Substructures of perceived knowledge quality and interactions with knowledge sharing and innovativeness: a sensemaking perspective

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Abstract

Purpose – *The purpose of this paper is to bridge the gap by addressing the substructures of perceived knowledge quality (PKQ) drawn upon the theory of sensemaking. It also examines interactions of the substructures which, in turn, have differing impacts on innovativeness. Additionally, this study illustrates which PKQ substructure is most affected by knowledge sharing. PKQ has become imperative, not an option, for innovativeness in the environment characterized by knowledge overload. However, there is little research on PKQ due to its abundant, variable nature.*

Design/methodology/approach – *The survey methodology was used to collect data. A total of 368 individuals in the USA participated in the study. The partial least squares analysis for structural equation modeling was used to test the research model.*

Findings – *Perceived intrinsic knowledge quality is most affected by knowledge sharing, while knowledge sharing is a critical determinant of three PKQ substructures (i.e. perceived intrinsic, contextual and actionable knowledge quality). Perceived intrinsic knowledge quality, however, is inadequate by itself and should be transformed into perceived contextual, actionable knowledge quality to produce innovativeness.*

Research limitations/implications – *This study addresses the shortfall of understanding the dynamics of PKQ's substructures and unfolds theoretical links to knowledge sharing and innovativeness.*

Practical implications – *This study offers valuable insights to managers who face ongoing challenges in sharing knowledge and improving knowledge quality, thereby leading their quality of knowledge into innovativeness.*

Originality/value – *Despite growing recognition, few empirical studies on PKQ are present in the literature. This study contributes to understanding a holistic view of PKQ and its substructures with unique relationships by knowledge sharing and innovativeness.*

Keywords *Knowledge sharing, Innovativeness, Perceived actionable knowledge quality, Perceived contextual knowledge quality, Perceived intrinsic knowledge quality, Perceived knowledge quality*

Paper type *Research paper*

Introduction

The knowledge-based view of the firm holds that knowledge is the foundation of a firm's primary value, and thus, organizations undertake effective mechanisms to make better use of the intellectual capital (Alavi and Leidner, 2001; Choi *et al.*, 2010; Hsu and Sabherwal, 2012). The advancements of information systems (ISs) have particularly facilitated social actors to have easy, ubiquitous access to a significant amount of knowledge. However, they grow discouraged by the credibility or relevance of knowledge, and lower use of knowledge repositories is a problem (Durcikova and Gray, 2009; Majchrzak *et al.*, 2013). Extant research illustrates that "knowledge spillovers are not the main driver of innovation" (Belenzon and Berkovitz, 2010), and knowledge can be "both a source of and a barrier to innovation" (Carlile, 2002). Amid a flood of knowledge, the old adage, "knowledge is

Received 26 September 2013
Revised 7 February 2014
5 March 2014
Accepted 6 March 2014

power", is not always the case. Rather, it is more appropriate to claim that quality of knowledge brings power. Literature recognizes that the identification of high-quality knowledge is a challenge due to the abundant, variable nature of knowledge quality (Poston and Speier, 2005; Yoo *et al.*, 2011). As such, there is a strong need for capturing the richness and diversity of perceived knowledge quality (PKQ).

As data, information and knowledge have a hierarchical structure, data and information quality have received wide attention (Nelson *et al.*, 2005; Xu *et al.*, 2013). In addition, studies have begun examining PKQ, which is defined as the extent to which an individual believes that knowledge has accurate content which meets his/her needs (Durcikova and Gray, 2009). PKQ in research, however, has been understudied, although knowledge overload is an increasing problem. What constitutes PKQ and how do its substructures interact with one another? What influence does each PKQ substructure, separately and in combination, have on innovativeness? What is the role of knowledge sharing in the PKQ process? This study addresses the research questions that arise from the research gap.

While answering the research questions, this study has primary purposes leading to contributions to the literature. First, it is to deepen the holistic view of PKQ in line with the theory of sensemaking. Research advances effectively when constructs are well specified in theory. Second, it is to examine the unique relationships between individual PKQ substructures and innovativeness. Literature shows that knowledge can be enabling or restraining and that quantity of knowledge does not always enhance performance (Pfeffer and Sutton, 2000; Haas, 2006; Belenzon and Berkovitz, 2010). This study can provide a plausible answer to the discussion by explaining differing impacts of PKQ's substructures on innovativeness. Third, it is to explore which PKQ substructure is most affected by knowledge sharing. Although much attention has been given to knowledge sharing (Faraj *et al.*, 2011; Majchrzak *et al.*, 2013), research on its relationship with PKQ's substructures is scarce. This study especially explores differing impacts of knowledge sharing on each PKQ substructure.

Literature review and research framework

Knowledge has been viewed differently: a state of mind, an object, a process, a condition of having access to information or a capability (Alavi and Leidner, 2001; Kulkarni *et al.*, 2007). The literature defines knowledge as a "justified true belief" that "increases an entity's capacity for effective action" (Nonaka and Takeuchi, 1995; Alavi and Leidner, 2001). Firms have been facing rapid changes in the knowledge economy. In such an environment, organizational growth and performance hinge on PKQ which is critical for sustaining and improving competitive advantages. Knowledge is accurate but would be inappropriate in a context. Knowledge is trustworthy but could be inapplicable in a context. Because the nature of knowledge is contextual, knowledge obtained may be too generic, not useful, in solutions (Majchrzak *et al.*, 2013). That is, knowledge should be organically refined or reproduced in the global competition to sustain the quality of the knowledge. With its growing importance, there have been some studies to empirically examine knowledge quality or similar concepts such as "content rating" (Poston and Speier, 2005), "knowledge content quality" (Kulkarni *et al.*, 2007), "perceived knowledge quality" (Durcikova and Gray, 2009) and "knowledge depth" (Carlo *et al.*, 2012; Majchrzak *et al.*, 2013). These studies, however, have some limitations. First, they focused primarily on repository-based knowledge quality. Second, they simplistically measured PKQ in a single dimension. Because knowledge inherently resides within individuals and people create knowledge (Bock *et al.*, 2005), there is a need for examining cognition-based knowledge quality. Knowledge is a multifaceted concept, and its quality needs to be considered in a multidimensional construct (Yoo *et al.*, 2011; Nonaka and Takeuchi, 1995).

The theory of sensemaking provides a coherent framework for the progressive dynamics of PKQ. The fundamental theme of sensemaking presents that individuals are trying to make sense of "equivocal inputs" and represents the sense back into the society (Weick *et al.*,

2005). It implies that organizational members continue to redraft knowledge by reconstructing it into their context and assessing its likelihood of implementations, and, subsequently, their knowledge becomes more holistic (Haas, 2006; Weick *et al.*, 2005). Sensemaking particularly involves applying generic understanding into a specific situation and "serves as a springboard to action" (Taylor and Van Every, 2000). Three important elements play critical roles in the course of sensemaking:

1. generic understanding;
2. a specific situation; and
3. action.

The three aspects lay the foundation for progressive determination of PKQ. In response to knowledge exchanges, an organization's members notice the intrinsic value of knowledge (i.e. generic understanding) and unfold a new, more useful meaning in their own circumstances (i.e. a specific situation). Furthermore, the generic understanding and the specific situation have an impact on facilitating actions. This study posits that PKQ consists of three progressively complex structures:

1. perceived intrinsic knowledge quality;
2. perceived contextual knowledge quality; and
3. perceived actionable knowledge quality (Figure 1).

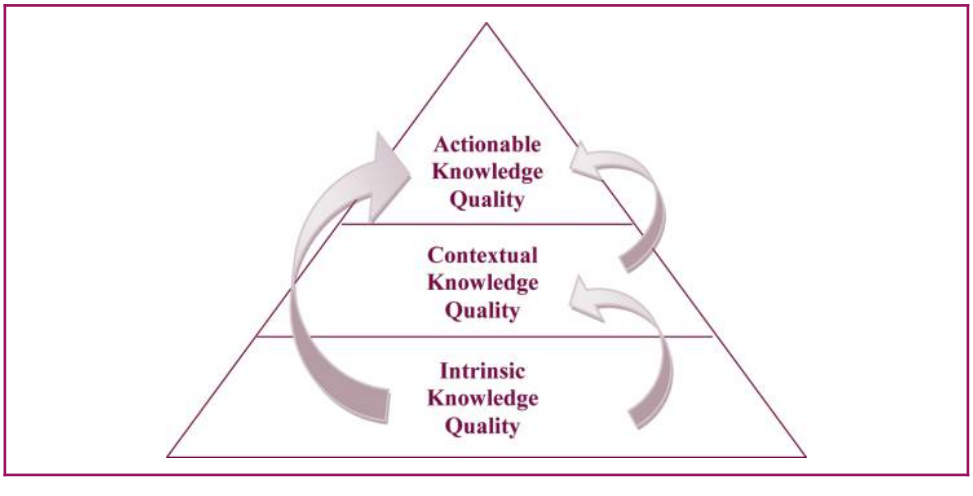
Perceived intrinsic knowledge quality

Knowledge has been regarded as "opinions", "insights", "experiences" or "beliefs" (Alavi and Leidner, 2001; Nonaka and Takeuchi, 1995). Accordingly, individuals may have different opinions, insights or beliefs, but they need to justify the truthfulness of their knowledge (Erden *et al.*, 2008). Perceived intrinsic knowledge quality describes "the extent to which knowledge has quality in its own right" (Yoo *et al.*, 2011). It indicates the intrinsic significance and addresses knowledge values in terms of inherent properties. It is a traditional view of PKQ and is associated with accuracy, reliability and believability of knowledge. Perceived intrinsic knowledge quality represents the core component of knowledge integrity.

Perceived contextual knowledge quality

Sensemaking occurs when an individual finds a new meaning for something that has already happened (Weick *et al.*, 2005). In other words, knowledge generates a plausible,

Figure 1 Progressive determination of perceived knowledge quality



"Three important elements play critical roles in the course of sensemaking: generic understanding, a specific situation, and action."

but different, story according to the context where an individual engages in sensemaking. Knowledge is embedded in context (Majchrzak *et al.*, 2013) and should be uniquely reassessed in a situation. That is, knowledge that is important to a context may be irrelevant to another or may be used for entirely different purposes (Durcikova and Gray, 2009). Literature shows that different contexts need even different knowledge management and that knowledge cannot be fully understood out of context (Yoo *et al.*, 2011). As such, PKQ is beyond the traditional view of perceived intrinsic knowledge quality and is highly dependent on individuals' context. Perceived contextual knowledge quality is defined as "the extent to which knowledge is considered within the context of the task" and is related to relevance and value-addedness (Yoo *et al.*, 2011).

Perceived actionable knowledge quality

More knowledge often fails to improve performance in organizations, and quantity of knowledge does not always enhance effectiveness (Pfeffer and Sutton, 2000; Haas, 2006). Although organizational members have sufficient knowledge due to the mobile, ubiquitous access to IS, it has become a difficult challenge to interpret the abundance of knowledge and put it into practice. Evidently, there are differences between what organizational members know and what organizational members act on knowledge (Pfeffer and Sutton, 2000). "Knowledge is always about action – the knowledge must be used to some end" (Nonaka and Takeuchi, 1995, pp. 57-58). Actionable knowledge quality indicates the pragmatic perspective of knowledge toward unambiguous purposes and is described as "knowledge that leads to immediate progress" (Cross and Sproull, 2004). Consequently, PKQ should be recognized within pragmatic utility judged by the usefulness and benefits of actions. This study defines perceived actionable knowledge quality as "the extent to which knowledge is expandable, adaptable or easily applied to tasks" (Yoo *et al.*, 2011).

Although the lines among the three properties of PKQ are clearly demarcated in Figure 1, the transition is not often easily identified by individuals involved. Intrinsic, contextual and actionable knowledge quality are intertwined, but they are theoretically unique. Thus, it is critical to distinguish one from the others. As shown in Figure 1, the progress on a higher substructure still requires the capacity of those below it. That is, perceived actionable knowledge quality builds on the existence of perceived intrinsic knowledge quality.

Interactions of PKQ's substructures

As discussed above, the concept of sensemaking offers a coherent theoretical basis for the development of PKQ. The sensemaking process involves two critical questions:

1. "What's the story here?" and
2. "Now what should I do?" (Weick *et al.*, 2005)

When social actors are exposed to a different set of knowledge, they may attempt to make sense of knowledge by asking "What's the story in my case?" This question has an impact of bringing intrinsic knowledge into their context. When social actors then ask "Now what should I do?" this question has an influence on bringing meanings into action (Weick *et al.*, 2005). Sensemaking involves the continuous development in the social context by rationalizing what individuals are doing and connecting "the abstract with the concrete" (Weick *et al.*, 2005). Reciprocal exchanges will continue if knowledge content is believed

to be accurate, knowledge use is relevant in the context and knowledge adaptation is plausible in his/her sensemaking. When equivocal inputs are ordered and meanings are organized, sensemaking facilitates actions (Weick *et al.*, 2005). With exposure to knowledge pertaining to intrinsic values, social actors begin making plausible sense, taking cues associated with their circumstances and reshaping knowledge for effective action. That is, intrinsic knowledge will be interpreted in the context, turning into contextual knowledge and providing a basis for actionable knowledge. As such, perceived intrinsic knowledge quality helps social actors continually redraft individuals' understanding in their own situations and further reconstruct knowledge into forming effective actions. Accordingly, this study presents the following hypotheses:

H1a. Perceived intrinsic knowledge quality is positively related to perceived contextual knowledge quality.

H1b. Perceived contextual knowledge quality is positively related to perceived actionable knowledge quality.

Sensemaking occurs in a situation where the state of the world is different from expectations (Weick *et al.*, 2005). A new set of intrinsic knowledge may provide some differences, and people begin interpreting the knowledge in their given frameworks. That is, social actors obtain perceived intrinsic knowledge quality and formulate conceivable stories from the core of knowledge. This sensemaking spurs individuals to respond to the cue. As noted above, the first question of sensemaking is "what's going on here", and the second equally important question is "what do I do next?" (Weick *et al.*, 2005, p. 412) The second question is obviously related to social actors' behavior. For effective use, knowledge needs to be "invested within a given practice" in addition to its exploration (Carlile, 2004). Accordingly, this study presents the following hypothesis:

H1c. Perceived intrinsic knowledge quality is positively related to perceived actionable knowledge quality.

Direct impacts of PKQ's substructures on innovativeness

While many outcomes may result from PKQ, this study focuses on innovativeness. The reasons are as follows. First, the uncertain, equivocal nature of innovativeness requires quality of knowledge. Because innovativeness involves both benefits and risks, PKQ is essential. Second, research shows that knowledge is a source of or a barrier to innovativeness (Belenzon and Berkovitz, 2010; Carlile, 2002). This study attempts to explain the conflicting results by different dynamics of PKQ's substructures. Third, the theoretical relationships between innovativeness and PKQ's substructures have not been examined to date. The findings of theoretical connections will make a contribution to the literature.

Innovativeness is an important construct to study individual behavior for innovation and it has a long standing in the innovation diffusion research. (McKnight *et al.*, 2002; Yuan and Woodman, 2010). Examples of innovative behavior include searching out new methods to complete a task, implementing new ways to enhance performance and applying new work processes. Innovativeness is a trait that reflects "confidence or optimism" regarding the production and adoption of novel, useful knowledge (McKnight *et al.*, 2002; Sun, 2012).

"Perceived intrinsic knowledge quality helps social actors continually redraft individuals' understanding in their own situations and further reconstruct knowledge into forming effective actions."

"While knowledge sharing stimulates PKQ, perceived intrinsic knowledge quality has the highest loading, indicating that it was most affected by knowledge sharing."

Knowledge is searched out to improve the effectiveness in a task. Individuals tap into an ongoing sense of knowledge, which is believed to be useful, by decreasing its equivocality and increasing its appropriability. This process is critical for interpreting knowledge into actions as a source of guidance for further improvement. In other words, perceived actionable knowledge quality enables social actors to engage in making meaningful progress. "A pragmatic knowledge boundary" is not about getting more knowledge, but about a process of adapting knowledge into a task (Carlile, 2002). A high level of actionable knowledge may modify an individual's cognitive structure, and this impact is key to behavior change. Perceived actionable knowledge quality facilitates social actors to make cognitive processes generate and adopt innovativeness more effectively. An organization's members are likely to engage in innovative behavior when they believe that perceived actionable knowledge quality is at hand. Accordingly, this study presents the following hypothesis:

H2a. Perceived actionable knowledge quality is positively related to innovativeness.

Individuals can derive different meanings from the same knowledge according to their circumstances and use this knowledge in their given practice (Carlile, 2002). Literature shows that innovative processes can be enabled or constrained by context (Murray and O'Mahony, 2007). Knowledge is a critical element of increasing innovativeness, but, for knowledge to be meaningful, "individuals must be able to localize knowledge around particular problems" and "alter the knowledge to be embedded within their practices" (Carlile, 2002, p. 446). When knowledge is situated in its particular place and time, individuals are more likely to internalize the value of knowledge and to believe that the quality of contextual knowledge will benefit their work. When knowledge is deemed worthy of situations, individuals are able to recombine the contextual knowledge and apply it into their own context. In other words, perceived contextual knowledge quality serves to justify innovative actions because innovativeness means change and disruptive components by nature. When social actors accommodate newly acquired knowledge in their own context, it will be more likely to be used in their innovative behavior.

H2b. Perceived contextual knowledge quality is positively related to innovativeness.

The mediating role of PKQ's substructures on innovativeness

Knowledge available in an organization is "encyclopedic" and "abstract" initially (Weick *et al.*, 2005). The mere exposure of knowledge may not directly lead to engage in innovative activities (Choi *et al.*, 2010). In other words, organizational members may not feel sufficient only with the integrity nature of knowledge, which is neither examined in their situation nor tested for applicable adaptability in their tasks. Certainly, there will be greater possibilities for the knowledge to be revisited when the intrinsic value of knowledge is deemed meaningful. Individuals, however, try to go through cognitive processes of underpinning contextual relevance and actionable adaptability of knowledge beyond perceived intrinsic knowledge value because of the nature of innovativeness accompanying both risks and benefits. Social actors have a tendency to understand how original knowledge was developed, how it can be relevant to their own situations and how it can be extended for their innovative actions instead of just using the knowledge (Yoo *et al.*, 2011). Consequently, this study argues that perceived intrinsic knowledge quality itself undermines innovativeness. Rather, when social actors make sense of perceived intrinsic

knowledge quality into their contextual relevance and practical applications, the knowledge will be used for their innovative behaviors. Accordingly, this study posits that perceived contextual, actionable knowledge quality mediates the effects of perceived intrinsic knowledge quality on innovativeness.

H2c. The effect of perceived intrinsic knowledge quality on innovativeness is fully mediated by perceived contextual, actionable knowledge quality.

Knowledge sharing and PKQ's substructures

An organization's members are expected to share knowledge, which is unevenly spread across individuals in an organization (Choi *et al*., 2010). Knowledge sharing is defined as "the process of locating distributed knowledge in an organization and transferring it to another context where the knowledge is needed" (Choi *et al*., 2010, p. 858). It is a social process by which an interactive exchange among members occurs. It includes verbal communications of know-how and feedback, the exchange of tangible artifacts and knowledge about who knows what in an organization (Chang and Gurbaxani, 2012).

Research shows that PKQ is an outcome of building on prior related knowledge (Yoo *et al*., 2011), and effectiveness is dependent upon how well knowledge is shared among members (Choi *et al*., 2010; Chang and Gurbaxani, 2012). Knowledge sharing through socialization utilizes resources available, leading to reduced uncertainty and raised creative potential. The interactive two-way sharing of knowledge helps in the communication of traits such as accuracy and integrity of knowledge and determines the veracity of knowledge (Murray and O'Mahony, 2007). While engaged in exchanges of knowledge, individuals realize the knowledge they interact with, distinguish the "complexities and subtleties of it" and integrate it into their "schemas and mental models" (Sussman and Siegal, 2003).

> To share understanding means to lift equivocal knowledge out of the tacit, private, complex, random, and past to make it explicit, public, simpler, ordered, and relevant to the situation at hand. (Weick *et al*., 2005, p. 413) For an interactive exchange among members, individuals should share not just the intrinsic value of knowledge but also its context where it is introduced (Brown and Duguid, 2001). Knowledge sharing in the social process facilitates the process of sensemaking into another context where the knowledge is needed (Choi *et al*., 2010; Alavi and Leidner, 2001; Weick *et al*., 2005). As organizational members share and assess the intrinsic value of knowledge, the core of knowledge can be associated with their context effectively (Carlile, 2004).

Knowledge sharing is the social process by which knowledge is made more available and usable. In other words, knowledge sharing through socialization helps recombine knowledge from one community of experts into another and offers a tangible form to be conducive to actions (Carlile, 2004). "For knowledge to be actionable, it may require access to materials, know-how, translation or the sharing of expertise among individuals" (Murray and O'Mahony, 2007, p. 1011). People with varying degrees of expertise and those who know more help sort through knowledge and decide which action to take (Sussman and Siegal, 2003). Knowledge receivers integrate newly acquired knowledge into their cognitive structures in the interactive two-way sharing of knowledge. The cognitive structure helps guide a response and determine a course of action that seems to best serve their needs (Sussman and Siegal, 2003). Accordingly, this study presents the following hypothesis:

H3. Knowledge sharing is positively related to perceived intrinsic, contextual and actionable knowledge quality.

Research methods

The survey methodology was adopted to collect data and to test the research model. This study examined the measurement and structural models by using partial least squares (PLS) Graph version 3.00. Instruments for PKQ's substructures used those of Wang and

Strong (1996) as a starting point and were modified for the PKQ context. Items for innovativeness were adopted from McKnight *et al.* (2002). Knowledge sharing was adapted from Bock *et al.* (2005). This study was concerned that the level of an individual's education and duration, sales, firm size and industries would have an impact on PKQ's substructures. As individuals have more education or job experiences, they may have more understanding of their work processes. When a firm has a bigger size and sales, individuals may have more resources to facilitate knowledge interactions. Because some industries are more competitive and innovative, knowledge work is more critical. Controlling for these effects allows this study to better identify the real impact of the variables.

A pilot study was conducted prior to the administration of a large-scale survey. MarketTools, Inc. invited managers in the USA who engaged in knowledge work. A total of 69 responses were used to test the corrected item to total correlation, exploratory factor analysis, correlation and Cronbach's alpha. Items were revised, and the large-scale survey methodology was used to test the research model. The instruments entering the large-scale survey are listed in Table I. The questionnaire asked respondents to answer each question on a scale from 1 to 5, where 1 was "Strongly Disagree" and 5 was "Strongly Agree". MarketTools, Inc. invited managers from various industries in the USA. It invited 1,900 people and 368 answered the survey, resulting in a 19.4 per cent response rate. Responses were received from those in the fields of information technology (15.8 per cent), telecommunications (9 per cent), manufacturing (28.3 per cent), finance/insurance (25 per cent), biotechnology (1.9 per cent), government (2.4 per cent), retail (3.0 per cent) and others (14.7 per cent). The size of firms was 100-249 (12.2 per cent), 250-499 (13.3 per cent), 500-999 (9.5 per cent), 1,000-2,499 (16 per cent) and 2,500 and over (48.1 per cent). Average annual sales from firms were $<$ \$10 million (9 per cent), \$10-49.9 million (14.9 per cent), \$50-99.9 million (13.6 per cent), \$100-499.9 million (13.3 per cent), \$500-1 billion (11.4 per cent) and $>$ \$1 billion (36.1 per cent). Respondents have spent an average of 11 years (median = 8.00, SD = 9.44) in the firms. Their education level was: high school (20.4 per cent), associated degree (14.4 per cent), bachelor's (42.7 per cent), master's (19.8 per cent) and PhD (1.9 per cent).

Table I Measurement items entering large-scale survey

Construct	*Acronym*	*Measurement item*	*Mean*	*SD*
Knowledge sharing	KS1	My knowledge sharing with other organizational members is an enjoyable experience	3.81	0.95
	KS2	My knowledge sharing with other organizational members is a wise move	3.94	0.90
	KS3	I consider knowledge sharing as a way to gain competitiveness	3.90	0.88
Perceived intrinsic knowledge quality	PIKQ1	Knowledge available for my work is accurate	3.88	0.94
	PIKQ2	Knowledge available for my work is objectives	3.72	0.97
	PIKQ3	Knowledge available for my work is believable	3.86	0.87
Perceived contextual knowledge quality	PCKQ1	Knowledge available for my work adds value to my operations	4.03	0.91
	PCKQ2	Knowledge available for my work gives me competitive advantage	3.91	0.96
	PCKQ3	Knowledge available for my work is relevant to my tasks	4.05	0.91
Perceived actionable knowledge quality	PAKQ1	Knowledge available for my work is actionable	3.77	0.85
	PAKQ2	Knowledge available for my work is adaptable	3.68	0.96
	PAKQ3	Knowledge available for my work is expandable	3.77	0.85
Innovativeness	IN1	I experiment with alternative ways to carry out my work	3.90	0.91
	IN2	I am innovative in thinking of new or better ways to perform tasks	4.12	0.84
	IN3	I like to explore new ways of doing tasks	4.19	0.85

Response/nonresponse bias was assessed by comparing data from early and late survey respondents on the number of employees and annual sales using a chi-square test. Results show that there is no significant difference between the early and the late responses on the number of employees and annual sales.

Measurement model

An exploratory factor analysis of reflective measures such as knowledge sharing and innovativeness was conducted. Results in Table II indicate two factors whose items load more highly on their associated construct than on the other construct. The two factors account for 64.39 per cent of the total variance. Confirmatory factor analysis was performed to assess convergent and discriminant validity for the reflective measures, using PLS-Graph 3.0. Convergent validity was tested by item loadings, composite reliabilities and average variance extracted (AVE). All item loadings exceeded the 0.70 threshold, as shown in Table III. Internal consistency, shown in Table IV, was assessed with composite reliabilities, which show that the lowest was 0.83 and were in excess of the 0.70 guideline. AVE exceeded the 0.50 threshold in all cases. The square root of AVE for reflective constructs was greater than the correlation and provided evidence of discriminant validity.

Because perceived intrinsic, contextual and actionable knowledge quality were modeled as formative constructs, the analysis for validity and reliability was conducted based on the guidance of Petter *et al.* (2007). The construct validity was tested by using principal components analysis to examine the item weightings for measures. The results, shown in Table V, indicate that the weight of each item was significant. The reliability was tested by examining multicollinearity. If the variance inflation factor value is < 3.3, the formative constructs gain reliability. Results show that there was no multicollinearity among items for formative constructs.

Table II Exploratory factor analysis

Acronym	*Innovativeness*	*Knowledge sharing*
KS1	0.072	**0.804**
KS2	0.057	**0.845**
KS3	0.182	**0.681**
IN1	**0.761**	0.098
IN2	**0.842**	0.073
IN3	**0.819**	0.154

Note: Bold signifies good exploratory factor analysis

Table III Item loadings and cross-loadings of confirmatory factor analysis

Acronym	*Knowledge sharing*	*Innovativeness*
KS1	**0.803**	0.190
KS2	**0.840**	0.183
KS3	**0.711**	0.238
IN1	0.195	**0.767**
IN2	0.186	**0.844**
IN3	0.246	**0.835**

Note: Bold signifies good confirmatory factor analysis

Table IV Descriptive statistics, correlations and average variance extracted

Construct	*Reliability*	*Knowledge sharing*	*Innovativeness*
Knowledge sharing	0.83	**0.74**	
Innovativeness	0.86	0.26	**0.76**

Note: The diagonal elements (in bold) represent the square root of AVE

Table V Validity and reliability tests results of formative constructs

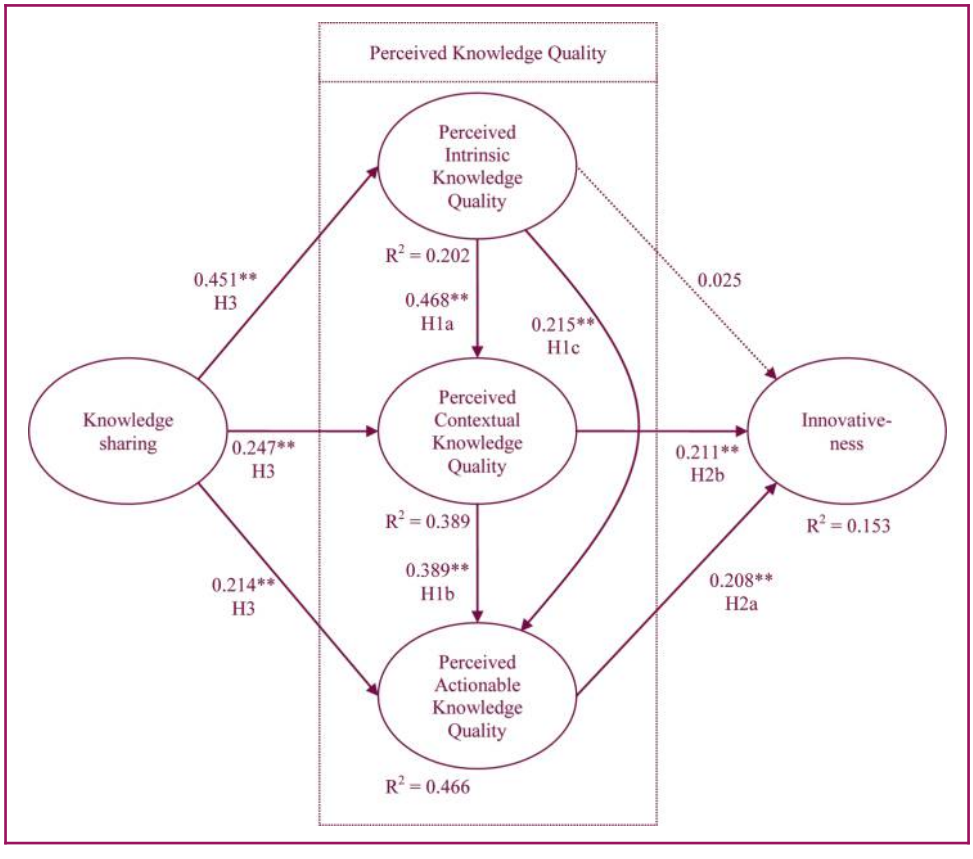
Construct	*Item*	*Weight*	*Standard error*	*T-value*	*VIF*	R^2
Perceived intrinsic knowledge quality	PIKQ1	0.330	0.112	2.923	1.976	0.494
	PIKQ2	0.223	0.077	2.727	1.475	0.322
	PIKQ3	0.609	0.100	6.001	2.070	0.517
Perceived contextual knowledge quality	PCKQ1	0.365	0.098	3.605	1.901	0.474
	PCKQ2	0.533	0.088	5.740	1.695	0.410
	PCKQ3	0.311	0.073	4.144	1.590	0.371
Perceived actionable knowledge quality	PAKQ1	0.432	0.094	4.506	1.572	0.364
	PAKQ2	0.481	0.099	4.566	1.805	0.446
	PAKQ3	0.313	0.100	3.197	1.570	0.363

As with all self-reported data, there may be a potential for common method bias. This study used the PLS model that is consistent with that used by Liang *et al.* (2007), examining each indicator's variance. Results show that the average variance explained by the substantive indicators is 0.668, while the average variance explained by the method is 0.005. Given the small magnitude of the method variance, the common method bias is unlikely to be a serious problem.

Structural model

Figure 2 displays path results, which show statistical significance for each hypothesis. Perceived intrinsic knowledge quality has a significant positive impact on perceived contextual knowledge quality ($\beta = 0.468$, $p < 0.01$) which, in turn, positively influences perceived actionable knowledge quality ($\beta = 0.389$, $p < 0.01$), supporting *H1a* and *H1b*.

Figure 2 PLS results of the structural model



Perceived intrinsic knowledge quality also has a positive effect on perceived actionable knowledge quality ($\beta = 0.215$, $p < 0.01$), thus supporting *H1c*. Innovativeness is significantly affected by perceived actionable knowledge quality ($\beta = 0.208$, $p < 0.01$) and perceived contextual knowledge quality ($\beta = 0.211$, $p < 0.01$), supporting *H2a* and *H2b*. To test the mediation role of perceived actionable, contextual knowledge quality, this study tested the direct effect of perceived intrinsic knowledge quality on innovativeness. The effect of perceived intrinsic knowledge quality ($\beta = 0.025$) lacked statistical significance. Thus, the full mediation hypothesis, *H2c*, was supported. Knowledge sharing has a positive, significant influence on perceived intrinsic ($\beta = 0.451$, $p < 0.01$), contextual ($\beta = 0.247$, $p < 0.01$) and actionable ($\beta = 0.214$, $p < 0.01$) knowledge quality, supporting *H3*. For control variables, education has a positive, significant influence on perceived actionable knowledge quality. Otherwise, none of the control variables had a significant effect.

Perceived intrinsic, contextual and actionable knowledge quality collectively explain 15.3 per cent of the variance in innovativeness. In addition, the model explains 20.2 per cent of the variance in perceived intrinsic knowledge quality, 38.9 per cent of the variance in perceived contextual knowledge quality and 46.6 per cent of the variance in perceived actionable knowledge quality.

Conclusion

Given that organizations spend a significant amount of time and effort in leveraging their intellectual capital, this study contributes to illustrating how PKQ's substructures are reinforced by knowledge sharing and induce innovativeness. The findings of this study provide useful insights for managers who face ongoing challenges in integrating knowledge and improving knowledge quality, thereby leading their knowledge into innovativeness. This study presents that PKQ has three different substructures: perceived intrinsic, contextual and actionable knowledge quality. While perceived contextual, actionable knowledge quality increase the likelihood of innovativeness, they mediate the relationship between perceived intrinsic knowledge quality and innovativeness. PKQ can be enhanced by knowledge sharing among social actors.

Limitations of the research and findings

Although the findings of this study offer new insights, they need to be understood in light of this study's limitations. This paper operationalizes PKQ in the cognition-based aspect to test the research model. Accordingly, the results of this study need to be understood in the context. Certainly, this study does not embody all possibilities of antecedents and consequences of PKQ's substructures. The data collected were perceptual, and it could be possible that respondents were not willing to admit their poor performance. Although this study thoroughly tested the measurement of PKQ's substructures, it is desirable to continue to test them in various contexts. In addition, continuing efforts should be made to validate, refine and extend the scales.

Implications for research

Although knowledge is regarded as a multifaceted concept (Nonaka and Takeuchi, 1994; Kulkarni *et al.*, 2007), studies have explored the concept of PKQ in a single dimension so simplistically. To this study's knowledge, this research is the first to systematically examine the progressive development of PKQ, drawn upon the sensemaking perspective, in a multidimensional construct. This study takes a step further to understand the interplay among PKQ's substructures. A high level of perceived intrinsic knowledge quality is a foundation of a high level of perceived contextual knowledge quality, which, in turn, builds on perceived actionable knowledge quality. Sensemaking is the process of finding meanings, building plausibility and moving into action (Weick *et al.*, 2005; Cornelissen, 2012). It indicates that comprehending the fundamentals of knowledge is a primary

concern at the beginning of the exposure. As a next step, social actors shift their focus on interpretations of knowledge in their own context by framing it into their environment. Furthermore, the contextually relevant knowledge builds a basis for applying the knowledge into their practice. Overall, this study explores the concept of PKQ by highlighting its distinctive features descriptively.

This study also began addressing the shortfall of understanding theoretical links between PKQ's substructures and innovativeness and between knowledge sharing and PKQ's substructures. Although research on knowledge management has examined enormous aspects over the decades (Alavi and Leidner, 2001; Bock *et al.*, 2005; Faraj *et al.*, 2011), the literature offers few testable models to explain the connection between knowledge sharing and PKQ beyond simplistic assertions that improving knowledge sharing will lead to beneficial outcomes. Path coefficients from results of this study suggest that knowledge sharing is a critical determinant of PKQ. It is consistent with findings of the prior research that knowledge sharing promotes "interactions to be generative rather than constrained" (Faraj *et al.*, 2011). This study's findings also show that perceived contextual knowledge quality will be enhanced more effectively when knowledge sharing is co-present with perceived intrinsic knowledge quality. In addition, it is much more essential for improving perceived actionable knowledge quality when knowledge sharing is co-present with perceived contextual knowledge quality. These results are supported by the literature that knowledge sharing alone cannot improve performance, and the shared knowledge must be effectively processed (Choi *et al.*, 2010). This research provides richer explanations between knowledge sharing and PKQ's substructures, offering insights to academicians who have striven to study quality of knowledge.

Researchers have acknowledged that knowledge can be a source of and as a barrier to innovativeness and that knowledge spillover is not the main driver for innovativeness (Carlile, 2002; Belenzon and Berkovitz, 2010). This study offers a plausible explanation of the double-edged sword of knowledge. At first, results of this study show that perceived contextual, actionable knowledge quality have a significant impact on innovativeness. They also highlight the mediating role of the perceived contextual, actionable knowledge quality in the relationship between perceived intrinsic knowledge quality and innovativeness. That is, PKQ does not universally produce innovativeness, but its substructures engage differently. When knowledge has a high level of perceived intrinsic knowledge quality but lacks contextual relevance or practical applications, it may not facilitate innovativeness. In fact, literature contends that individuals generate more innovation when knowledge is recontextualized and deeper (Carlo *et al.*, 2012). Few research studies have examined how PKQ's substructures have differing impacts on innovativeness. This study endeavors to illuminate the relationships between innovativeness and the multifaceted nature of PKQ.

Implications for management

This study has implications for the effort of organizational members intended to produce innovativeness by actively sharing knowledge. The magnitude of path coefficients provides useful insights into the relative importance in the interplay of knowledge sharing, PKQ's substructures and innovativeness. While knowledge sharing stimulates PKQ, perceived intrinsic knowledge quality has the highest loading, indicating that it was most affected by knowledge sharing. While PKQ generally shapes innovativeness, perceived contextual knowledge quality has the highest loading on innovativeness and perceived actionable knowledge quality follows. It illustrates that knowledge sharing enables an organization's members to entice the intrinsic value of knowledge which may not lead to innovativeness directly. Perceived intrinsic knowledge quality is not adequate by itself and should be transformed into perceived contextual, actionable knowledge quality to produce innovativeness. As a matter of fact, the literature argues that individuals have a tendency to minimize their efforts and focus on what is needed to get their tasks done (Poston and

Speier, 2005). It implies that effort is weighed more heavily than accuracy. Inaccurate or irrelevant knowledge may not be processed rigorously and thus may not trigger the need for examining the content more thoroughly. Intrinsic knowledge quality, on the other hand, reinforces the central process of sensemaking. Credibility indicators may give social actors the ability to adjust their knowledge evaluation processes (Poston and Speier, 2005). The intrinsic knowledge needs to be transformed contextually and practically, and once transformed, it will increase the likelihood of innovativeness. Individuals equipped with contextualized knowledge have a tendency to experiment and thus produce good outcomes (Carlo *et al.*, 2012). The progressive transition from perceived intrinsic knowledge quality to perceived contextual, actionable knowledge quality will be facilitated by individuals' sensemaking processes.

Possible areas for future research

Future studies may build on this study to better understand the dynamics of PKQ. IS enhances knowledge exchanges, and thus, future research may investigate the repository-based knowledge quality in the multifaceted aspects. This study is interested in individual perceptions, and future studies may explore PKQ at the team or organizational level. More research is needed to investigate critical factors that impact PKQ's substructures. The PKQ research should grow in scope and prominence because individuals are struggling with knowledge overload. This study may give good guidance for the research stream.

Offering a substantial model of PKQ is an enduring research question, and this study makes significant contributions to the literature. This research provides useful insights that are theoretically based and empirically supported. Because this study is one of the initial endeavors to empirically examine the relationships among knowledge sharing, PKQ's substructures and innovativeness, this study may open a new avenue for research on how to build and sustain PKQ effectively.

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