0.849 AVE = 0.652)	
I perform all the tasks that are required by the physician	0.82
I adequately complete all the tasks instructed by the physician (*error covaried*)	*Eliminated*
I follow strictly the physician's instructions on what to do at home	0.84
I always comply with self-managing the disease as advised by the physician	0.76
Outcome value (CR = 0.848 AVE = 0.651)	
In comparison with the money, time and effort I spend…	
The benefits I receive from this service is as good as expected	0.80
The services I receive from this service is of high value	0.82
The physician provides me with the benefits I want	0.80
The physician gives me what I need (*error covaried*)	*Eliminated*
Process value (CR = 0.873 AVE = 0.697)	
In comparison with the money, time and effort I spend…	
The physician makes me feel confident during the time I am in treatment	0.77

Table 2 continued

Item wording	Std. loading
The physician gives me a positive experience during the treatment	0.90
I have an encouraging time during the treatment	0.83
I have a good time during the treatment (*error covaried*)	*Eliminated*

CR composite reliability, *AVE* average variance extracted

5.3 Test of common method variance

As described in the method section, this study employed dyadic approach to data collection, in which data for one case were collected from two different sources of respondents involved in the interaction. This pre-data-collection technique helped control the common method bias in the survey data (Podsakoff et al. 2003). Moreover, in the post hoc analysis of collected data, the marker-variable technique was undertaken for detecting CMV (Lindell and Whitney 2001). Accordingly, the smallest correlation among the manifest variables provides a reasonable proxy for CMV. In the current study, the smallest correlations were $r = 0.056$ ($p = 0.348$) between two items measuring ethical interaction and information seeking, and $r = 0.060$ ($p = 0.311$) between ethical interaction and responsible behavior. These results indicated that CMV was not the major source of the variations in the observed items.

5.4 Structural model estimation and hypothesis testing

Given the satisfactory fit of the measurement model, the proposed hypotheses were then tested using structural equation modeling. The estimation of the proposed structural model using ML method resulted in a good fit: Chi-square = 390.486; dF = 259; CFI = 0.962; GFI = 0.901; TLI = 0.956; RMSEA = 0.042.

Based on the standardized path coefficients and p value shown in Table 4, we found that four hypotheses H1, H2, H4, and H5 were supported (at $p = 0.05$), but H3 was not. In other words, frontliners' individuated, relational, and empowered interaction behaviors have significantly positive effects on customer participation in the service process, which then has a positive effect on customer's perceived value. However, hypothesis H3 about the positive effect of ethical interaction on customer participation was not supported as $\gamma = 0.069$ ($p = 0.481 > 0.05$). The results also showed that the proportion of the variance in customer participation explained by the three components of frontliner interaction was considerably high at 52; and 56 % of the variation in customer's perceived value could be explained by customer participation.

5.5 Testing the mediating effect of customer participation

To fully understand the mechanism of how frontliner interactions co-create value with customer, we tested the mediating role of customer participation on the effects of four components of interaction on perceived value. In so doing, the procedure and decision tree suggested by Zhao et al. (2010) was adopted.

Table 3 Squared correlation and average variance extracted (AVE) of scales

	Individuated interaction	Relational interaction	Ethical interaction	Empowered interaction	Information seeking	Information sharing	Responsible behavior	Process value	Outcome value
Individuated interaction	**0.625**								
Relational interaction	0.166	**0.602**							
Ethical interaction	0.179	0.118	**0.570**						
Empowered interaction	0.286	0.167	0.200	**0.580**					
Information seeking	0.119	0.037	0.048	0.151	**0.717**				
Information sharing	0.101	0.129	0.067	0.092	0.240	**0.586**			
Responsible behavior	0.211	0.192	0.029	0.203	0.276	0.306	**0.652**		
Process value	0.223	0.170	0.191	0.145	0.111	0.167	0.194	**0.651**	
Outcome value	0.190	0.183	0.291	0.176	0.115	0.161	0.147	0.464	**0.697**

An AVE of more than 0.50 indicates convergence validity

Values in the lower triangular region represent the squared correlation coefficients

Values in the diagonal represent the average variance extracted (AVE)

Table 4 Standardized estimates (sample size = 285 dyadic cases)

	Hypothesis	Std. Coeff.	*p* value	Test result
H1	Individuated interaction → Customer participation	0.310	0.005	Supported
H2	Relational interaction → Customer participation	0.281	0.002	Supported
H3	Ethical interaction → Customer participation	0.069	0.481	Not supported
H4	Empowered interaction → Customer participation	0.262	0.008	Supported
H5	Customer participation → Perceived value	0.749	0.003	Supported

Table 5 Testing the mediating effect of patient participation

Path	Direct		Indirect		Total		Mediating test result
	Std. Coeff	*p*	Std. Coeff	*p*	Std. Coeff	*p*	
Individuated interaction → Perceived value	0.130	0.238	0.119	0.011	0.248	0.013	Indirect-only mediation
Relational interaction → Perceived value	0.144	0.226	0.105	0.013	0.249	0.017	Indirect-only mediation
Ethical interaction → Perceived value	0.389	0.001	−0.026	0.467	0.363	0.002	Direct-only non-mediation
Empowered interaction → Perceived value	−0.038	0.814	0.125	0.006	0.087	0.380	Indirect-only mediation

As shown in Table 5, the indirect effect of individuated interaction on perceived value via customer participation was significant ($\gamma = 0.119$; $p = 0.011 < 0.05$) but the direct effect was not ($\gamma = 0.130$; $p = 0.238 > 0.05$). Similar results were found for relational interaction (significant indirect effect $\gamma = 0.105$; $p = 0.013 < 0.05$ and non-significant direct effect $\gamma = 0.144$; $p = 0.226 > 0.05$) and for empowered interaction (significant indirect effect $\gamma = 0.125$; $p = 0.006 < 0.05$ and non-significant direct effect $\gamma = -0.038$; $p = 0.814 > 0.05$). Thus, in these three cases, customer participation is an *indirect-only mediator* (or full mediator). In contrast, participation has a non-mediation role (non-significant indirect effect $\gamma = -0.026$; $p = 0.467 > 0.05$) on the effect of ethical interaction on perceived value (significant direct effect $\gamma = 0.389$; $p = 0.001 < 0.05$). Thus, this falls into a *direct-only non-mediation* relationship. In aggregation, hypotheses H6a, 6b, 6d were supported but H6c was not.

6 Discussions

Marketing literature advocates that service providers and customers co-create value (Grönroos 2008); and that value is co-created through resource integration and interaction (Gummesson and Mele 2010). In this study of the provider–customer interaction in health care service, we provide more concrete empirical evidence on the roles and mechanism in which the two sides, i.e., service frontliners and customers, interact in the joint sphere to co-create value.

This study found that there is a significant positive effect of interacting behaviors of the service frontliners on customer participation, through which more customer resources are contributed to the service creation. That is, the extent of customers' participation and resource contribution depends on how the service frontliners interact with them in the role of an initiator. Given the notion that both sides are co-creators of value, this result demonstrates that service frontliners actually play the initiator role in activating customer resources and participation. Thus, in this case it could be said that within the value co-creation joint sphere, the service provider (or frontliner) is a *value initiator* and the customer is a *value co-creator*, although on the whole need-satisfying process, the role of customers and service providers may be the other way around (Grönroos 2008; Vargo et al. 2008).

The initiating role of service frontliners in the joint sphere of interaction is particularly important in services where customer participation is a compulsory part of the co-creation process but customers are reluctant or not motivated to participate, as in the case of health care, education, consulting, or other professional services (Lengnick-Hall et al. 2000). In health care, most customers are inferior in knowledge and in the stressful situation caused by illness, anxiety, pain, fear, and uncertainty of service outcomes. These features create a hurdle for them to act as an effective participant in the service process. As a value initiator of the service, the service frontliner needs to be aware of this situation and to help customers overcome these obstacles by facilitating and motivating them to participate effectively. Facilitation and motivation can be accomplished through individuated interaction, relational interaction, and empowered interactions. In this case, interacting behaviors of service frontliners are to increase customers' extrinsic motivation (Ryan and Deci 2000) and to improve their social or psychological resources (Arnould et al. 2006) for the co-creation behavior.

In this specific study, individuated, relational, and empowered interactions exert balanced effects on customer participation, which together account for 52 % of the variation of this construct. However, these three interacting behaviors do not have direct effect on the customer's perceived value. In other words, they only contribute indirectly to the co-created value via customer participation. Thus, they can be thought of as customer *participation-activating* interaction behavior. The main function of these interaction behaviors of service frontliners is to activate customers' co-creation activities to contribute resources. On the other hand, our results showed that ethical interaction has a direct-only effect on perceived value and no effect on customer participation. In other words, ethical interaction facilitates positivity in customer perception of what they get against what they give. In a knowledge-based professional

service like health care, there is always a significant distance in power, decision making right, and professional knowledge between service frontliners and customers. In this context, if customers perceive that they are treated respectfully, fairly, and dedicatedly, they would highly value what they get from the service. Thus it can be thought of as *value-enhancing* interaction behavior. That is, this interaction behavior aims to make customers perceive that what service providers do for them is more worthy of value.

In aggregation, this study contributes to the literature of service value co-creation by showing that service frontliner interactions are able to contribute to the value co-created by both parties in a service consumption. Particularly, it specifies the role of each interaction behavior of frontliners in activating customer participation as well as creating perceived value. Ethical interaction has a direct-only positive effect on perceived value, thus is thought of as *value-enhancing* interaction behavior. On the other hand, individuated, relational, and empowered interactions have significant positive impact on customer participation, which affects patient-perceived value, that is, indirect-only effect. Therefore, they are *participation-activating* interaction behavior. All of the four components belong to service frontliners and have different mechanisms to co-create value with customers. Although these results are drawn from health care service only, they provoke further research elaboration toward a broader theoretical generalization.

From the methodological view, a highlighted feature of this study is the dyadic approach to data collection. While prevailing quantitative studies employed survey data collected from single informants, the current study relied on the paired-case approach to data collection for a better reflection of the nature of two-side interaction. In other words, this study departs from the traditional static approach in which customers are viewed as passive receivers in the service transaction, to adopt the dynamic approach in which customers are viewed as partners and co-creator participants in a value-creating relationship (Tronvoll et al. 2011). Moreover, this data collection method is considered one of the most effective ways to minimize the common method bias in the survey data. Therefore, the findings of this study are deemed to be reinforced in its validity.

From the practical view, the results of this study provide some managerial implications for health care providers. First, physicians should explain to patients that their active participation in the service process is beneficial for them and they should provide opportunities and mechanism for patients to contribute their ideas and to make their own decisions where possible (empowered interaction). The second suggestion is related to improving the inherent "cold" professional environment in health care centers. Although a professional environment is necessary, it may make patients feel timid or uncomfortable and thus, negatively affects patients' interaction with physicians (Bitner 1992). Service providers should pay attention to develop a more "human" environment. In this environment, health care professionals should have sympathy for patients' fear of illness and anxiety, and encourage them to share information (relational interaction). Also, patients should be assured that their personal health problem and preference are heard and taken into account seriously (individuated interaction), and physicians are their friendly mentor not their boss. These social measures would make patients feel more relieved and confident to participate. Third, given the fact that, not only

patients feel stress of illness but most physicians are also often in stressful situations in hospitals and clinics (Berry and Bendapudi 2007). In this regard, measures to improve physician interaction should include interpersonal skill improvement and stress management as well. Finally, although ethical standards are professional requirements that all physicians must abide to, they must be manifested and made easily observable during the interaction with patients.

7 Conclusion

The current study contributes to extend the knowledge about the twofold roles of interaction behaviors of service frontliners in the value co-creation process. Interaction behaviors are primarily a reflection of the customer-oriented behavior, a critical success factor in any high-contact service (Mechinda and Patterson 2011). In the joint sphere of a service process, the frontliner's interaction behaviors play an initiator role in activating the participation of customers to contribute their resources for a better service creation, leading to higher value perception. Specifically, interaction behavior of service frontliners can be further broken into two components, namely *participation-activating interaction and value-enhancing interaction* behaviors. Both of which eventually lead to the improvement of customer value perception.

This study still has a number of issues hindering the generalizability of its findings, which suggest areas for further research. Firstly, this research was confined within one service industry (i.e., health care). Given the diverse nature of services, further research is suggested to examine the roles of interaction and its components in other services having different features such as knowledge distance between the customer and the provider (high vs. low), target of service acts (object vs. human), and relation base (membership vs. contract-based). The second issue is related to the problem of customer's knowledge inferiority, which may hinder the active participation of customer in the co-creation process. A recent trend is that many customers use internet to enrich their information about the service and their knowledge of the disease before coming to interact directly with the physician (Prahalad and Ramaswamy 2002). Further research on this topic should include this into account. The third issue is to explore internal drivers of customer participation, given the fact that the current study has investigated the role of frontliner interaction as external factors. Finally, as value co-creation includes interaction and resource integration, and the current study has already investigated the roles and mechanism of interaction, future research should elaborate the roles and mechanism of resource integration to co-create value.

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