Inf Technol Manag (2015) 16:193–206
DOI 10.1007/s10799-015-0220-x

Applying social exchange theory in IT service relationships: exploring roles of exchange characteristics in knowledge sharing

Jun-Gi Park[1] · **Hyejung Lee**[2] · **Jungwoo Lee**[3]

Published online: 21 March 2015
© Springer Science+Business Media New York 2015

Abstract Extending the social exchange theory which emphasizes trust and dependence as important in building and maintaining relationships, exchange specific characteristics (relationship investments and benefits) are additionally posited here as critical antecedents in knowledge sharing relationship among IT service team members, along with partner characteristics (expertise and value similarity) and interaction (communication frequency). An instrument was constructed and administered against client side project leaders in three different IT service firms. Analyses of 126 data points revealed that relationship benefit, investments, and expertise are strongly associated with dependence while relationship investment, expertise and value similarity are strongly associated with trust in IT service relationship. Findings confirm that the exchange characteristics suggested by the social exchange theory plays important roles in building and maintaining dependence in IT service relationships and, in turn, towards building trust for knowledge sharing, but only indirectly via dependence. Also, paths from dependence to trust and knowledge sharing are confirmed as suggested by previous studies. Results implies that the benefits and investments for and in IT service relationship needs to be cultivated, exposed and emphasized in order to increase the necessary knowledge sharing levels. Limitations of the study are discussed with suggestions for further studies into social exchange characteristics in the conclusion.

Keywords Systems development · Knowledge sharing · Dependence · Trust · Social exchange theory

1 Introduction

Dramatic advances in information technology have enabled new methods of working or collaborating among knowledge workers, also bringing novel opportunities to knowledge workers provided by advanced information technologies. As organizations encounter the need to develop information systems (IS) for novel business applications and new problem domains, the need for knowledge collaboration in the IS project process is increasingly recognized in practice [1]. IS development or IS project implementation is a complex activity that requires more in-depth knowledge than an individual possesses [2]. IS projects are often based on complex technologies that pose a high knowledge burden and are difficult for project members to grasp. In these cases, the ability of project members to learn and use the technology domain and the business domain effectively is often critical for successful development and implementation of IS.

A stream of research has recently focused on how to transfer and share knowledge within project teams [3]. Each project has internal sources of knowledge, such as

✉ Jungwoo Lee
jlee@yonsei.ac.kr

Jun-Gi Park
Warren.pak@gmail.com

Hyejung Lee
h.jlee@yonsei.ac.kr

[1] IT Policy & Strategy Research Institute, Yonsei University, 50 Yonsei Ro, Sudaemun Gu, Seoul, Republic of Korea

[2] Graduate School of Information, Yonsei University, 50 Yonsei Ro, Sudaemun Gu, Seoul, Republic of Korea

[3] Center for Work Science, Yonsei University, 50 Yonsei Ro, Sudaemun Gu, Seoul, Republic of Korea

project participants, project deliverables, and project ecologies. To maximize the use of internal knowledge, the knowledge must be shared among team members. In other words, the sharing of knowledge between project participants in IS projects is critical for successful performance. The time spent on problem solving can be reduced significantly when the project participants share accumulated knowledge.

IS projects need intensive knowledge contributions from professionals with different expertise. A variety of business field knowledge needs to be integrated and converged with a variety of technological knowledge in order to build appropriate information systems. These experts may reside in different parts of the organization or in different organizations intensifying the problem of knowledge sharing. Organizations with specialized IS department may have staffs working internally serving other functions in the same organization, or in IT outsourcing cases, IS consultant are coming from other organizations.

The interaction between business clients and IS consultants can extend to every stage of the project. During the early stages, such as process innovation or requirement analysis, the IS consultants must understand the business clients' requirements to deliver the solutions expected by the user. The business clients also need to learn about the IS consultants' service to ensure that they will receive the expected services and will be able to maintain the information systems afterward. In other words, the two parties must share knowledge with each other in building information systems successfully.

According to the theory of relationship maintenance, trust and dependence between parties are central factors in motivating each party to participate or engage in successful and mutually beneficial exchange relationships [4]. Knowledge sharing based on exchange relationships is fundamental to foster collaboration between members and to achieve the goals of an IS implementation [5]. Thus, trust and dependence play a central role in building and maintaining relationships between the participants of an IS project and in promoting knowledge-sharing activities. The relationship between business clients and IS consultants explains the characteristics of the trust and the level of dependence on the project partner. In the service relationship, a number of studies reveal that the two most prominent factors defining the extent to which the provider and the customer demonstrate a relational orientation toward each other are the perceptions of the level of dependence and the level of trust between the two parties [6–8]. In this regard, prior studies in the relationship at project environment have focused on trust or credibility. Trust and credibility are known to be key factors of knowledge sharing [9–19].

In this study, the social exchange theory is brought to bear in explaining the role trust and dependence plays in IT service relationships with exchange specific characteristics of relationships. Relationship investment and benefits perceived by IT service clients are taken in as critical exchange specific antecedents for building dependence and trust among business and technology experts in project teams. In this regard, three sets of antecedents are posited here that contribute to trust and dependence in IS project teams: exchange characteristics (relationship benefits and investments), partner characteristics (expertise and similarity of project values) and interaction (the communication frequency). In the section that follows, we first frame our research in the context of knowledge sharing in information systems. Next, we present our research model, which identifies the five constructs in three groups and illustrates how each contributes to trust, dependence and knowledge sharing. Finally, instrument development, data collection and empirical analyses are provided, followed by findings and discussions.

2 Literature review: knowledge sharing, systems development and social exchange theory

Knowledge is a critical resource in any organizations. For an organization to operate successfully, employees with specific knowledge and competencies need to share the knowledge in a collaborative manner. In this regards, organizations must consider how to transfer and share expertise and knowledge. Knowledge sharing is the fundamental means through which organizational members can contribute to the organizational success.

Thus, studies of knowledge sharing have been conducted in a variety of domains beyond and before information systems, such as organizational behaviors and strategic management. Earlier in organizational learning, March [20] explicated and differentiated mechanism of knowledge exploration and exploitation. In further defining the learning organization, Huber [21] specifically used concepts around organizational knowledge processes in terms of its acquisition, distribution, interpretation and memory—i.e. the process model of knowledge and information.

Also, in studying the design and use of the knowledge management systems, many studies were conducted with focus on incentives and disincentives for stakeholders. In exploring how to let people use knowledge management systems, agency theory had been used primarily at individual level [22] and transaction cost economics in inter-organizational sharing of knowledge [23]. These theories of agency and transaction cost are the ones that trust and dependence came from in the sense that higher the trust level, the less the contractual requirements, i.e. transaction cost among parties involved. Also, in information systems research, efforts were concerted to identify technology and

systems that may enhance trust, theorizing that these technological features may enhance and help knowledge sharing activities [24]. In this context, knowledge sharing studies related to trust and dependence are reviewed here with specific references towards the social exchange theory.

2.1 Knowledge sharing in information systems development

Knowledge sharing has been identified as a major area of focus for collaborative work such as software development and new product development projects [25]. Knowledge sharing generally involves a relationship between two parties—one party that possesses the knowledge and another that requires the knowledge [26]. Knowledge sharing has been defined as a conscious act of participating in a knowledge exchange activity even when there is no external compulsion to do so [27].

At the individual level of analysis, knowledge sharing concerns the willingness of individuals in an organization to share with others the knowledge that they have acquired and created [28]. According to Ryu et al. [29], knowledge sharing is the behavior of an individual who disperses obtained knowledge and information to colleagues within an organization. At the team level of analysis, Pee et al. [3] suggest that knowledge sharing in IS development projects is defined by the extent to which sub-units of business clients and external IS consultants consciously reveal the presence of knowledge and exchange pertinent knowledge with one another. Knowledge sharing is also defined as revealing the presence of pertinent knowledge without necessarily transmitting it in its entirety [1].

Prior studies on the topic of knowledge sharing during projects have provided insights into its antecedents. Organizing the antecedents provides us a better understanding of the state of research on knowledge sharing and identifies different subjects in prior research. Relationship exchange literature identifies project participants, the project interaction and the relationships between participants as the basic elements. The first domain is the project participants; the participants' absorptive capacity and competency, indicating their ability to encode and decode knowledge clearly, has been identified as a key characteristic of the participants in the project [1, 5]. Other influential knowledge, source attributes, includes the participants' levels of expertise, their experience, and their credibility [16, 30]. Expertise heterogeneity defines the diversity of the expertise possessed by the members of a project team [1]. The second domain, project interaction, refers to communication with participants inside and outside of the project. Given that IS development is a process involving frequent communication and negotiation, often among associated stakeholders, communication activities and verbal and nonverbal expressions from a source will lead to a more satisfying relationship with the recipient, thereby facilitating the transfer of knowledge [16]. The last domain is the relationship, which is represented by two indicators. The first indicator is trust or credibility (the source's credibility). Trust is known to be a key antecedent of knowledge sharing [9–19]. Building trust with the provider in an outsourcing environment helps to enhance the success of outsourcing. The other indicator is the influence, which have been conceptualized in terms of mutual influence [9]. The nature of social interdependence can also impact knowledge sharing [3].

2.2 Social exchange theory: trust and dependence

In social exchange literature, certain features have repeatedly been found to be important when building quality relationships. Specifically, trust and dependence between parties have been proposed as central factors in motivating each party to participate or engage in a successful and mutually beneficial exchange relationship [4]. Bendapudi and Berry [31] suggest that trust and dependence can play a role in relationship maintenance, proposing that "constraints will only determine the stability of the relationship (will it persist?) whereas dedication determines the quality of the relationship (will it grow?) (p. 18)." These authors propose that customer behaviors differ depending upon their motivation to maintain the relationship and their perceptions of their degrees of freedom in either continuing or terminating the relationship.

Regarding service relationships, several studies have revealed that the two most prominent factors determining the extent of the relational orientation between the provider and the customer are the level of trust placed in the partner and the perceptions of the level of dependence on the partner [6–8]. Dependence is a structural factor that refers to the customer's need to maintain the relationship with the partner to achieve his or her goals [4]. The relational behaviors that arise due to dependence on the partner are calculative and motivational mechanisms ultimately based on need. Trust is an attitudinal factor that is developed by a customer's confidence in the integrity and reliability of a partner [32]. Trust reduces outcome uncertainties and increases the willingness to take risks in an exchange relationship [15].

Both dependence and trust are important drivers of relational behaviors, those two drivers also have a same role in IS project environment. During whole stage of IS project, IT service providers and clients (system users of the future) interact exchanging information, sharing knowledge and making critical decisions [33]. ERP implementation project environment is also a clear evidence as much

as former one. Successfully implementing ERP often requires extensive customization to configure it to the specific client and their marketplace [34]. Information system customization requires critical decision-making efforts [35]. During the implementation phase, clients should be willing to trust the customization vendor, as they have determined the utility that they expect from the IS system and because they depend upon the vendor's knowledge of IS systems [11].

3 Research model and hypotheses

The research model posits that the trust-dependence relationship influences the extent of knowledge sharing during the IS development process. The relationships between variables are shown in the research framework in Fig. 1.

3.1 Dependence, trust and knowledge sharing

In a service relationship, a successful relationship is built by creating and maintaining a reciprocal profitable relationship with the partner and showing cooperative behaviors such as exchanging information and knowledge with the partner [36]. If there is high joint dependence in a client–vendor relationship, the dependence plays a key role in creating a strong partnership [32]. When there is higher dependence on the partner, the firm tends to care more about the interests of the partner and is willing to help the partner [37]. In a channel relationship, if one firm is highly dependent on its partner, it will devote significant effort to fulfill the partner's requests so that it does not lose its status as a valuable partner. Thus, dependence on a partner has a strong effect on information exchanges as a form of relational behavior [8].

During the requirements analysis process in IS development projects, IS consultants ask for the case of business requirement from users and design the functions of system. In this case, the IS consultants depend on the business client's knowledge of processes or functions [3]. Dependence on the partner in a project has a positive effect on knowledge sharing in teams [38]. Accordingly, we propose the following:

H1 Dependence on the partner is positively related to knowledge sharing.

Building trust within a project, in particular within the context of a dyadic relationship between business clients and IS consultants, is crucial for the effective execution of the project [39]. Yuan et al. [18] explains trust as the extent to which there is reciprocal trust within software developer dyads from interacting teams. In the information systems literature, trust is considered to be a determinant of the effectiveness of the knowledge-sharing activities [38]. Trust in management plays a critical role in facilitating knowledge sharing within and between teams [40]. Kanawattanachai and Yoo [41] examine the role of trust in the project setting and highlight the fact that trust affects knowledge sharing in a virtual team over time. If system developers from different groups trust each other, they will be likely to share their knowledge with the developers within the teams because they expect to make good use of

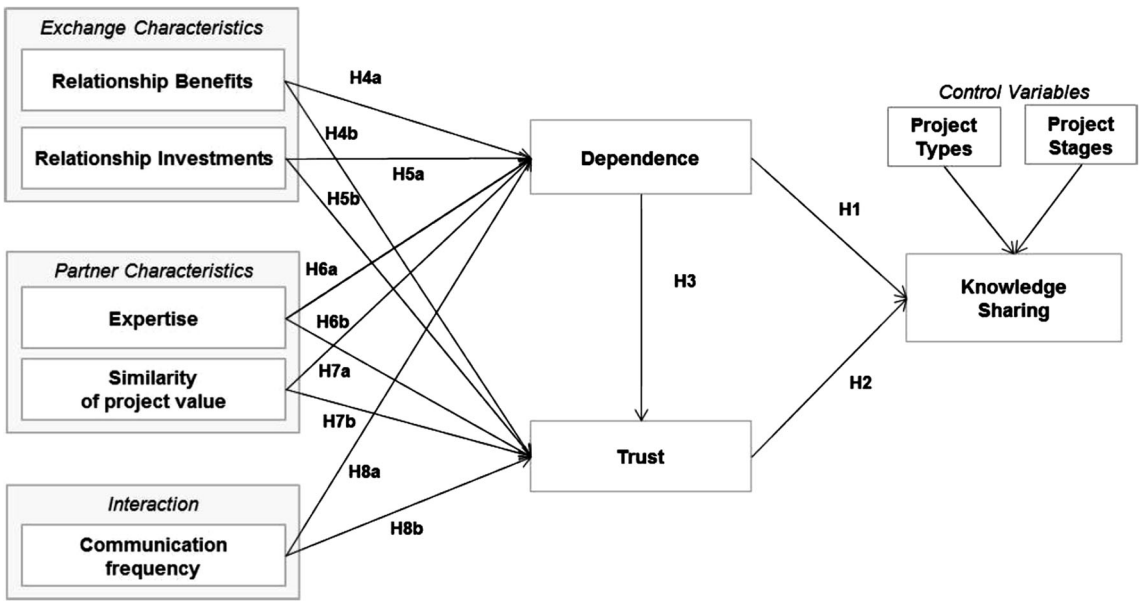

Fig. 1 Research model

the knowledge. Additionally, Maurer [42] identifies how trust between project participants affects knowledge acquisition in a project context. Under a condition of high trust, the project members are more likely to receive project-related knowledge [5]. Therefore, we propose the following:

H2 Trust in the partner is positively related to knowledge sharing.

The dependence of one party on another defines the extent to which the dependent party relies on the relationship for the fulfillment of important needs [43]. In the project environment, dependence refers to the extent to which a participant believes that he/she depends on the other to carry out his/her work [44]. Dependence also means that one party's outcomes are contingent on the trustworthy or untrustworthy behavior of others [45]. When performing complicated tasks involving limited alternative sources of a critical resource, the buyer's satisfaction in a high dependence relationship between a buyer and a seller is likely to enhance the buyer's trust in the seller [46]. Wicks et al. [47] argue that the amount of trust can differ based on the dependence level in the relationship. Wells and Kipnis [45] empirically show that a manager's dependence on an employee is related to the employee's trust in the manager. Grant and Baden-Fuller [48] found that mutual dependence has a positive impact on trust in an IT outsourcing relationship. The following hypothesis is proposed:

H3 Dependence on the partner is positively related to the trust in the partner.

3.2 Relationship benefits and investments: *perceived exchange characteristics*

In a customer–provider relationship, the service provider typically tries to give the customer benefits that will fulfill the customer's needs [49]. Customers who continue to receive the supplied benefits will maintain their relationship and the benefits will be likely to make the customer feel locked into their relationship [50]. Relationship benefits have been shown to affect relational mediators such as trust and commitment positively [51]. Relationship benefits are considered to be important factors when building relationships because they reduce uncertainty about the level of the service being offered, increase the perceived trust in the partner, and enhance the level of service expectations [52–54].

When benefits of the relationship have been proven by the partner, the customers will be willing to maintain the relationship with their partner and will depend on their partner [31]. Palmatier et al. [55] also suggest that the customer's perception of relationship benefits have a positive impact on the perceived switching costs. Customers with a perception of higher switching costs are more dependent on their partners. In an IS outsourcing environment, an analysis of the client's data allows the IS service provider the opportunity to provide suitable IS functions to their clients during the IS contract. These are the relational benefits that the clients can experience with their IS service provider, and they are predicted to entice the client to maintain their contract [56]. Based on this discussion, we propose the following:

H4a The perceived relationship benefits are positively related to dependence on the partner.

H4b The perceived relationship benefits are positively related to the trust in the partner.

Service providers who want to keep their customers are willing to express their friendship, rapport and social support [57]. According to Bendapudi and Berry [31], a relationship investment is composed of people, equipment, and process investments between both parties. A relationship investment can contribute to a higher level of trust in a cooperative relationship. Trust typically means the perception that another party has the ability to meet his/her goals [58]. A high relationship investment leads to a positive estimation of the partner's intention to maintain the relationship [6], and it influences the customer's feelings associated with the service experience [59]. Therefore, trust is the primary element involved in developing high-level relationships between the customer and the supplier [60].

According to [61], one enhancement strategy for a relationship between the customer and the supplier is having the supplier create customer switching costs to lock in the relationship. Effective relationship investment by the partner increases the costs of switching to alternative resources and creates customer dependence [31]. If the service supplier provides a unique and irreplaceable investment in the relationship, they will increase their customer's perception of the level of dependence [62]. Establishing various relationship ties between a customer and a provider requires effort and attention to enhance the interaction. The amount of investment leads to high attachment to the provider by the customer and to stronger relationship bonds during the service relationship. Thus, we propose the following:

H5a The relationship investment is positively related to the dependence on the partner.

H5b The relationship investment is positively related to the trust in the partner.

3.3 Expertise and similarity of project values: *partner characteristics*

The project team consists of various experts from different organizational contexts. The expertise of the project team refers to the aggregation of individual skills and knowledge. In IS literature, expertise refers to IS consultants' ability to support the client by implementing the IS solution [63]. If the provider is perceived to be an expert, the customer will try to maintain their relationship with the provider [31]. When competent experts increase the value of the customer, the customer wants to strengthen and maintain the relationship with their experts [64]. The partner's capabilities encourage the customer to increase their level of dependence on the partner; the customer needs to maintain their relationship with the exchange partner to achieve their desired goals [65]. The partner's capabilities also generate customer loyalty by providing core offerings and operations that create benefit-based dependence or increase cost-based dependence [66].

The perceived expertise of the partner can also increase the partner's trust in the customer. Expertise has been found to be a determinant of trust [67]; across a variety of contexts, including health care [68] and other high-involvement services such as tool development [69] and IS service provision [70]. Johnson and Grayson [71] found that service provider expertise is an antecedent of cognitive trust because the assessments of expertise and cognitive trust are both considered to be components of the evaluation process. The following hypotheses are proposed:

H6a The partner's expertise is positively related to the dependence on the partner.

H6b The partner's expertise is positively related to the trust in the partner.

The level of similarity between a service provider and a customer represent the presence of common values and interests in provider–customer relationships [72]. From the perspective of a business client, similarity of business values with the partner means that the customer's perception of the goals and the partner's vision are recognized as being similar [73]. Partner similarity enhances trust development because the "sense-making process relies on congruent expectations and assumptions held by transacting parties about each other's prerogatives and obligations" [74]. Similarity helps develop trust because actors readily identify with each other, enhancing the social efficiency of their interactions [75].

In the case of an ERP implementation, shared cultural characteristics, sometimes referred to as cultural similarity, should increase the user's trust in the vendor by identifying shared values and similar lifestyles and appearance between the client and the vendor [76]. This similarity to the IS consultants can provide a level of shared understanding about different behaviors in the interaction between the parties and can reduce the risk of misunderstanding individual behaviors while the project is carried out. Indeed, in customer–provider relationships, perceived similarity increases trust [58]. The following hypotheses are proposed:

H7a The similarity of the project values is positively related to the dependence on the partner.

H7b The similarity of the project values is positively related to trust in the IS partner.

3.4 Communication frequency: *interaction*

Communication frequency refers to how often information is exchanged between different functional areas of an organization over a certain period of time [77]. Hartwick and Barki [78] suggest that frequent communication activities should be included as part of the user's participation in IS development.

The frequency of communication is argued to influence the customers' opinions about their relationships with their partners. Frequent communication also helps to build and maintain the team's social capital, which is embedded in the team members' relationships [16]. The frequency with which partners communicate to solve business issues has been shown to be a key factor in the customer–provider relationship [49]. Mitręga and Katrichis [79] found that communication frequency positively influences the seller's level of dependence in the relationship.

Giddens [80] suggested that trust is likely to develop when individuals frequently communicate through face-to-face contact. Frequent communication in which conflicts are solved with an organization's employees builds a strong sense of positive trust [81]. Anderson and Narus [82] stated that communication is positively associated with customer trust. The reason that communication frequency contributes to the improvement of trust is that more frequent communication enables an understanding of personal characteristics and the organizational context [83]. We propose the following:

H8a The frequency of communication is positively related to the dependence on the partner.

H8b The frequency of communication is positively related to the trust in the partner.

4 Research method and procedure

This study has been conducted as a survey research, exploring relationships among constructs identified in the research model, specifically the relationship benefits,

relationship investments, partner expertise, project value similarity, and communication frequency against the level of trust, dependence and knowledge sharing.

4.1 Measurement development

All measures were adopted from prior studies. Most of items are adopted from Park and Lee [84] except the items for the relationship benefits and the relationship investment constructs. Items measuring the level of relationship benefits were developed based on the six items used by Sweeney and Webb [49] and Reynolds and Beatty [85]. The scale of relationship Investment were modified from Kristof De et al. [86] 's three items.

In studying dependence and trust, Park and Lee [84] were conceptualizing the project complexity as critical antecedent while this study focuses on input for relationship (relationship investment) and outcome of relationship (relationship benefits) in IT service context. In this regard, a survey for this study was administered among client personnel while Park and Lee [84] administered the survey in matched pairs of client personnel and service personnel in same project teams. Appendix A presents adopted measures along with their studies. Though the items are adopted, standard procedures for measurement development were applied wherever needed involving the use of multi-item indicators for reliability and unidimensionality. Final questionnaire contained 34 items for eight constructs.

Threats of common methods bias were assessed using Harman's one-factor test. Following the procedure recommended by Podsakoff et al. [87], we entered all of our variables in an exploratory factor analysis; the dataset would have a common methods bias problem if a single factor emerged that accounted for a large percentage of the variance in the resulting factors. However, a single factor did not emerge in our analyses, and the first factor accounted for 42.9 % of the total variance.

4.2 Sampling and data collection

Data were collected from client side project leaders from March to May 2013. In data collection, a two-stage approach was used. Survey packages included a cover letter and questionnaires with demographics, antecedent variables and knowledge sharing. 213 client side project leaders in three different IT service firms were contacted by email and phone soliciting the participation. All of these leaders are currently responsible for IT service projects for their clients. One firm is specialized in maintenance of SAP ERP across different industries while the other two are general IT outsourcing providers serving various clients in various industries. Project representatives who responded with willingness to participate in our study were then contacted by e-mail in the second stage. We electronically delivered the survey packages to 165 client side project leaders who agreed to participate.

We made follow-up phone calls or send emails to increase the response rate. A total of 126 responses were collected over the period of 2 months. This yielded a valid response rate of 76.4 %. Non-response bias was tested by comparing differences between the first wave of respondents (first quartile) and the last wave of respondents (last quartile) on key demographic and study variables. This comparison was based on the premise that the last wave of respondents were more likely to be similar to non-respondents [88]. The comparative assessment revealed no significant differences in demographics and study variables. Demographic information of the final respondents and descriptive project details are provided in Table 1.

5 Analysis and results

Partial least squares (PLS) method is used to evaluate the relationships specified in the research model. PLS has the ability to handle relatively small sample sizes, making it an appropriate choice for testing this research model [89]. With PLS, the psychometric properties of the scales used to measure the variables are tested and the strengths and directions of the pre-specified relationships are analyzed [90]. PLS was used in a two-stage approach. In the first stage, all measurement models were examined for proper psychometric properties. The second stage focused on testing the research model and the hypotheses-structural model.

5.1 Measurement model

The assessment of the measurement model is determined by examining several tests of convergent and discriminant validity [91]. To assess convergent validity, (1) individual item reliability and (2) construct reliability are assessed. Internal consistency is assessed by examining the loadings of the measures with their respective constructs. A generally accepted rule of thumb is to accept items with loadings of 0.70 or above, which suggests that there exists more shared variance between the construct and its measures than error variance [89]. The descriptive statistics, weights, and loadings can be found in Table 2.

Construct reliability is assessed with two internal consistency indicators: composite reliability and average variance extracted (AVE) scores. AVE is similar to Cronbach's alpha. All relevant composite reliability measures in this survey are higher than 0.880 (see Table 2), providing strong evidence of reliability [89]. With respect to the AVE scores, a value of 0.5 is required to provide evidence of

Table 1 Respondent's characteristics

Respondent's variable	*N*	%	Project variable	*N*	%
Gender			*Project size (members)*		
Male	104	82.5	~10	58	46.0
Female	22	17.5	11–20	29	23.1
Position			21–30	12	9.5
CEO/CIO	31	24.6	31~	27	21.4
Project manager	64	50.8	*Project statues*		
Project leader	31	24.6	System planning	0	0.0
Job experience (year)			Requirement analysis	32	25.4
~4	23	18.2	Analysis and design	37	29.3
5–8	31	24.6	Development and test	39	31.0
9–12	40	31.7	Roll-out	18	14.3
13–16	22	17.5	*Project type*		
17–20	7	5.6	Data management	30	23.8
20~	3	2.4	Business intelligence	15	11.9
Firm type			Enterprise resource planning	43	34.1
Technology/network	31	24.5	Supply chain management	9	7.1
Manufacturing	64	50.8	Human resource	4	3.2
Transportation	1	0.8	Customer resource management	4	3.2
Banking, insurance	23	18.3	Accounting and financing	17	13.5
Software	4	3.2	Web application	5	3.2
Health care	3	2.4			
Total	126	100.0	Total	126	100.0

satisfactory construct reliability [33]. All of our scores meet this standard. The reliability of the measures (items and scales) is adequate for the analysis.

To evaluate discriminant validity, AVE can be used. There are two procedures for assessing discriminant validity. First, AVE values must be examined to determine if they are consistently greater than the off-diagonal correlations. Table 3 shows the correlations among the constructs, where the values in the diagonal are the square roots of the AVE scores. Hence, it can be concluded that the measurement model demonstrated adequate discriminant validity [33]. Second, each within-construct item must load highly on the construct it is intended to measure, and the cross-loadings need to be lower than the within-construct item loadings. All constructs meet these requirements. When assessing discriminant validity, items not loading highly on their own constructs, but instead loading on other constructs, were deleted.

5.2 Structural model

Measurement model analysis verified the reliability and validity of the measurement items for this study. In the next stage, the assessment of the structural model involves estimating the path coefficients and the R^2 values using PLS. Path coefficients explain the strengths of the relationships between the independent and dependent variables, whereas the R^2 value is a measure of the predictive power of a model regarding the dependent variables. To assess the statistical significance of the model's path estimates, a bootstrapping method (with 2000 re-samples) was used [92]. The target t test value was 1.960 (for $p < 0.05$ using two-tailed tests). The sample size of 126 exceeded the recommended minimum of 50, which represented 10 times the number of independent constructs influencing a dependent construct [89]. Results of PLS analysis are presented in Fig. 2. Path coefficients are the standardized beta coefficients from the PLS analysis. A summary of the test results is shown in Table 4.

As expected, dependence on the partner is significantly associated with relationship benefits ($\beta = 0.284$, $p < 0.01$), relationship investments ($\beta = 0.219$, $p < 0.01$) and expertise ($\beta = 0.222$, $p < 0.05$), which together explain 55.1 % of the dependent variable's variance. Three paths have effects in the direction hypothesized, and Hypotheses 4a, 5a and 6a are therefore supported. Contrary to expectations, similarity of the project value and communication frequency did not significantly affect dependence. Thus, Hypotheses 7a and 8a are not supported. As also hypothesized, trust in the partner is significantly associated with expertise ($\beta = 0.332$, $p < 0.01$), similarity of the project value ($\beta = 0.286$, $p < 0.01$), and dependence ($\beta = 0.202$, $p < 0.01$), which together explain 65.9 % of the dependent variable's variance. Three paths have

Table 2 Confirmatory factor analysis

Construct	Mean	SD	Factor	Average variance extracted	Composite reliability	Cronbach's alpha
Relationship benefits						
RBE1	5.397	1.005	0.848	0.658	0.920	0.897
RBE2	5.460	0.952	0.804			
RBE3	5.460	1.056	0.834			
RBE4	4.960	1.670	0.814			
RBE5	4.540	1.547	0.797			
RBE6	4.683	1.473	0.768			
Relationship investment						
RIN1	5.452	1.100	0.932	0.867	0.951	0.923
RIN2	5.548	1.025	0.936			
RIN3	5.476	1.164	0.924			
Expertise						
EXP1	5.754	0.797	0.890	0.780	0.934	0.906
EXP2	5.635	0.796	0.868			
EXP3	5.706	0.972	0.896			
EXP4	5.698	0.966	0.879			
Similarity of project value						
SIM1	5.468	0.977	0.853	0.762	0.928	0.896
SIM2	5.405	1.029	0.837			
SIM3	5.325	1.151	0.909			
SIM4	5.333	1.159	0.891			
Communication frequency						
FRE1	5.302	1.292	0.706	0.711	0.880	0.796
FRE2	5.468	1.041	0.927			
FRE3	5.468	1.048	0.881			
Trust						
TRU1	5.310	0.959	0.883	0.766	0.942	0.924
TRU2	5.333	0.947	0.894			
TRU3	5.365	1.070	0.844			
TRU4	5.429	0.967	0.874			
TRU5	5.540	0.873	0.880			
Dependence						
DEP1	5.825	0.886	0.855	0.727	0.889	0.813
DEP2	5.579	0.958	0.848			
DEP3	5.802	0.955	0.856			
Knowledge sharing						
KSH1	5.286	0.970	0.881	0.737	0.944	0.929
KSH2	5.429	0.933	0.857			
KSH3	5.460	0.960	0.802			
KSH4	5.302	0.974	0.868			
KSH5	5.183	1.148	0.857			
KSH6	5.317	1.001	0.883			

effects in the direction hypothesized, and Hypotheses 3, 6b and 7b are therefore supported. However, Three independent variables—relationship benefits, relationship investment and communication frequency—have no significant effect on trust in the IS consultant. Thus, H4b, H5b and H8b are not supported. As shown in Fig. 2, dependence ($\beta = 0.330$, $p < 0.01$) and trust ($\beta = 0.341$, $p < 0.01$) significantly influence knowledge sharing, accounting for 37.3 % of the variance and providing support for Hypotheses 1 and 2.

Table 3 Correlations analysis

Constructs	REB	REI	EXP	SIM	FRE	TRU	DEP	KSH
Relationship benefits	**0.811**							
Relationship investment	0.659	**0.942**						
Expertise	0.617	0.554	**0.883**					
Similarity of project value	0.517	0.528	0.603	**0.873**				
Communication frequency	0.410	0.350	0.299	0.523	**0.843**			
Trust	0.588	0.608	0.713	0.683	0.395	**0.875**		
Dependence	0.655	0.617	0.613	0.555	0.384	0.660	**0.853**	
Knowledge sharing	0.408	0.380	0.351	0.451	0.579	0.559	0.553	**0.858**

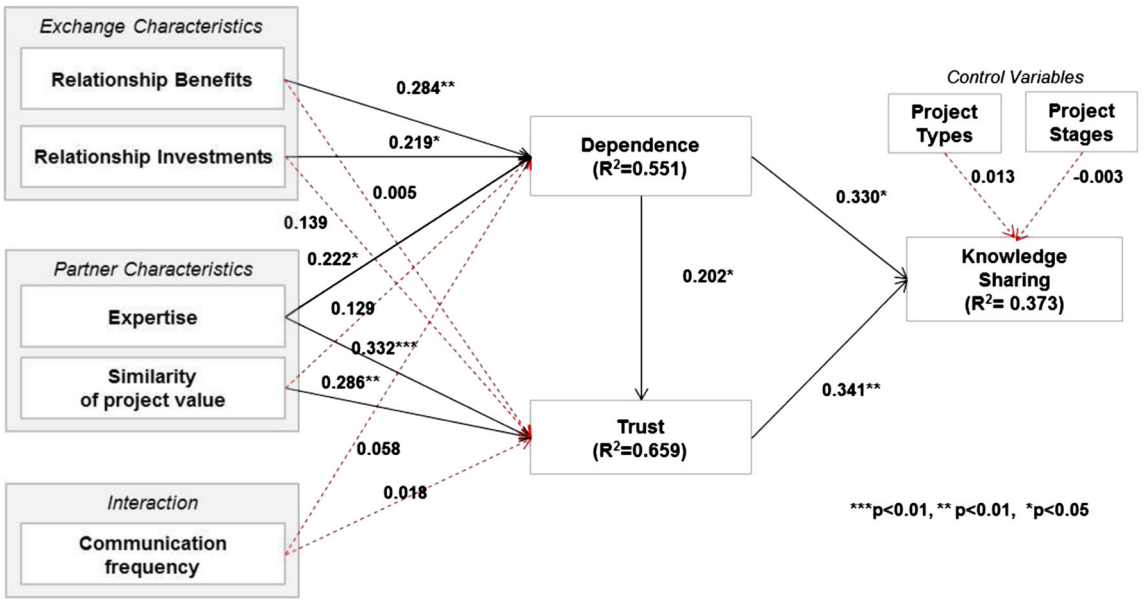

Fig. 2 Structural model analysis results

Table 4 Hypotheses tests

Hypothesis		β	T-value	Supported
H1	Dependence → knowledge sharing	0.330*	2.509	Yes
H2	Trust → knowledge sharing	0.341**	3.267	Yes
H3	Dependence → trust	0.202*	2.514	Yes
H4a	Relationship benefits → dependence	0.284**	2.909	Yes
H4b	Relationship benefits → trust	0.005	0.058	No
H5a	Relationship investments → dependence	0.219*	2.407	Yes
H5b	Relationship investments → trust	0.139	1.822	No
H6a	Expertise → dependence	0.222*	2.225	Yes
H6b	Expertise → trust	0.332***	4.254	Yes
H7a	Similarity of project value → dependence	0.129	1.155	No
H7b	Similarity of project value → trust	0.286**	3.115	Yes
H8a	Communication frequency → dependence	0.058	0.765	No
H8b	Communication frequency → trust	0.018	0.204	No

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

6 Discussions and conclusions

This research extends our understanding of knowledge sharing in IT service projects. The trust-dependence mechanism adopted from the social exchange theory provides us with the larger picture of knowledge sharing in IT service projects. Though several previous studies introduced the trust-dependence mechanism as the mediating vehicle for effective knowledge sharing in IT service projects adopting the social exchange theory, the exchange specific characteristics are introduced here additionally as critical antecedents of dependence and trust, and empirically validated. Further studies are in due order to explicate the details confirming the results presented here.

Specifically, the findings in this study indicates that exchange specific characteristics—relationship investment and benefits—are more strongly associated with dependence than with trust itself, suggesting mediating role that dependence is playing between social exchanges occurred and trust built among team members. Exchanges in the relationship possibly increase the dependence level perceived by clients of IT service projects, but not the trust directly. Rather, the trust level is more strongly associated with the perceived expertise level of partners. Though numerous studies were conducted exploring details of trust in IT service projects context, further studies would still be needed explicating mechanism operating trust and dependence in IT service projects. Complex knowledge needs to be shared, exchanged and embodied by team members striving to build systems for novel business applications for competitive survival and advantages in this technologically fast advancing environment.

This study suggests that it is important for project teams to try to enhance trust in their partners by utilizing expertise and the sharing of project value because trust will affect knowledge sharing. As dependence strongly influences knowledge sharing practice, the ability of the project manager to manage dependence appears to be more effective for increasing knowledge sharing than a trust-based approach as dependence would be more manageable via relationship investments and benefits. Nurturing and fostering exchange related activities seems to increase feelings of investments and expected benefits and critically building trust leading to more active knowledge sharing.

Also, as similarity of the project value is critical in building trust along with perceived expertise level of partners, activities can be planned to foster and assimilate the strategic goals and intended purpose of the system across different teams and team members of IT services. Other interesting finding is that the communication frequency seems to be not so much effective in building dependence or trust. It may suggest the importance of quality of communication compared to quantity of communication among team members.

This study has limitations. First is the snowball sample problem. Random sampling is not easy to conduct in this area because a comprehensive listing of IS development projects is not available. The sample is limited to project leaders in three IT service firms in Korea. Further studies can be conducted in different firms in different countries. Another limitation is that the instrument is designed to measure perceptions of current projects rather than completed projects. Good side is that it may reduce the retrospective bias at a minimum level, but bad side is that their perceptions may change as project progresses and when even completed. For example, perceive level of expertise and relationship benefits in one phase of a project may be different from following phases. Only longitudinal study following the changes throughout a project can prevent and overcome this limitation.

This study suggested the roles played by exchange specific characteristics in IT service project relationships. Further research can be conducted exploring and explicating further details of these constructs, along with other cognitive constructs such as individual motivation (e.g. team motivation, clients' and IS consultants' motivation), that may lead to effective knowledge sharing among members of different background in IT service context.

Acknowledgments This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2012S1A3A2033474).

Appendix: Measurement items

Expertise—Spake and Megehee [68]

1. My partner has specialized knowledge.
2. My partner has extensive, broad knowledge.
3. My partner is experienced in solving problems like mine.
4. My partner contributes expertise and experience in executing the IS Project.

Relationship benefits—Sweeney and Webb [49] and Reynolds and Beatty [85]

1. I value very highly of the convenience my partner provides to me.
2. I value very highly of the time-saving my partner provides to me.
3. I benefit from advices my partner gives to me.
4. I make better decisions because of my partner.
5. I enjoy spending time with my partner.

6. I have more than just a formal business relationship with my partner.

Relationship Investment—Kristof De et al. [86]

1. My partner makes efforts to increase my loyalty.
2. My partner makes various efforts to improve the tie with me.
3. My partner really cares about relating with me.

Similarity of project value—Nicholson et al. [73]

1. My partner and I share the same basic project values.
2. My partner and I agree about how to manage the projects.
3. My partner and I think alike about how to manage the projects.
4. I think that my perception of project value is similar to that of my partner's.

Communication frequency—Massey and Kyriazis [93]

1. Electronic mail
2. Scheduled one-to-one meetings (face-to-face)
3. Informal face-to-face conversations in a non-work setting (e.g. after-work drinks, barbeques)

Trust—Park et al. [94]

1. My partner is open and honest when problems occur.
2. My partner helps me make critical decisions.
3. My partner is always willing to provide assistance.
4. My partner is always sincere.
5. My partner would be trusted completely.

Dependence—Yilmaz et al. [32]

1. My partner is important to our IS Project.
2. My partner is crucial to our overall IS performance.
3. It would be costly to lose my partner.

Knowledge Sharing—Bock et al. [28]

1. We share the minutes of meetings or discussion records in an effective way.
2. We always provide technical documents, including manuals, books, training materials to each other.
3. We share project plans, project status in an effective way.
4. We always provide know-where or know-whom information to each other in an effective way.
5. We try to share expertise from education or training in an effective way.
6. We always share experience or know-how from work in a responsive and effective way.

References

1. Tiwana A, McLean ER (2005) Expertise integration and creativity in information systems development. J Manag Inf Syst 22:13–43
2. Xia W, Lee G (2004) Grasping the complexity of IS development projects. Commun ACM 47:68–74
3. Pee LG, Kankanhalli A, Kim H-W (2010) Knowledge sharing in information systems development: a social interdependence perspective. J Assoc Inf Syst 11:550–575
4. Hewett K, Bearden WO (2001) Dependence, trust, and relational behavior on the part of foreign subsidiary marketing operations: implications for managing global marketing operations. J Mark 65:51–66
5. Xu Q, Ma Q (2008) Determinants of ERP implementation knowledge transfer. Inf Manag 45:528–539
6. Ganesan S (1994) Determinants of long-term orientation in buyer–seller relationships. J Mark 58:1–19
7. Razzaque MA, Tan Gay Boon MA (2003) Effects of dependence and trust on channel satisfaction, commitment and cooperation. J Bus Bus Mark 10:23–48
8. Sezen B, Yilmaz C (2007) Relative effects of dependence and trust on flexibility, information exchange, and solidarity in marketing channels. J Bus Ind Mark 22:41–51
9. Nelson KM, Cooprider JG (1996) The contribution of shared knowledge to is group performance. MIS Q 20:409–432
10. Kotlarsky J, Oshri H (2005) Social ties, knowledge sharing and successful collaboration in globally distributed system development projects. Eur J Inf Syst 14:37–48
11. Sarker S, Nicholson DB, Joshi KD (2005) Knowledge transfer in virtual systems development teams: an exploratory study of four key enablers. Prof Commun IEEE Trans 48:201–218
12. Ko D-G, Kirsch LJ, King WR (2005) Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. MIS Q 29:59–85
13. Chiu C-M, Hsu M-H, Wang RTG (2006) Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. Decis Support Syst 42:1872–1888
14. Jones MC, Cline M, Ryan S (2006) Exploring knowledge sharing in ERP implementation: an organizational culture framework. Decis Support Syst 41:411–434
15. Mooradian T, Renzl B, Matzler K (2006) Who trusts? Personality, trust and knowledge sharing. Manag Learn 37:523–540
16. Joshi KD, Sarker S, Sarker S (2007) Knowledge transfer within information systems development teams: examining the role of knowledge source attributes. Decis Support Syst 43:322–335
17. Yang S-C, Farn C-K (2009) Social capital, behavioural control, and tacit knowledge sharing—a multi-informant design. Int J Inf Manage 29:9
18. Yuan M, Zhang X, Chen Z, Vogel DR, Chu X (2009) Antecedents of coordination effectiveness of software developer dyads from interacting teams: an empirical investigation. Eng Manag IEEE Trans 56:494–507
19. Lin T-C, Huang C-C (2010) Withholding effort in knowledge contribution: the role of social exchange and social cognitive on project teams. Inf Manag 47:188–196
20. March JG (1991) Exploration and exploitation in organizational learning. Organ Sci 2:71–87
21. Huber GP (1991) Organizational learning: the contributing processes and the literatures. Organ Sci 2:88–115
22. Fey CF, Furu P (2008) Top management incentive compensation and knowledge sharing in multinational corporations. Strateg Manag J 29:1301–1323
23. Ke W, Wei KK (2007) Factors affecting trading partners' knowledge sharing: using the lens of transaction cost economics and socio-political theories. Electron Commer Res Appl 6:297–308
24. Pan SL, Leidner DE (2003) Bridging communities of practice with information technology in pursuit of global knowledge sharing. J Strateg Inf Syst 12:71–88

25. Del Rosso C (2009) Comprehend and analyze knowledge networks to improve software evolution. J Softw Maint Evol Res Pract 21:189–215
26. Hendriks P (1999) Why share knowledge? The influence of ICT on the motivation for knowledge sharing. Knowl Process Manag 6:91–100
27. Davenport TH, De Long DW, Beers MC (1998) Successful knowledge management projects. Sloan Manage Rev 39(2): 43–57
28. Bock G-W, Zmud RW, Kim Y-G, Lee J-N (2005) Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivatiors. Soc Psychol Forces Organ Clim MIS Q 29:87–112
29. Ryu S, Ho SH, Han I (2003) Knowledge sharing behavior of physicians in hospitals. Expert Syst Appl 25:113–123
30. Faraj S, Sproull L (2000) Coordinating expertise in software development teams. Manage Sci 46:1554
31. Bendapudi N, Berry LL (1997) Customers' motivations for maintaining relationships with service providers. J Retail 73: 15–37
32. Yilmaz C, Sezen B, Ozdemir O (2005) Joint and interactive effects of trust and (inter) dependence on relational behaviors in long-term channel dyads. Ind Mark Manage 34:235–248
33. Fornell C, Larcker DF (1981) Structural equation models with unobservable variables and measurement error: algebra and statistics. J Mark Res 18:382–388
34. Pan SL, Newell S, Huang J, Galliers RD (2007) Overcoming knowledge management challenges during ERP implementation: the need to integrate and share different types of knowledge. J Am Soc Inform Sci Technol 58:404–419
35. Vandaie R (2008) The role of organizational knowledge management in successful ERP implementation projects. Knowl Based Syst 21:920–926
36. Lawson B, Petersen KJ, Cousins PD, Handfield RB (2009) Knowledge sharing in interorganizational product development teams: the effect of formal and informal socialization mechanisms*. J Prod Innov Manage 26:156–172
37. Yang Z, Peterson RT (2004) Customer perceived value, satisfaction, and loyalty: the role of switching costs. Psychol Mark 21:799–822
38. Staples DS, Webster J (2008) Exploring the effects of trust, task interdependence and virtualness on knowledge sharing in teams. Inf Syst J 18:617–640
39. Lander MC, Purvis RL, McCray GE, Leigh W (2004) Trust-building mechanisms utilized in outsourced IS development projects: a case study. Inf Manag 41:509–528
40. Renzl B (2008) Trust in management and knowledge sharing: the mediating effects of fear and knowledge documentation. Omega 36:206–220
41. Kanawattanachai P, Yoo Y (2007) The impact of knowledge coordination on virtual team performance over time. MIS Q 31:783
42. Maurer I (2010) How to build trust in inter-organizational projects: the impact of project staffing and project rewards on the formation of trust, knowledge acquisition and product innovation. Int J Project Manage 28:629–637
43. Rusbult CE, Van Lange PAM (1996) Interdependence processes. Social psychology: handbook of basic principles. In: Tory E, Kruglanski AW (eds) Social psychology: handbook of basic principles. PressHiggins, New York, pp 564–596
44. Van der Vegt GS, Van de Vliert E (2005) Effects of perceived skill dissimilarity and task interdependence on helping in work teams. J Manag 31:73–89
45. Wells CV, Kipnis D (2001) Trust, dependency, and control in the contemporary organization. J Bus Psychol 15:593–603
46. Andaleeb SS (1996) An experimental investigation of satisfaction and commitment in marketing channels: the role of trust and dependence. J Retail 72:77–93
47. Wicks AC, Berman SL, Jones TM (1999) The structure of optimal trust: moral and strategic implications. Acad Manag Rev 24:99–116
48. Grant RM, Baden-Fuller C (2004) A knowledge accessing theory of strategic alliances. J Manage Stud 41:61–84
49. Sweeney JC, Webb D (2002) Relationship benefits: an exploration of buyer–supplier dyads. J Relat Mark 1:77
50. Vázquez-Carrasco R, Foxall GR (2006) Positive vs. negative switching barriers: the influence of service consumers' need for variety. J Consum Behav 5:367–379
51. Morgan RM, Hunt SD (1994) The commitment-trust theory of relationship marketing. J Mark 58:20–38
52. Lewandowski J, Rosenberg BD, Parks MJ, Siegel JT (2011) The effect of informal social support: face-to-face versus computer-mediated communication. Comput Hum Behav 27:1806–1814
53. Rodríguez NG, Pérez MJS, Gutiérrez JAT (2008) Can a good organizational climate compensate for a lack of top management commitment to new product development? J Bus Res 61:118–131
54. Palmatier RW, Scheer LK, Houston MB, Evans KR, Gopalakrishna S (2007) Use of relationship marketing programs in building customer–salesperson and customer–firm relationships: differential influences on financial outcomes. Int J Res Mark 24:210–223
55. Palmatier RW, Gopalakrishna S, Houston MB (2006) Returns on business-to-business relationship marketing investments: strategies for leveraging profits. Mark Sci 25:477–493
56. Goo J, Kishore R, Rao HR, Nam K (2009) The role of service level agreements in relational management of information technology outsourcing: an empirical study. MIS Q 33:119–145
57. Zeithaml VA, Berry LL, Parasuraman A (1996) The behavioral consequences of service quality. J Mark 60:16
58. Doney PM, Cannon JP (1997) An examination of the nature of trust in buyer–seller relationships. J Mark 61:35–51
59. Chiu H-C, Hsieh Y-C, Li Y-C, Lee M (2005) Relationship marketing and consumer switching behavior. J Bus Res 58:1681–1689
60. Palmatier RW, Dant RP, Grewal D (2007) A comparative longitudinal analysis of theoretical perspectives of interorganizational relationship performance. J Mark 71:172–194
61. Jones MA, Reynolds KE, Mothersbaugh DL, Beatty SE (2007) The positive and negative effects of switching costs on relational outcomes. J Serv Res 9:335–355
62. Belonax JJJ, Newell SJ, Plank RE (2007) The role of purchase importance on buyer perceptions of the trust and expertise components of supplier and salesperson credibility in business-to-business relationships. J Pers Sell Sales Manag 27:247–258
63. Wang ETG, Lin CC-L, Jiang JJ, Klein G (2007) Improving enterprise resource planning (ERP) fit to organizational process through knowledge transfer. Int J Inf Manag 27:200–212
64. Palmatier RW, Dant RP, Grewal D, Evans KR (2006) Factors influencing the effectiveness of relationship marketing: a meta-analysis. J Mark 70:136–153
65. Celly KS, Frazier GL (1996) Outcome-based and behavior-based coordination efforts in channel relationships. J Mark Res 33:200–210
66. Scheer L, Miao C, Garrett J (2010) The effects of supplier capabilities on industrial customers' loyalty: the role of dependence. J Acad Mark Sci 38:90–104
67. Moorman C, Deshpande R, Zaltman G (1993) Factors affecting trust in market research relationships. J Mark 57:81–101
68. Spake DF, Megehee CM (2010) Consumer sociability and service provider expertise influence on service relationship success. J Serv Mark 24:314–324

69. Ming-Tien T, Chao-Wei C, Cheng-Chung C (2010) The effect of trust belief and salesperson's expertise on consumer's intention to purchase nutraceuticals: applying the theory of reasoned action. Soc Behav Personal Int J 38:273–287
70. Thong JYL, Yap C-S (1994) Engagement of external expertise in information systems implementation. J Manag Inf Syst 11:209–231
71. Johnson D, Grayson K (2005) Cognitive and affective trust in service relationships. J Bus Res 58:8
72. Darr ED, Kurtzberg TR (2000) An investigation of partner similarity dimensions on knowledge transfer. Organ Behav Hum Decis Process 82:28–44
73. Nicholson C, Compeau L, Sethi R (2001) The role of interpersonal liking in building trust in long-term channel relationships. J Acad Mark Sci 29:3–15
74. Ring P, Van de Ven A (1994) Developmental processes of cooperative interorganizational relationships. Acad Manag Rev 19:90–118
75. Robson MJ, Katsikeas CS, Bello DC (2008) Drivers and performance outcomes of trust in international strategic alliances: the role of organizational complexity. Organ Sci 19:647–665
76. Gefen D (2004) What makes an ERP implementation relationship worthwhile: linking trust mechanisms and ERP usefulness. J Manag Inf Syst 21:263–288
77. Fisher RJ, Maltz E, Jaworski BJ (1997) Enhancing communication between marketing and engineering: the moderating role of relative funcational identification. J Mark 61:54–70
78. Hartwick J, Barki H (2001) Communication as a dimension of user participation. Prof Commun IEEE Trans 44:21–36
79. Mitręga M, Katrichis JM (2010) Benefiting from dedication and constraint in buyer–seller relationships. Ind Mark Manage 39:616–624
80. Giddens A (1990) The consequences of modernity. Strandford University Press, Strandford
81. de Ruyter K, Moorman L, Lemmink J (2001) Antecedents of commitment and trust in customer-supplier relationships in high technology markets. Ind Mark Manage 30:271–286
82. Anderson JC, Narus JA (1990) A model of distributor firm and manufacturer firm working partnerships. J Mark 54:42–58
83. Becerra-Fernandez I, Sabherwal R (2001) Organizational knowledge management: a contingency perspective. J Manag Inf Syst 18:23–55
84. Park J-G, Lee J (2014) Knowledge sharing in information systems development projects: explicating the role of dependence and trust. Int J Project Manage 32:153–165
85. Reynolds KE, Beatty SE (1999) Customer benefits and company consequences of customer–salesperson relationships in retailing. J Retail 75:11–32
86. De Kristof W, Gaby O-S, Iacobucci D (2001) Investments in consumer relationships: a cross-country and cross-industry exploration. J Mark 65:33–50
87. Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol 88:879–903
88. Armstrong JS, Overton TS (1977) Estimating nonresponse bias in mail surveys. J Mark Res 14:396–402
89. Gefen D, Straub DW, Boudreau M-C (2000) Structural equation modeling and regression: guidelines for research practice. Commun AIS 4:1–79
90. Barclay C, Osei-Bryson K-M (2009) Toward a more practical approach to evaluating programs: the multi-objective realization approach. Project Manag J 40:74–93
91. Hair J Jr, Anderson R, Tatham R, Black W (1995) Multivariate data analysis: with readings. Prentice-Hall, Upper Saddle River
92. Chin WW (1998) The partial least squares approach for structural equation modeling. In: Marcoulides GA (ed) Methodology for business and management. Lawrence Erlbaum Associates Publishers, Mahwah, pp 295–336
93. Massey GR, Kyriazis E (2007) Interpersonal trust between marketing and R&D during new product development projects. Eur J Mark 41:1146–1172
94. Park J, Lee J, Lee H, Truex D (2012) Exploring the impact of communication effectiveness on service quality, trust and relationship commitment in IT services. Int J Inf Manage 32:459–468