Communication effectiveness on IT service relationship quality

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Abstract
Purpose – This study aims to investigate the effect of communication effectiveness (CE) on service quality (SQ) leading to relationship quality (RQ) in IT service relationships.

Design/methodology/approach – CE was decomposed into frequency, bi-directionality and quality of communication while SQ was decomposed into functional and technical qualities, and RQ into trust and relationship commitment. An empirical study is conducted testing the nomological research model consists of these dimensions, using survey method collecting data from 144 subjects.

Findings – The findings indicate that good SQ can impact relationship commitment only via the clients' trust, but not directly. Influence of functional quality is stronger on trust but technical quality also maintains significant impact. Detailed findings imply that, while communication is important element influencing perceptions of SQ, quality of bi-directional communication is more critical than simple but frequent communication.

Originality/value – This study explores the direct impact of CE on SQ leading to RQ in IT service context. Previous studies rarely tested the impacts of functional and technical SQ, simultaneously. Findings of this study add values to research on service relations as well as IT services research in terms of differentiating functional and technical service qualities.

Keywords Trust, Service quality, Communication effectiveness, IT services, Relationship commitment

1. Introduction
Information technology (IT) service is a knowledge-based service that demands close collaboration between business professionals and technology experts. Throughout IT service processes, technology experts provide technological consultation based on domain knowledge elicited and obtained from the business professionals – the clients. They need to work together closely to solve business problems that they are facing using technological solutions. In this regard, IT service processes, by definition, require in-depth involvement and close collaboration between IT experts and clients. IT service has different aspects of user behavior from other engineering or technical services. IT users or clients often have more fluent business knowledge than IT knowledge and use his/her IT system directly. So IT experts should depend on their clients. However, engineering services such as car maintenance service do not need to meet relationship between their clients.

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Effective communication between service exchange partners helps participants share useful and critical information and knowledge with each other in providing solutions of unfamiliar problems (Moorman et al., 1993). Particularly in those services that involve frequent and knowledge intensive interactions between clients and providers, such as IT services, the service provider’s communication competencies play important roles in forging a sustainable relationship (Rafaeli, 1993). And it is important to analyze the routes through which perceived service quality (SQ) influences trust and relationship commitment. Because, it is difficult to change the service provider for a certain period of time once the client chooses a service provider, due to the nature of IT services.

In this regard, a research model is posited here that the communication effectiveness (CE) is positively associated with perceived SQ, leading to relationship quality (RQ) in IT service relationships. Through literature review, each construct is, theoretically, decomposed into subcomponents. An empirical analysis is conducted in order to test the relationships among these constructs. Despite abundance of research on communications, there have been few studies concerning the theoretical and empirical relationships among CE, perceived SQ, and RQ, especially in the context of IT services.

 Literatures are briefly reviewed in the next section with detail explication of research model and constructs, followed by research design and procedural description of research process. Findings from the analysis of data collected from the survey are explained in detail in the next section followed by implications and limitations of this study.

2. Literature review

In IT services, where intangible, knowledge-based professional services are provided, effective communication throughout the process appears to play a critical role in gaining longer-term trust and commitment from clients; these feelings of commitment and trust are critically dependent on the perceived quality of services already provided or being provided (de Brabander and Thiers, 1984; Massey and Kyriazis, 2007; Park et al., 2012; Sharma and Patterson, 1999). Based on reviews of service and relationship research, Aurier and N’Goala (2010) concluded that a causal relationship exists in marketing whereby better evaluation of services leads to better RQ via value and satisfaction. Therefore, CE is an antecedent of perceived SQ, and this relational chain extends towards RQ.

2.1 Communication effectiveness

In this research, communication can be defined as a series of processes through which groups share and generate information in order to promote common interests (Rogers, 1981). CE, which represents the achievement of an intended outcome of communication, is an important factor that influences an IT department’s SQ, trust, and relationship commitment (Park et al., 2012). Communication behaviors associated with the sharing and exchange of information improve organizational effectiveness (Tzafrir et al., 2004).

This role of communication is also applicable to the interaction between IT experts and clients in IT service environments. de Brabander and Thiers (1984) argued that effective communication between IT experts and service users ultimately contributes to improving users’ satisfaction in the information systems (IS) development process. Massey and Kyriazis (2007) measured three underlying dimensions of CE: communication frequency, bi-directional communication, and communication quality.
Communication frequency referred to the number of communication events per unit time; bi-directional communication represented the degree to which a two-way communication process occurred between IT experts and clients; and communication quality was defined as the extent to which appropriate and useful information was provided through communication.

Each dimension plays its own role in making effective communication. As communication frequency increases within an organization, more extensive sharing of ideas occurs between the business and IT departments, and their capabilities are combined accordingly to promote business efficiency (Reich and Benbasat, 2000). Bi-directional communication allows information to be shared on a mutual, give-and-take basis during joint problem-solving or decision-making, and it thus has a positive impact on CE (Fisher and Maltz, 1997). And making communication effective depends on the communication quality – how properly a message has been delivered – rather than the communication behavior itself. Since communication does not take place simply because one party thinks he/she has communicated; rather, it only occurs when the listener has understood the speaker’s intended message (Service, 2005).

2.2 SQ, specifically IT SQ
SQ has been defined as “a customer’s judgment of a service’s overall excellence or superiority” (Zeithaml, 1988), “a perceived judgment, resulting from an evaluation process where customers compare their expectations with the service they have perceived” (Gronroos, 1984), or “a global judgment or attitude relating to the superiority of a specific service” (Parasuraman et al., 1988).

It is generally agreed that SQ comprises multiple dimensions, but there are a variety of opinions about the elements and constructs that compose each dimension (Brady and Cronin, 2001). Gronroos (1984) divided SQ into two components: technical quality related to the service itself (what to serve) and functional quality related to how the service is provided. Based on previous studies, the quality of IT services can be measured using IS-SERVQUAL (Kettinger and Lee, 1994) to concentrate on functional quality as well as on technical quality related to system quality (e.g. response time and system reliability) and information quality (e.g. completeness, ease of understanding, and security) (DeLone and McLean, 2003; Landrum and Prybutok, 2004).

Swan and Combs (1976) categorized attributes of quality into two categories: instrumental and expressive. Instrumental attributes refer to the physical performance of an offering and expressive attributes derive from psychological performance. They suggested that expressive attributes tend to have a greater positive effect on satisfaction than instrumental ones when performed well. Otherwise, instrumental attributes lead to a more distinct negative effect resulting in dissatisfaction in case of low performance.

Parasuraman et al. (1985) also suggested similar distinction with different domains: outcome quality and process quality. Outcome quality is a measure of service performance after the service has been completed, whereas process quality is a measure of performance while the service is being delivered. Kang (2006) tested the process and outcome quality of mobile phone users and found that the two-component model yields better fit than a model concentrating on process quality alone.

Park et al. (2012) based on Gronroos (1984) suggested model stated that IT SQ, as experienced by a IT user, is composed of two dimensions: technical SQ and functional SQ. The functional SQ takes into account the way a service is provided (i.e. courtesy,
attention, promptness, professionalism, and so on), whereas the technical SQ refers to the result of the service as such (i.e. information quality, system quality and so on).

In the regard, Gronroos (1984) and Park et al. (2012) provide theoretical explanations as to why SQ should be categorized in the way they were proposed and their SQ model is employed in this study.

2.3 Relationship quality
Good perceived RQ which is built from the interaction between customer and provider has positive impact on customer’s loyalty or repurchase intention (Moliner et al., 2007). RQ consists of trust and commitment (Morgan and Hunt, 1994). Morgan and Hunt (1994) argued that relational commitment and trust are the most important factors in relational exchange.

Trust. In examining the relationship between service providers and clients, trust becomes a source of confidence in the honesty and reliability of exchange partners (Crosby et al., 1990). Mutual trust between IT service providers and clients contribute to increased levels of shared knowledge (Nelson and Cooprider, 1996). In the IT service environment, where IS are developed and maintained, trust plays a more important role in increasing reciprocity when an interdependent relationship exists as a result of continued services (Chakrabarty et al., 2007).

Commitment. Commitment can be defined as an enduring desire to maintain valuable relationships or a psychological state characterized by the intention to maintain long-term relationships (Moorman et al., 1993). Along with trust, it has been considered a critical variable of RQ (Morgan and Hunt, 1994). A high level of affective commitment corresponds with devotion to maintaining the relationship (Bendapudi and Berry, 1997).

Sharma and Patterson (1999) suggested that clients’ relationship commitment towards a service provider functions as a way to perceive the service provider’s performance. Relationship commitment has also been considered the final factor that determines the level of clients’ voluntary participation in IT services (Carr, 2006).

3. Research model and hypotheses development
Sharma and Patterson (1999) insisted that CE affects relationship commitment by way of SQ and trust. Aurier and N’Goala (2010) also support the causal relationship between SQ and RQ. In this regard, this study proposes a research model that depicts the relationships of each variable and its specific dimensions based on the relational chain of CE → SQ → RQ (Figure 1).

3.1 CE towards IT SQ
This paper views CE in the context of IT services as an antecedent that influences SQ and attempts to analyze these relations using the three dimensions of CE discussed above. Hypotheses are developed in the following section.

Communication frequency. Communication frequency refers to how often information is exchanged between different functional areas of an organization over a certain period of time (Fisher and Maltz, 1997). Park et al. (2012) analyzed the impacts of CE on SQ, trust, and relationship commitment from the perspective that communication frequency and effectiveness constitute both functional and technical SQ in professional services. Watson et al. (1998) identified communication with clients
as one of the factors that contribute to improving the quality of IS services, arguing that candid and frequent communication inspires trust and confidence in IS and ultimately helps improve SQ.

Frequent communication can provide the clients with more chance to contact with IT experts when they want. This timely interaction may help the clients perceive good quality of service delivery (functional quality):

**H1.** Communication frequency is positively associated with the perceived functional quality of IT services.

The perceived SQ is influenced by a wide range of information that service experts provide about services (Sharma and Patterson, 1999). The more communication occurs, the more information can be shared. With this shared information, IT expert can recognize clients’ expectation of the service output and provide better technical quality:

**H2.** Communication frequency is positively associated with the perceived technical quality of IT services.

**Bi-directional communication.** The bi-directionality of communication can be defined as the degree to which two-way communication occurs between parties (Fisher and Maltz, 1997). Bennett and Barkensjo (2004) suggested that, in the relationship between service providers and clients, higher levels of bi-directional communication should raise clients’ perceptions of IT SQ.

Bi-directional communication promotes collaboration and feedback during the problem solving process. Collaborative work and feedback may help more clients’ participation and better perceived functional quality. Bennett and Barkensjo (2004) suggested the quality of two-way communication should be raised to improve client-perceived functional SQ:

**H3.** The degree of bi-directional communication is positively associated with the perceived functional quality of IT services.
Bi-directional communication also facilitates problem solving between different parties (Massey and Kyriazis, 2007). Solving clients’ problems increases the chance that clients meet desired outcome. Thus, bi-directional communication relates to the perceived outcome quality by way of clients’ problem solving:

\[ H4. \] The degree of bi-directional communication is positively associated with the perceived technical quality of IT services.

**Communication quality.** Communication quality is a measure of how reliable, understandable, appropriate, and useful the information provided through communication is judged to be. Communication quality has also been emphasized as an antecedent of IS success. Salaway (1987) empirically showed that quality of interaction is an important determinant of systems success. Furthermore, Sharma and Patterson (1999) argued that effective communication by service experts plays a key role in shaping clients’ perceptions of the functional and technical quality of services with which they are provided.

Shelby (1998) proposed that communication quality is composed of three quality attributes, correctness (technical quality), audience adaptation (functional quality), norm-based preferences (aesthetic quality). From this perspective, audience adaptable communication and aesthetic communication can improve functional SQ because the two attributes relate to how communication was made in an audience-friendly way. Park et al. (2012) proposed that communication quality of IT service provider has stronger impact on functional quality than technical quality because clients would benefit greatly from the information and knowledge exchanged during the service process itself:

\[ H5. \] Communication quality is positively associated with the perceived functional quality of IT services.

From the Shelby’s (1998) perspective, correctness of communication can have a positive impact on service outcome by helping appropriate information be transferred to clients. Özbek and Yuldashev (2010) stated that communication between supervisor and subordinate positively affects the subordinate’s self-perceived outcomes of SQ:

\[ H6. \] Communication quality is positively associated with the perceived technical quality of IT services.

3.2 IT SQ towards RQ

**On trust.** Chakrabarty et al. (2007) and Carr (2006) reported a positive relationship between the quality of IT services and trust in IT service context. Sharma and Patterson (1999) considered both the functional and technical quality of IT services in describing the relationship between SQ and trust, and their study empirically shows that these two factors play important roles in building trust.

The functional quality of IT services presented and revealed during the IT service process itself is related to the direct help that clients receive in solving business problems with technology or seeing the future prospects of systems under development. The perceptions formed during this process may lead clients to believe and trust IT experts or to disbelieve and distrust them if the perceived quality is below expectations.

The technical quality of IT services, which is generally revealed during the assessment of outcomes through consultation processes such as system modules or...
related documentation, may work as an instantaneous trigger of service perception as clients critically review the delivered results. This technical SQ may also have a direct impact on forming perceptions of trust:

\[ H7. \text{ The functional quality of IT services is positively associated with the client's trust in IT experts.} \]

\[ H8. \text{ The technical quality of IT services is positively associated with the client's trust in IT experts.} \]

On relationship commitment. Wetzels et al. (1998) analyzed the direct and indirect impacts of SQ on relationship commitment, considering the two dimensions of SQ – functional quality and technical quality – and the two dimensions of relationship commitment – affective commitment and calculative commitment. Eisingerich and Bell (2007) reported that functional quality and technical quality have direct and indirect impacts on consumers’ repurchase intentions by way of trust. Thus, relationship commitment is a major dependent variable of service success:

\[ H9. \text{ The functional quality of IT services is positively associated with the client's relationship commitment.} \]

\[ H10. \text{ The technical quality of IT services is positively associated with the clients' relationship commitment.} \]

3.3 Within RQ: from trust to commitment
Most studies related to relationship marketing conclude that trust has a positive impact on commitment (Crosby et al., 1990). Aurier and N’Goala (2010) also provided support for this conclusion by demonstrating that numerous studies dealing with relationship marketing theory focus on the causal chain of “satisfaction $\rightarrow$ trust $\rightarrow$ relationship commitment”. Dwyer et al. (1987) asserted that when participants in an exchange relationship trust each other, they are able to settle difficult issues such as power, conflicts and low profitability; therefore, trust induces commitment, the highest level of relational exchange. Sharma and Patterson (1999) stated that trust in experts who provide advice on services leads to increased relationship commitment, or emotional attachment, to experts. Likewise, trust in IT experts can be said to have a positive impact on relationship commitment to IT service managers (Carr, 2006):

\[ H11. \text{ Trust in IT experts is positively associated with the client's relationship commitment to them.} \]

4. Research method
4.1 Survey measures
Measures were mostly adopted from prior research. Consistent with Massey and Kyriazis (2007), the CE construct was measured through three sub-constructs. Technical SQ was measured with five items adapted from Park et al. (2012), while functional SQ was measured with four items from IS-SERVQUAL (Park et al., 2012). Trust and relationship commitment measures were adapted from Carr (2006). All of the items were evaluated by a five-point Likert-type scale, where 1 represents “strongly disagree” and 5 represents “strongly agree”. Measures are included in the Appendix.
4.2 Survey sample
This study obtained data from team members currently working in a globalized IT service firm. This IT service firm provides various IT service worldwide such as system development and consulting services exceeded US$2.7 billion sales volume in 2012. Its business activities span 152 different companies with 7,850 employees. For convenience reasons along with permissions, participants were only solicited from six clients sites – mostly electronic manufacturing.

Participation was solicited by e-mails sent to 250 individuals who had been involved in 42 different systems development projects for their operational systems during 2011. E-mail included an address to the internal web site where the online questionnaire had been uploaded. Data were collected for the month of September 2011, and a total of 144 questionnaires were returned. Sample demographics are shown in Table I.

4.3 Analysis method
This study used partial least squares (PLS) to evaluate the proposed model and its hypotheses for the following reasons. First, it is suitable for assessing theories of development stage. Second, it requires minimal sample size as opposed to other SEM techniques. The size of our sample for analysis was acceptable at a modest level, making the PLS appropriate for testing our model (Chin et al., 2003). We conducted our analysis in three steps. First, we examined the psychometric properties of the measures using confirmatory factory analyses after pretesting measures. Second, we performed statistical tests to examine the appropriateness validity and reliability. At the same time, we checked the common-method bias. Finally, we tested hypotheses by testing the model.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Category</th>
<th>Sample</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>IT display company</td>
<td>27</td>
<td>18.8</td>
</tr>
<tr>
<td></td>
<td>Phone and device company</td>
<td>27</td>
<td>18.8</td>
</tr>
<tr>
<td></td>
<td>LED and components company</td>
<td>29</td>
<td>20.1</td>
</tr>
<tr>
<td></td>
<td>IT chemical and material company</td>
<td>32</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>IT equipment company</td>
<td>13</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>IT semiconductor company</td>
<td>16</td>
<td>11.1</td>
</tr>
<tr>
<td>Experienced IS project</td>
<td>Enterprise resource planning</td>
<td>47</td>
<td>32.6</td>
</tr>
<tr>
<td></td>
<td>Product data management</td>
<td>17</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td>Enterprise portal</td>
<td>6</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>Manufacturing execution system</td>
<td>52</td>
<td>36.1</td>
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<td></td>
<td>Human resource management</td>
<td>11</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>Purchase system</td>
<td>11</td>
<td>7.6</td>
</tr>
<tr>
<td>Work experience (years)</td>
<td>Less than 3</td>
<td>63</td>
<td>43.8</td>
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<tr>
<td></td>
<td>3-5</td>
<td>25</td>
<td>17.4</td>
</tr>
<tr>
<td></td>
<td>6-10</td>
<td>35</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>11-15</td>
<td>8</td>
<td>5.6</td>
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<tr>
<td></td>
<td>More than 15</td>
<td>13</td>
<td>9.0</td>
</tr>
<tr>
<td>Jobs</td>
<td>Accounting and planning</td>
<td>12</td>
<td>8.3</td>
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<tr>
<td></td>
<td>HR and general affairs</td>
<td>17</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td>Manufacture and purchase</td>
<td>73</td>
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<td>IT</td>
<td>5</td>
<td>3.5</td>
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<td>Marketing and sales</td>
<td>8</td>
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<tr>
<td></td>
<td>Research and development</td>
<td>29</td>
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</tr>
<tr>
<td></td>
<td>Sum</td>
<td>144</td>
<td>100</td>
</tr>
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</table>

Table I. Summary of sample profile
A qualitative pretest was conducted with five client personnel within the same sampling frame as in the primary data collection. Several modifications were made in terms of word sequencing and syntactical errors based on their feedback, but no major changes were made in the pretest. 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 (Armstrong and Overton, 1977). The comparative assessment revealed no significant differences in demographics and study variables.

To control for multicollinearity, the variance inflation factors of the variables and interaction were calculated and inspected. The variables and interactions yielded values between 1.34 and 3.26, indicating the absence of serious multicollinearity problems (Kleinbaum et al., 2007). Threats of common methods bias were assessed using Harman’s one-factor test (Podsakoff et al., 2003). Following the procedure recommended by Podsakoff et al. (2003), 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 29.9 percent of the total variance. This collectively suggests that our results are not due to common methods bias.

5. Analysis and results

PLS analysis is that it can evaluate a theoretical structural model and a measurement model simultaneously (Chin et al., 2003). SmartPLS software was used in a two-stage approach, measurement and structural model testing.

5.1 Measurement model

Assessment of the measurement model involves evaluations of reliability, convergent validity, and discriminant validity of the construct measures. Generally, if the factor loading of each measurement item onto its construct is more than 0.7, the measurement item is considered valid (Chin et al., 2003). Factor loadings of more than 0.7 for each measurement item indicate the convergent validity, as can be seen in Table II. To evaluate discriminant validity, the average variance extracted (AVE) can be used. The square root of AVE for each construct should be greater than the correlations among the constructs in order for measures to be discriminantly valid. Table III shows the correlations among the constructs, and the values in the diagonal are the square roots of the AVE. Square-rooted AVEs were greater than all of the other correlation coefficients. Thus, it can be concluded that the measurement model demonstrated adequate discriminant validity.

Reliability was examined using Cronbach’s α (α) and composite reliability. As indicated in Table II, Cronbach’s α exceeded 0.8 for each construct. AVE indicates the amount of variance in the measurement items accounted for by the latent construct. It is generally more conservative than Cronbach’s α and should be 0.5 or higher to establish the composite reliability of measures (Fornell and Larcker, 1981). As shown in Table III, all of the AVE values are greater than 0.50. Therefore, it can be concluded that the individual measurement items reliably measure the relevant constructs.
5.2 Structural model

In the next stage, the proposed hypotheses were tested using a bootstrap significance test for inter-variable paths using PLS. Results of the PLS analysis are shown in Figure 2. The path coefficients were the standardized beta coefficients from the PLS analysis.

Bi-directional communication had a significant and positive relation to functional SQ ($\beta = 0.396, p < 0.01$) and technical SQ ($\beta = 0.354, p < 0.01$). Communication quality was found to have a significant positive relationship with functional SQ ($\beta = 0.457, p < 0.01$) and technical SQ ($\beta = 0.272, p < 0.01$). Therefore, H3-H6 were supported as expected. However, the paths from communication frequency (H1 and H2), surprisingly,

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>Factor loading</th>
<th>Cronbach’s $\alpha$</th>
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<td>Communication frequency</td>
<td>CF1</td>
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<td>CF2</td>
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<td></td>
<td>CF3</td>
<td>3.368</td>
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<td>0.855</td>
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<td>CQ3</td>
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<td>Relational commitment</td>
<td>RC1</td>
<td>3.764</td>
<td>0.989</td>
<td>0.957</td>
<td>0.932</td>
</tr>
<tr>
<td></td>
<td>RC2</td>
<td>3.757</td>
<td>0.970</td>
<td>0.953</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RC3</td>
<td>3.694</td>
<td>0.933</td>
<td>0.903</td>
<td></td>
</tr>
</tbody>
</table>

Table II. Factor loadings and Cronbach’s $\alpha$

<table>
<thead>
<tr>
<th>Construct</th>
<th>AVE</th>
<th>Composite reliability</th>
<th>CF</th>
<th>BC</th>
<th>CQ</th>
<th>TSQ</th>
<th>FSQ</th>
<th>TS</th>
<th>RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication frequency</td>
<td>0.765</td>
<td>0.907</td>
<td>0.875</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bi-directional communication</td>
<td>0.844</td>
<td>0.942</td>
<td>0.455</td>
<td>0.918</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Communication quality</td>
<td>0.805</td>
<td>0.925</td>
<td>0.512</td>
<td>0.718</td>
<td>0.897</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional SQ</td>
<td>0.916</td>
<td>0.978</td>
<td>0.410</td>
<td>0.727</td>
<td>0.746</td>
<td>0.957</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical SQ</td>
<td>0.797</td>
<td>0.952</td>
<td>0.354</td>
<td>0.574</td>
<td>0.554</td>
<td>0.669</td>
<td>0.893</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>0.852</td>
<td>0.945</td>
<td>0.409</td>
<td>0.732</td>
<td>0.671</td>
<td>0.706</td>
<td>0.643</td>
<td>0.923</td>
<td></td>
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<tr>
<td>Relational commitment</td>
<td>0.880</td>
<td>0.957</td>
<td>0.405</td>
<td>0.636</td>
<td>0.506</td>
<td>0.602</td>
<td>0.543</td>
<td>0.690</td>
<td>0.938</td>
</tr>
</tbody>
</table>

Table III. Discriminant validity

5.2 Structural model

In the next stage, the proposed hypotheses were tested using a bootstrap significance test for inter-variable paths using PLS. Results of the PLS analysis are shown in Figure 2. The path coefficients were the standardized beta coefficients from the PLS analysis.

Bi-directional communication had a significant and positive relation to functional SQ ($\beta = 0.396, p < 0.01$) and technical SQ ($\beta = 0.354, p < 0.01$). Communication quality was found to have a significant positive relationship with functional SQ ($\beta = 0.457, p < 0.01$) and technical SQ ($\beta = 0.272, p < 0.01$). Therefore, H3-H6 were supported as expected. However, the paths from communication frequency (H1 and H2), surprisingly,
were not supported. Functional SQ was found to have a significant positive relationship with trust ($\beta = 0.500$, $p < 0.01$). Likewise, technical SQ had a significant positive relationship with trust ($\beta = 0.308$, $p < 0.01$). Therefore, $H7$ and $H8$ were supported. Regarding $H9$ and $H10$, which deal with the relation between technical SQ and relationship commitment, the resulting coefficient did not provide support. Trust maintained a positive impact on relationship commitment ($\beta = 0.581$, $p < 0.01$), supporting $H11$.

Squared multiple correlations ($R^2$) for endogenous constructs are shown in Figure 1. $R^2$ measures the percent of variance explained by independent constructs in the model. Independent constructs were found to explain a substantial portion of the variance in dependent constructs. CE explained 66.2 percent of variances in functional SQ and 37.3 percent of variances in technical SQ. In addition, SQ was found to explain 55.1 percent of the variance in trust, and trust accounted for 50.7 percent of the variance in relationship commitment.

5.3 Results
Testing the posited research model against collected data revealed that bi-directional communication and quality of communication maintained significant impacts on perceived functional and technical SQ in IT services, while the path from communication frequency was found to be statistically insignificant. In addition, perceived functional and technical service qualities were found to have a positive impact on trust, subsequently leading to relationship commitment while the direct paths from service qualities towards the relationship commitment were found to be insignificant.

These findings correspond with the results of the previous studies regarding CE and relationship commitment in professional services (Sharma and Patterson, 1999) in which CE was found to be a key driver of functional and technical quality of services. It seems that in IT services in which knowledge exchange plays a critical role for project success, effective communication between service providers and clients would be critically impact the relationship commitment via raising the level of perceived SQ, functional and technical.
It is noteworthy that the hypotheses (H9 and H10) regarding the direct paths of both service qualities on relationship commitment were not supported. It implies that good SQ may build the commitment only after building trust in the clients’ mind. As trust building requires more than providing functionally and technically sound service, it seems to be a fruitful area for future research explicating other factors and mechanisms in building trust including quality measures of services.

It is also notable that communication frequency was found to be statistically insignificantly associated with both IT service qualities (H1 and H2). While, in this study, communication is confirmed as the important driver for SQ and relationship commitment in IT service context, simple frequent communication would not suffice in raising the commitment level. It can be interpreted as above-normal or inappropriate levels of communication frequency may have a negative impact on SQ and further down the road, on relationship commitment. Too much communication would hurt the SQ due to the overflow of information, but intuitively, too less communication would also hurt the perceived SQ due to the lack of information delivery within the relationship. It would be nice to find out appropriate level of communication frequency in further researches using more samples in a longitudinal context of IT services.

6. Conclusions
6.1 Theoretical and managerial implications

What distinguishes this study from previous studies in IT service context is its attempt to analyze the quality of IT services in two separate but closely related dimensions: functional and technical service qualities. In marketing research, it is already well accepted that SQ consists of multiple dimensions (Berry et al., 1985; Gronroos, 1984; Kang, 2006; Parasuraman et al., 1985; Yoon and Suh, 2004), though it is rarely the case in IT service research. Even the IS-SERVQUAL that has been widely used to measure the quality of IT services has been criticized because it emphasizes only functional quality as a measure for delivery processes of IT services while paying little attention to technical quality, which is relevant to service outcomes.

IT service is rather a knowledge intensive service in which actual outcome – the technical outcome – is not volatile as can be found in other traditional services, such as restaurant. Most cases of the IT service outcomes are being used as a basis for next step. The outcome might be some systems or specifications of systems that further along the road systems may be built on. Even in studies concerning product performance and customer satisfaction, multiple aspects of customer assessment for continuous use had been discussed, such as in Swan and Combs’s (1976) instrumental and expressive aspects of product use. Analogically functional dimension approximates “instrumental” aspect while technical approximates “expressive” side of SQ.

Nonetheless, findings of this study reveals the stronger impact of functional SQ than technical service on trust (β = 0.500 versus 0.308). This may justify the wide use of IS-SERVQUAL in measuring IT SQ in which only functional SQ measures are prevalent, mostly neglecting the technical side of the IT SQ. However, it should be noted here that the impact of technical SQ on trust was not negligible. Though this may sound tautological, in order to increase the power of explanation and precision, both dimensions of the IT SQ would better be measured in future studies.

Aside from the academic contributions explained above, for practitioners, findings of this study have multiple implications. First of all, as IT service
encounter is a knowledge intensive process throughout an extensive period of time among members with different specialties and backgrounds, good quality interaction at service encounter is critically important in maintaining client relations. Bi-directional communication seems to be much more important that the number of communicative interactions. Quality interactive relationship as partners may guarantee reciprocally beneficial outcome such as sustained strategic partnership between business firms and IT service firms leading to growing and prosperous relations in the coming age of information and knowledge. In the information society, IT service is one of the critical professional services providing longer term and direct benefits to business clients and the sustenance of this relationship can only be made possible via continuous exchanges of information, knowledge, and expertise. Therefore, functional SQ is critical for gaining trust and relationship commitment, but at the same time, given that IT service aims to produce systems for actual use, technical SQ is also critical in longer-term relationship maintenance. For IT services to be successful in longer terms, they need to focus on well-serving the clients (functional SQ) as well as producing good outputs and outcomes (technical SQ).

6.2 Limitations and future research
First of all, findings of this study is based on cross-sectional data points collected from a single IT service firm, though data points were spread over 42 project teams across six different clients. As cultures and business processes may be different from firm to firm, findings of this study may be limited to the selected firm, though it was an internationalized mega firm of IT services.

Also, though conjecture had been made concerning the nature and longevity of the client relationship, findings of this study may need to be confirmed and reinforced by longitudinal studies observing behavioral changes of firms during longer term periods. If feasible, analysis of all clients with continuous commitments as well as intermittent commitments would be needed to find out what really drives the strategic partnership between business and IT service firms along the growth of their own businesses.

References


Appendix

Communication effectiveness (Massey and Kyriazis, 2007):

(1) Communication frequency:
   CF1: I frequently communicated with him/her through phone conversations.
   CF2: I frequently communicated with him/her through electronic mail.
   CF3: I frequently communicated with him/her through scheduled one-on-one meetings (face-to-face).

(2) Bi-directional communication:
   BC1: He/she always responded to my communication.
   BC2: He/she provided me with a large amount of feedback.
   BC3: There was much two-way communication between him/her and myself.

(3) Communication quality:
   CQ1: The information provided by him/her was very useful for my work.
   CQ2: I was very satisfied with the content of the information provided him/her.
   CQ3: The information provided by him/her was highly relevant to my work.

Functional service quality (Park et al., 2012):
   FQ1: He/she kept promises on deadlines and due dates.
   FQ2: He/she provided prompt service.
   FQ3: He/she instilled confidence in you.
   FQ4: He/she gave me individualized attention.

Technical service quality (Park et al., 2012):
   TQ1: The system provided reliable information.
   TQ2: The system provided sufficient information.
   TQ3: The system was designed with flexibility.
   TQ4: The information provided by the system was accurate.
   TQ5: The information provided by the system was useful.

Trust (Carr, 2006):
   TR1: He/she was open and honest when problems occurred.
   TR2: He/she had high integrity.
   TR3: He/she helped me to make critical decisions.

Relationship commitment (Carr, 2006):
   RC1: I feel somewhat of an emotional bond with her/him.
   RC2: I would like to continue to work with her/him because I like being associated with him/her.
   RC3: I would like to continue to work with her/him in future projects because I genuinely enjoy relating to him/her.

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