



Research Article

Doctor-patient Relationship and Value Co-creation: An Empirical Study of Service-dominant Logic

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Abstract

Background: This Study aimed to explore the relevance among interaction, trust, co-decision-making, information disclosure and value co-creation from the perspective of service-dominant logic. **Methods:** Questionnaires were given to the hospitalized patients of a regional hospital. A total of 232 questionnaires were received. The statistical software of the least squares method was used to examine the applicability of measurement patterns. **Results:** “Interaction” ($\beta=0.197$, $p<0.001$), “trust” ($\beta=0.248$, $p<0.001$) and “co-decision-making” ($\beta=0.143$, $p<0.05$) positively affect value co-creation while “information disclosure” ($\beta=-0.079$) does not have a significant effect. **Conclusions:** Service-dominant logic is the interaction and value co-creation between the service provider and receiver, and it is thus suggested that the interaction and trust building between doctors and patients and the provision of patient-centered service be encouraged. In the medical service value network, the interaction, trust and co-decision-making of doctors and patients are established with an aim of integrating medical service resources in order to fulfill the service-dominant logic purpose of value co-creation.

Keywords: Doctor-patient relationship; Value creation; Service-dominant logic

Introduction

The service-dominant age of the health care industry has come; it is necessary to actively integrate resources in order to provide differentiated and customized service. Service Dominant Logic (SDL) of co-creating value with customers is highly valued in the current theoretical research and practice of strategy and marketing. The idea of Service Dominant Logic was proposed by professors Vargo and Lusch [1] in 2004, who stated that services are the essence of commodities. They pointed out that the entire economic system, including the manufacturing industry, falls in the category of service industry; commodities are just the tangible products created by the manufacturer during value creation. The true value should be the value co-created with the members of the value network when the customer uses the product [1]. It is emphasized in SDL that the value is created by the producer, customer, government agencies and other stakeholders collectively [2-4]. For the health care industry, the medical service provider (hospital and health professionals) can actively allow patients and health professionals to fully understand the “input, process and output” of health care service to integrate the resources and experience they have, find the problems with medical and health care service and propose solutions together in order to improve the cooperation and value creation of medical service [4-6].

To be specific, the patient-physician relationship has shifted from the high dominance of doctors and caring about the feelings of patients to active involvement in the medical process by patients and finally to the co-creation value of medical services. In this Study, the point of SDL regarding

reflecting the importance of the theoretical research. The factors of patient-physician relationship and value co-creation are generally divided into following “interaction”, “trust”, “shared decision making”, “information disclosure” according to the arguments in SDL-related literature.

Both parties interact and exchange information to reach their medical purpose. The information helps find out the problems of patients to reduce and treat diseases [7]. Generally speaking, medical service is highly inseparable in essence; therefore, patients and medical professionals interact intensively during the treatment [8]. The interaction in patient-physician relationship includes: (1) Emotional: Patients are willing and have ways to express their conditions in the language they are familiar with [9]. (2) Recognitive: Doctors should give medical information to patients [10]. (3) Technical: Patients and doctors interact to discuss the patients’ conditions and therapies during diagnosis and treatment [10]. (4) Non-technical: Doctors and patients have common communication to exchange messages [10]. In the health care system, doctors are the main medical service provider; the quality and quantity of interaction between both parties will influence patients’ feeling about the value of health care service. Thus, interaction between patients and physicians in medical care will determine the value co-creation of both parties to a certain degree [11].

Trust is essentially required to establish good patient-physician relationship. The expression of sympathy and encouragement and answering or explaining the questions related to their conditions will influence the trust of patients on physicians [12]. If a patient has high confidence in a

doctor, his/her attitude and behavior will be influenced as well and they tend to believe that doctors will provide the most suitable medical care and treatment [13]. Previous research shows that a patient with greater confidence in the doctor will have a better medical result [14-16] and higher satisfaction [17], and higher obedience with doctor's instructions (such as: taking medicine on time, diet control, doing exercise and regular tracking), [14,18-19] leading to the improvement of the self-efficacy of disease control [15]. High confidence is beneficial to facilitating the mutual communication of doctors and patients and increasing patient willingness to receive treatment [14,20]. Hence, trust helps the value co-creation of the patient-physician relationship, (such as collective improvement of medical service quality and other positive effects).

Shared decision making assures the important rights of patients in modern medical science and is an inter-subjective and equal relationship [21]. It includes: (1) Patients want the medical service provider to have them involved in healthcare decision-making during the treatment. (2) Medical service providers offer related examples of practical treatment to patients when treating patients, offering therapeutic options and considering the potential advantages and side-effects of different therapies for jointly deciding treatment [22]. Therefore, sharing decision-making should be considered as the provision of a right to patients. Medical professionals should have patients well informed of the medical process to increase their ability to make decisions and encourage and provide opportunities to join and respect autonomy during decision-making. If medical professionals intentionally or unintentionally control the message to inform during message exchange, patients' attitude to joint decision-making will be affected or they will even dominate the decision-making process [23,24]. Thus, encouraging patients and doctors to make decisions together and decide the best treatment based on patients' conditions is beneficial to value co-creation of the patient-physician relationship [14,20].

Unlike general commodities, medical service is special due to its uncertainty, information asymmetry, externality, government intervention, health insurance system and other non-profit parties such as vendors [25-27]. The medical service provider has more professional knowledge than the customer due to professionalism. If doctors provide medical information in a friendly way, patients can understand the problem in the treatment process and solutions more completely, positively influencing the satisfaction of patients and treatment results [28]. Doctors need to share information and medical knowledge required for decision making with patients through information disclosure to eliminate information asymmetry [23,29]. Meanwhile, patients should fully disclose messages related to medical treatment appropriately so that doctors can find the problems and ease or deal with the disease through proper medical treatment [14]. Accordingly, the service provider and customer know that problems are exactly found, determined and solved during medical treatment via information disclosure and the effect of health care as well as the quality of medical service will be improved together [30].

Two stakeholders expand the creation of common value via joint activities while increasing the value of each other

[31,32]. Thus, both parties mutually improve the value in the relationship during co-creation by applying the resources in their "relationship" [33,34]. The top goal of health care organizations is to provide highly efficient medical treatment and processes and finally produce the best medical result [35]. More and more scholars attach importance to the co-creation of values [4,36-38], mainly emphasizing that mutual trust [39], interaction [40], co-policy-making [20,41] and information disclosure [14-16,42] help the co-creation of medical service values [4,43-47].

The Study aims to explore the connection of interaction, mutual trust, shared decision making and information disclosure with value co-creation in the patient-physician relationship based on SDL and the research on this important issue may bridge the gap of service-dominant logic in health care practice research.

Materials and Methods

Research design and subject

It is a cross-sectional study on the hospital which has been graded "Excellent" in the hospital accreditation and classified as a regional hospital in the National Health Insurance program. The inpatients of the hospital were provided with questionnaires mainly because they stay longer in the hospital and receive more in-depth service than the outpatients. Accordingly, the inpatients of ordinary wards (excluding minors and people lacking the ability to express thoughts) were the subjects.

Data were gathered by using structured questionnaires and the subjects could decide whether to fill out the questionnaires or not. Questionnaires were given on September 1 and received on October 31, 2014. The total number of qualified inpatients was 569 and the return rate was 40.77%. The factors of "gender" and "education" were used to examine the appropriateness in order to prove the effectiveness of the samples and the result showed that these two factors did not have significant influence ($\rho=0.251$; $\rho=0.246$), indicating that each feature is representative. The questionnaire and research design have been inspected and approved by Institutional Review Board by (IRB 1030701) and all subjects have signed the informed consent form.

Research tools

The "Patient-Physician Relationship and Value Co-creation Scale", the research tool of the Study, has been drafted with reference to related literature; the questionnaire includes 5 dimensions, i.e. interaction, trust, shared decision making, information disclosure and value co-creation. In the early stage of the research, we compiled 47 questions and score by using the Likert 5 point scale from "strongly disagree" (1) to "strongly agree" (5). The higher the score is, the better the patient-physician relationship and value co-created.

Interaction refers to the interpersonal interaction and relationship between doctors and patients; trust refers to the confidence between patients and physicians and the degree of confidence in medical treatment. Shared decision making

means that doctors allows patients to join the process of medical care while being treated and allow them to decide treatment together. Information disclosure means the full information disclosure between physicians and patients, and exchange and sharing of the medical knowledge required in order to eliminate information asymmetry of both parties. Value co-creation is to improve the quality and cooperation of medical service as well as value co-creation through finding and solving problems of medical and health care.

The basic information of subjects include gender, age, time of hospitalization, education background, occupation, department, whether operations or surgeries have to be performed, days of hospitalization and whether they have used the outpatient service of the attending physician before.

After the draft of the scale was completed, 5 experts of health care administration and medical care were invited to conduct expert validation and provide modification suggestions. 8 questions were deleted from 47 questions after the experts discussed them and 39 questions were left for inspection. The Content Validity Index (CVI) was 0.93 for the appropriateness of each question. In general, the question of original questionnaires determines what the first draft has before the grading method was selected. Thus, the questionnaire has effects to some degree in the measurement of variables and constructs. Finally, the questionnaire has been modified based on the content validity and face validity of actual interviews and theories to complete.

Data analytical method

SPSS for Windows 18.0 was used to create files and analyze research data and the level of significance (p) is <0.05. First, the demographic variables, departments, whether they are hospitalized or receive operations this time, days of hospitalization and whether they have received outpatient service of the attending physician are shown through the descriptive statistics of patients. The data of patients have been used to find out the best regression model. In order to avoid sample errors from affecting the study, the non-response error verification has been conducted right after questionnaires were received. The questionnaires received were divided into the early respondents and late respondents based on the suggestion of Armstrong and Overton [48] and verified by using important constructs (such as interaction and value co-creation). The result shows that there is no significant difference in these important constructs, and therefore the non-response errors should not affect the sampling of the study.

Results

Descriptive statistics of sample characteristics

Two hundred and thirty two effective samples were acquired (Table 1). 53.9% subjects are women and 38.4% of them aged 40-60. The subjects with high school certificates account for 51.8% and 70% of subjects are married. Subjects not in the academic, agricultural, industrial and commercial fields occupy 57.3% and the number of subjects receiving treatment at the departments of medicine and surgery is fifty-

fifty. 52.2% inpatients did not have operations this time and 77.2% patients were hospitalized for less than 7 days. 58.2% patients have used the outpatient service of the attending physician.

Variables	Patient	%
Gender		
Male	107	46.1
Female	125	53.9
Age		
Below 39	55	23.7
40-64	89	38.4
Above 65	88	37.9
Education		
None	28	12.0
Elementary, junior high	84	36.2
Senior high	57	24.6
University	63	27.2
Marriage status		
Single	37	15.9
Married	163	70.3
Others	32	13.8
Occupation		
Academic	25	10.8
Agriculture	3	1.3
Industry	44	19.0
Business	27	11.6
Others	133	57.3
Department		
Medicine	116	50.0
Surgery	116	50.0
Performing of operations		
No	121	52.2
Yes	111	47.8
Hospitalization days		
7 days and below	179	77.2
8 days and above	53	22.8
Use of outpatient service of the attending physician before		
No	97	41.8
Yes	135	58.2

Table 1: Subjects' data (n=232).

Reliability and validity Test of the measurement model

The software of Partial Least Squares (PLS) is used to examine the appropriateness of the measurement model in order to check the reliability and validity. The examination of the measurement model includes internal consistency, convergent validity and discriminate validity. First of all, three indicators are used to test the convergent validity of research tools in accordance with Lee and Scott's the research guidelines [49] as follows. (1) Factor loading should be significant and ≥ 0.5 . (2) Cronbach's alpha and composite reliabilities (CR) should ≥ 0.60 and 0.70 (Hair, 1998). (3) Averaged Variance Extracted (AVE) should be ≥ 0.50 . (Note:

In other words, the square root of AVE should be ≥ 0.71 .) It can be known from Table 2 that the AVE of each construct is 0.5 or higher on average, meaning that the measurement model has great convergent validity. Cronbach's alpha and complex reliability (CR) are consistent with the

forementioned. Hence, the research tools of the Study meet the basic requirements of the three convergent validity indicators mentioned above, indicating that the Study has convergent validity and discriminate validity which proves the accuracy of the measurement result.

Construct	Average	Standard deviation	Cronbach's α	Complex validity	Average variable extracted
Interaction	4.457	0.645	0.917	0.885	0.720
Trust	4.494	0.574	0.674	0.769	0.526
Shared decision-making	4.335	0.364	0.863	0.795	0.565
Information disclosure	3.799	0.817	0.837	0.889	0.732
Shared co-creation	4.297	0.610	0.974	0.973	0.710

Table 2: Validity and average variable extracted.

Discriminate validity is how well the measurement variables discriminate different constructs. The correlation coefficient of each variable and other variables by which the same construct is tested should be higher than that of the variables that are used to measure different constructs. In order to conduct discriminate validity test, the AVE square root (Table 3, the value in the diagonal line) of individual construct should be higher than the correlation coefficient of

other constructs in the model (Table 3, the value in the non-diagonal line), indicating that it has discriminate validity [50]. Table 3 shows the matrix of correlation coefficient of each construct. The AVE square roots of the construct are shown diagonally. According to Table 3, the AVE square root of the measurement variable of each construct is higher than the correlation coefficient of any two constructs, indicating that the study has good discriminate validity.

Construct	Interaction	Trust	Shared decision-making	Information disclosure	Value co-creation
Interaction	0.849				
Trust	0.492***	0.725			
Shared decision-making	0.338***	0.305***	0.753		
Information disclosure	0.344***	0.185**	0.236***	0.855	
Value co-creation	0.340***	0.374***	0.267***	0.068	0.842

Note: The value in the diagonal line represents the square root of the average variable extracted (AVE) of the construct and the value in non-diagonal line represents the correlation coefficient of each construct.

Table 3: Square root of the matrix and average variable extracted.

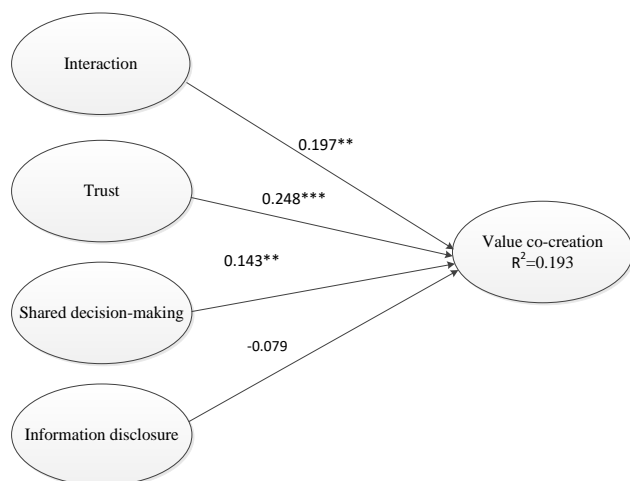


Figure 1: Analyzing result of the path mode.

The reason why Smart PLS is applied is that the difference between the coefficients of the original sample and bootstrap is little. Accordingly, it is considered as the stable

estimation. In PLS, the path coefficient can be interpreted as the standardized beta weights of regression analysis, i.e. the ability to interpret modes. The analytical result of Smart PLD path shows that “interaction” ($\beta=0.197$, $p<0.001$) has significantly positive influence on value co-creation so as to “Trust” ($\beta=0.248$, $p<0.001$). “Share decision-making” ($\beta=0.143$, $p<0.05$) significantly influences value co-creation while “information disclosure” ($\beta=-0.079$) negatively affects value co-creation, not significantly though. R2 of the entire mode is 0.193, meaning that the predictability of the four exogenous variables of the construction mode to value co-creation (endogenous variables) reaches 18.6%. The analytical result of the path is shown in Figure 1.

Discussion

The Study aims to explore the connection between the patient-physician relationship and value co-creation from service-dominant logic. Smart PLS was used to examine the empirical evidence in questionnaires and the result shows that interaction, trust and shared decision making have positive influence on value co-creation. Previous literature proves that

the interaction between patients and doctors makes patients more willing to obey doctors' instructions and attach importance to health behaviors [18,19,51]. Patients are allowed to raise questions openly or provide relevant physical and psychological information to caregivers during interaction to ensure the safety of patients. Moreover, it is more likely that patients will know more about health-related values. Hospitals strengthen interaction with other patients in order to improve medical quality and if the staff of the hospital commits themselves to interaction, they can effectively create values for the hospital [52]. However, some scholars find that patients may know their rights to "know" and doctors have the obligation to fully "inform" them during interaction. Nonetheless, patients often lack the courage to challenge medical professional authority in some circumstances. For example, they tend to talk less to avoid irritating doctors or think that doctors are too busy to be asked [53]. Even more, patients may feel the authority of doctors through non-verbal languages, such as the tone, attitude and eyes [54] so that the courage to express ideas will be constrained. The empirical result of the Study shows that the better the interaction is, the higher the co-created value from the perspective of value co-creation of service-dominant logic.

Patients and doctors should trust each other [55] and trust plays the core role [16,20,41]. When a patient has confidence in a doctor, he/she tends to obey the doctor's instructions [19] and believe that he/she can keep long-term health [56]. As a result, the uncertainty of medical behaviors will be reduced [57]. The higher the confidence a patient has, the better the health result [14-16]. It will bring a lot of benefits for hospital management, such as the improvement of patient satisfaction, decrease of transferring to other hospitals [12] and increase of the good comments on the doctor [58]. Accordingly, the patient-physician relationship is established on the basis of interaction of both parties and confidence [59] and the result proves that interaction and trust have positive influence on value co-creation.

Then, the research on the factors that influence patients' decisions to join medical decision-making has been compiled through a systematic review of literature. It is found out that the demographics of patients (young, well-educated, female, active in medical decision), medical history, health care, diagnosis and health conditions have influence on the medical decision-making of patients. However, there is no discussion about the influence of different roles of a patient on decisions and the different meaning of involvement and joining in decision-making in some literature [60]. Medical service is offered based on a series of professional judgment; it is an interactive decision; it is an interactive mode of "shared decision-making" [24]. When a patient actively joins the discussion of medical decision and expresses his/her ideas, conflicts in decision are less likely occur [61] and satisfaction with the medical decision will be improved [62]. More importantly, shared decision-making will influence value co-creation on the condition that patients have adequate relevant knowledge in order to join medical decision-making. It is found in the Study that the subjects may have adequate sharing channels of medical knowledge so they can join shared decision-making, further influencing value co-creation of patient-physician relationship.

Lastly, it is found that information disclosure does not have significant influence on value co-creation. In other words, information disclosure is not the major drive of value co-creation of medical service. In the field of medical care, economists consider doctors as income seekers [63] because medical service is a heterogeneous product and it is difficult for patients to search for information due to the information structure of the medical market. There is obvious information asymmetry between patients and doctors and doctors serve as the representatives of patients; therefore, doctors have stronger dominance over the medical care service of patients. In this circumstance, an imperfect representative relationship often occurs as follows. (1) The doctor may not respond to or misunderstand the requirements of the patient. (2) Doctors may not know which therapy can cure the patient and lack complete information. (3) The doctor may mislead the patient about the effect of treatment [64]. Thus, Rush [65] strongly supports the necessity of information disclosure and the agreement of patients. The information asymmetry already exists in the medical care market but patients can have adequate knowledge to determine health-related information and have the ability to make decisions because of the development of mass media and the internet to ensure that the doctor effectively discloses information to the patient. Disclosure refers to how much information regarding diagnosis, therapies and conflicts of advantages the doctor tells the patient [66]. Patients can solve the problems together via selecting the therapy and medical service provided. Information disclosure does not have significant connection with value co-creation in the Study. The reason may be that the patient may doubt the role of the doctor in medical service or the patient does not want to disclose too much medical information, but instead allow the doctor to make determination based on the clinical diagnosis, resulting in insignificance. In general, the Study proves that information disclosure does not have a significant effect on value co-creation and the reason may be further discussed in the future.

Conclusion

National Health Insurance has been implemented since 2005 in Taiwan, and therefore the environment of the medical industry has greatly changed and competition is getting fiercer every day. Because of the increased level of medical knowledge, population of education and higher level of medical information, patients will compare and select the hospital with complete equipment and better quality service, facilitating the hospital to change the hospital-centered relationship swiftly [67]. Hospitals need to strengthen "interactions" with patients in order to provide quality "health and well-being". Especially, how doctors and all medical professionals apply professionalism, thinking and decision making in medical care will influence the result of value co-creation in some degree [52]. A good patient-physician relationship can be established through information disclosure and the effective communication of both parties [23,29]. Fluent communication between both parties helps improve satisfaction with medical service and facilitate the creation of higher value [42]. Interpersonal interaction [10], trust [12], shared decision-making [22,23] and elimination information

asymmetry of information disclosure [3,29] will determine the final result of value co-creation.

It is proven in the Study that interaction and trust have positive influence on value co-creation. Since the medical ecology is totally different, individualism and customer awareness rise and medical service becomes easily accessible, medical institutions and doctors face fierce competition. Nowadays, more focus has been put on understanding and respecting patients' autonomy, how to understand the psychology and behavior mode of patients and how to use knowledge and experience to have great interaction with patients and win their trust in order to attract potential customers and acquire new customers. In general, the Study provides the theory and thoughts about the patient-physician relationship and value co-creation from service-dominant logic. The quantitative analyzing method of large samples has been applied for the research of value co-creation, thus making up the deficiency of qualitative research. Even more, theories and perspectives were proposed in the Study based on previous research and the empirical research verifies that interaction and trust obviously influence value co-creation, responding to the service-dominant logic of Vargo and Lusch [1,2]. It is concluded that interaction and trust are key drivers of value co-creation from the perspective of patients.

Moreover, the central idea of service-dominant logic is to allow service providers and recipients to interact and co-create values, encourage customers to interact and join, provide patient-oriented service and create value together with stakeholders in order to integrate resources. The interaction between doctors and patients involves deep physical and psychological contact. Patients need to describe symptoms and medical history in detail so that doctors can diagnose and offer treatment on the basis of the information in order to reach the common goal of medical care. Meanwhile, since both parties have high confidence in each other, doctors can provide patient-centered medical service. Therefore, medical reform goes beyond change and improvement of medical quality and technology and extends to service and value co-creation. If hospitals put focus on the value co-created for medical care, pressure will be exerted on the government. Accordingly, the government will begin medical reform and Taiwan will become a model of value co-creation in medical care.

Study Limitation

The data have been compiled and analyzed as completely as possible but there still are some limitations. For example, the variables of "interaction" and "trust" proposed in the Study have content validity but there is no comparison since patients are the only subjects, with no doctors included. The SDL research in the future may be conducted on the basis of the Study to provide a more detailed theoretical framework. Besides, no empirical support of variables (such as information disclosure) has been obtained and it is necessary to find out the reason via field interviews, the gathering of secondary data and other qualitative research. Finally, since patients are the subjects of the Study, it is suggested to conduct research and analyses of other stakeholders in future research.

Ethical approval

The study protocol was reviewed and approved by the Institutional Review Board of School of Show Chwan Memorial Hospital for review and approval (IRB 1030701).

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Author Contributions

Yu-Hua Yan initiated the research, collected data, conducted the analysis and wrote the manuscript. Shih-Chieh Fang and Shih-Chieh Fang contributed to the design of the study, provided critical reviews of the manuscript and contributed to interpretation of the results.

Competing interests

None declared.

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