Knowledge sharing and the theory of planned behavior: a meta-analysis review

Yasha Afshar Jalili

Department of Psychology, Islamic Azad University Science and Research Branch, Tehran, Iran, and

Samaneh Ghaleh

KM Department, Oil Industries Commissioning and Operation Company, Tehran, Iran

Abstract

Purpose – The purpose of this paper is to summarize the application of the theory of planned behavior (TPB) in predicting knowledge sharing behavior (KSB) based on a systematic literature review.

Design/methodology/approach – A meta-analysis was applied as a research methodology, and 47 studies were included in this study with a total population of 15,528 people (mean = 353). The authors summarized previous studies which used the TPB for predicting (KSB).

Findings – Findings reveal that KSB is determined jointly by knowledge-sharing intention (KSI) and perceived behavioral control (PBC). Intention itself is a function of attitude toward knowledge sharing, subjective norm surrounding knowledge sharing and PBC to perform KSB.

Practical implications – The primary implication of this meta-analysis is to deeply interpret the essence of KSB r and its determinants, in which managers can foster the conduction of this valuable behavior in their organizations. However, as a limitation, a remarkable threat to validity in the existing literature is a potential "cooperation bias" in which participants likely overestimate their knowledge sharing intention and knowledge sharing behavior. In future studies, this limitation can be addressed by measuring actual KSB.

Originality/value – This study is the first meta-analysis conducted to investigate the prediction power of the TPB for determining KSB. While there are several contradictions reported in the researches which used the TPB in the knowledge-sharing context, this research has summarized and reported the results.

Keywords Knowledge-sharing behaviour, Knowledge management, Meta-analysis, Knowledge-sharing intention, The theory of planned behaviour, Theory of reasoned behaviour

Paper type Research paper

Introduction

Knowledge has been consistently considered as a dominant source of competitive advantage and a critical factor for organizational development in today's turbulent knowledge economy (Kuo and Young, 2008; Hameed *et al.*, 2019). It is recognized as a strategic asset that empowers organizations (Choi and Lee, 2003; King and Marks, 2008; Singh *et al.*, 2019). Considering the crucial role of knowledge, organizations have no choice but to initiate knowledge management (KM) practices in their organizations (Donnely, 2019).

It is contended that the key element of KM is knowledge-sharing behavior (KSB) (Alavi and Leinder, 2001). Encouraging knowledge workers to share their knowledge enhances mutual learning, promotes best practices, reduces operational costs of redundant learning, enhances knowledge creation, facilitates innovation and increases organizational productivity

(Markus, 2001; Vries *et al.*, 2006; Reychav and Weisberg, 2009; Yang, 2010; Philsoophian *et al.*, 2016; Ahmad, 2017). Knowledge sharing (KS) could enable team members to create new knowledge which might be far from what they could do individually (Hooff and Hendrix, 2004), which in turn accelerates organizational innovation (Oliveira *et al.*, 2019). Besides, KS can lead to greater organizational problem-solving capacity which is functional for organizational improvement (Nickerson and Zenger, 2004). Therefore, it is well said that KS is the heart of KM (Dainty *et al.*, 2005).

However, despite the importance of KS it is not easy to encourage people to share their knowledge (O'Dell and Grayson, 1998), because KS is a labor-intensive process (Oliveira *et al.*, 2019). Davenport and Prusak (1998) asserted that KS is often unnatural, and people will not share their knowledge, on account of most of them think that their knowledge is too valuable. In other words, if individuals are not intended to share what they know, no one can force them to do so. Recently, KS researchers become interested in applying socio-psychological theories to better comprehend the psychological aspects of an individual's KSB. The psychological aspect of individuals may encourage or deterrent people's KSB (Afshar-Jalili and Ghaleh, 2018).

The theory of planned behavior (TPB) is one of the popular psychological theories which have been widely applied in the KM domain. This theory argued that an individual's behavior is driven by intention toward the behavior where the behavioral intention is a function of his/her attitude toward the behavior, the subjective norms (SN) regarding the behavior and the individual perceived behavioral control (PBC) (Li *et al.*, 2008).

The literature studies reviewed on the TPB appliances in KSB reveal that there are discordances in the findings reported. For instance, while Kuo and Young, (2008) rejected the relationship between knowledge sharing intention (KSI) and actual KSB in their studied population, this relationship was confirmed by Chennamaneni *et al.* (2012). For further clarification, some researchers did not acknowledge the relationship between PBC and KSI (Idrus and Rochman, 2012; Akhavan and Sarkhosh, 2015), but others supported it significantly (Tohidinia and Mosakhani, 2010). These ambivalences create an ambiguous interpretation which has raised the question as to whether the TPB can eventually predict and explain KSB in organizational context effectively. This deficiency that has already existed in the literature would impair the decision-making process regarding the development of KSB among organizational members. This study aims to bridge this knowledge gap as its contribution to the literature by using a meta-analysis method to clarify whether TPB explains KSB.

As regards the importance of tackling such a problem, performing a systematic meta-analysis would help managers to decide more productively based on a summarized conclusion of previous studies. Meta-analysis is a quantitative method applying statistical approaches to measure the effect size of conducted studies (Shadish *et al.*, 2002) in a specific field. Meta-analysis is proper for empirical findings derive diverging outcomes (Van Wijk *et al.*, 2008), which presents empirical generalizations across several studies by estimating and comparing the effect size of relationships (Hunter and Schmidt, 2004). In fact, with the help of such analysis, researchers would be enabled to estimate true relationships between studied variables.

The remainder of this paper proceeds as follows:

- literature search results and hypothesis development;
- methodology;
- meta-analysis results; and
- discussion.

Literature review and hypotheses development

Knowledge-sharing behavior

KS has drawn notable attention from researchers interested in organizational behavior (Afshar Jalili *et al.*, 2011; Philsoophian *et al.*, 2016), and hence, it is worthy to be shared and managed effectively. Despite its importance, there is no consensus on the definition of KS (Afshar Jalili, 2019). Interchangeably, researchers have applied various terms such as knowledge exchange, knowledge diffusion, knowledge distribution and knowledge transaction to describe KS (Dixon, 2000). KSB is the process by which individuals refine their thought collectively and iteratively (Chua, 2003). Wu and Zhu (2012) defined KS as a degree to which knowledge workers share their knowledge with their colleagues or peer groups. KS is the act of making the required knowledge accessible to others within organizations (Olatokun and Elueze, 2012).

KS is the key element for transforming personal knowledge into organizational knowledge (Nonaka, 1994; Foss *et al.*, 2010). Davenport and Prusak (1998) suggested that transmission and absorption are the two main activities involved in KSB. KS is also characterized as behavior by which individuals voluntarily present their unique knowledge and experiences to other social actors (Hansen and Avital, 2005). Connelly and Kelloway (2003) defined KS as a set of behaviors including the exchange of knowledge with others. The common points in all definitions are that KS is considered as behavior that cannot be forced by managers and formal task systems (Afshar Jalili and Salemipour, 2019). On the other hand, KS has a discretionary nature. People choose as to whether to get involved in KS and how much knowledge and experience they want to share (Gagne and Deci, 2005). These characteristics are the reason that KS requires to be investigated deeply within the lens of psychological theories such as the TPB.

The theory of planned behavior

The TPB arguably is the most commonly cited explanation of human behavior (Sussman and Gifford, 2019), which is vastly applied for explaining and predicting particular behaviors (Wu and Zhu, 2012). The TPB was derived from the theory of reasoned action (TRA) which postulated that a person's specific behavior is derived by his/her intention toward it, which in turn is determined by that person's attitude and SN regarding the behavior (Zhang and Ng, 2012). Regarding TRA, one of the basic assumptions is that most social-related behaviors are shaped based on volitional control (Ajzen and Fishbein, 1980), which means that the person can feel free to choose to act in a certain way (Hansen and Avital, 2005). Hence, when there are certain external constraints (such as lack of resources or required opportunities), having mere intention is not enough to form a behavior (Armitage and Conner, 2001). Considering the limitation of TRA in predicting behaviors that people do not have completely volitional control, TPB was developed with the companion of PBC as one of the determinants of intention and behavior (Ajzen, 1991). TPB postulates that the intention toward a specific behavior is determined by three components including attitude, SN and PBC. Then, PBC and intention jointly predict the actions of behavior. In this model, PBC is a predictor for both intention and actual behavior (Sussman and Gifford, 2019). Accounting KS as organizational behavior, this meta-analysis assessed the capability of the TPB model in predicting KSB.

Attitude toward knowledge sharing

Attitude is defined as the degree to which a person has a favorable or an unfavorable evaluation toward a specific object (Kuo and Young, 2008), such as a behavior that is shaped based on his/her past and present experiences (Sheppard *et al.*, 1988). Simply said, an

attitude is one's evaluation of an object, ranging from extremely negative to extremely positive (Safa and Von Solms, 2016). Hepler (2015) considered attitude as a psychological tendency toward an object that can influence intention.

According to the TPB, attitude is formed based on a set of beliefs about the expected outcomes of behavior and the extent to which these consequences are favorable or unfavorable (Ajzen and Fishbein, 1980). The conducted research on the TPB in a KM context postulates that attitude significantly and positively influences the intention toward KSB (Kuo and Young, 2008; Kuo and Young, 2008; Stenius *et al.*, 2015; Cheng, 2017; Samad, 2018). However, some researchers have questioned this relationship. For instance, Stenius *et al.* (2015) claimed that a mere positive attitude toward KS significantly relates to intention, while negative attitude has a non-significant relationship with intention. Besides, Teh and Yong (2011) proposed that attitude affects KSI negatively. From these findings, the following hypothesis can be drawn:

H1. The attitude toward KS associates with intention toward KS.

Subjective norms and intention toward knowledge sharing
SN is based on normative beliefs (Wu and Zhu, 2012) which refer to one's perceived social pressure as to whether expect them to involve in a particular behavior (Chennamaneni *et al.*, 2012). In other words, it is defined as a person's belief that significant others or reference groups whether to expect him/her to involve in a particular behavior. These significant others and reference groups might be executive board, top managers, supervisors, peer groups (Chennamaneni *et al.*, 2012) and organizational role models.

By applying the TPB in the KM context, subjective norm reflects the perceptions as to whether KSB is accepted, encouraged and performed by significant others (Kuo and Young, 2008). KS occurs whenever organizational members help one another to develop the required capacities (Senge, 1998). Conversely, organizational knowledge-rejecting norms might hinder KSB (Husted and Michailova, 2002). Although some studies have questioned the relationship between SN and KSI (Sihombing, 2011; So and Bolloju, 2010; Zhang and Ng, 2012; Ling *et al.*, 2013), notable number of researchers have reported the significant positive relationship between both constructs (Ryu *et al.*, 2003; Lin and Lee, 2004; Bock *et al.*, 2005; Stenius *et al.*, 2015; Mafabi *et al.*, 2017; Igbinovia, 2018). Based on the mentioned findings, the following hypothesis is derived:

H2. The SN associates with intention toward KS.

Perceived behavioral control of knowledge sharing
PBC refers to the extent to which a person perceives his/her ability to perform a particular behavior (Ajzen, 1985, 1988). It is a perception of ease or difficulty of doing the behavior (Cox, 2012). More precisely, Ajzen (2002) postulated that self-efficacy and controllability jointly determine PBC. The TPB proposes that PBC influences on intention because people are not naturally interested in behaviors, which leads them to failure. The role of PBC in the TPB can be investigated in two ways. First, it collectively with SN and attitude determines intention. Second, actual behavior can be affected directly by PBC (Chennamaneni *et al.*, 2012).

In the KS context, people do not intend to or perform KS unless there are reliable PBC, including self-efficacy and controllability. Reviewing literature, some researchers have questioned both the relationship between PBC and KSI (Ryu *et al.*, 2003; Idrus and Rochman, 2012;

Akhavan and Sarkhosh, 2015) and the relationship between PBC and KSB (Kuo and Young, 2008; Zhang and Ng, 2012). Sihombing (2011) even deduced that PBC impacts negatively on KSB. However, others acknowledge that PBC influence on intention (Lin and Lee, 2004; So and Bolloju, 2005; Teh *et al.*, 2010; Chen, 2011; Safa and Von Solms, 2016) and actual behavior (He-feng, 2009; Chennamaneni *et al.*, 2012; Wu and Zhu, 2012; Samad, 2018). Considering that supportive researches outweigh the negative ones, the following hypotheses can be drawn:

H3. The PBC associates with intention toward KS.

H4. The PBC associates with KSB.

Intention toward knowledge sharing and actual knowledge sharing behavior
Behavioral intention is motivational factor that indicates the readiness of a person for getting involved in a particular behavior. In other words, it refers to an individual's willingness to try or exert efforts for performing a behavior (Ajzen, 1991). Lee (2014) defined intention as a mental state which illustrates a commitment to executing a specific action to achieve a goal.

In the context of KM, intention means a knowledge worker's readiness and willingness to engage in KSB (Wu and Zhu, 2012). Regarding the mentioned literature, the intention in the TPB context is determined jointly by attitude, SN and PBC. Underlying these constructs, it is expected that KSI leads to actual KSB. Unless (Kuo and Young, 2008; Olatokun and Elueze, 2012) most studies investigated KS in TPB consensus that KSI affects actual KSB (Chen *et al.*, 2009; Teh *et al.*, 2010; Tohidinia and Mosakhani, 2010; Chen, 2011; Akhavan and Sarkhosh, 2015). Therefore, the following hypothesis can be proposed:

H5. The intention toward KS associates with KSB.

Figure 1 presents the hypotheses generated for investigating in this meta-analysis. Furthermore, Table I reveals the summarized definition of constructs used in the study.

Method
Meta-analysis has been widely accepted during the past 25 years in the social and managerial context as a useful research methodology that integrates quantitatively the findings of a set of single primary studies on a specific topic (Huedo-Medina *et al.*, 2006). The method used in this research is declared as follows:
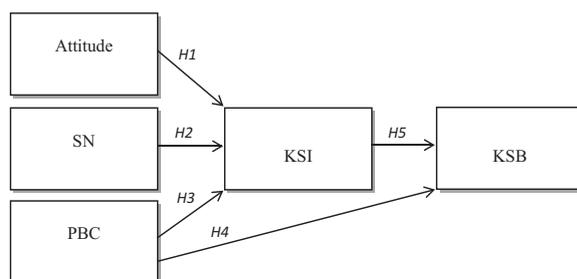
Notes: SN = subjective norms; PBC = perceived behavioral control; KSI = knowledge sharing intention; KSB = knowledge sharing behavior

Eligibility criteria

For conducting meta-analysis, an explicit set of inclusion and exclusion criteria should be developed for three reasons including:

(1) developing reliable guidance to decide which studies should be included in the meta-analysis;

(2) defining the population to which the meta-analysis make conclusions; and finally; and

(3) following the transparency goal in reporting, in the case that a reader performing the same searches could come to the same conclusions (Card, 2012).

For defining inclusion criteria, any study applying regression or structural equation modeling for analyzing the impact of TPB components on KSB was considered in this research. Studies were included if they:

• applied KSB as the independent variables;

• considered TPB elements entirely as a research model;

• presented analyzable data (i.e. correlation, *p*-value);

• used a self-report questionnaire for measuring or experimental research;

• were written in English or Farsi (Persian); and finally; and

• were research papers, dissertations and industrial studies, importing proper statistics to meta-analysis, and there were no constraints about the time and population of the studies.

Literature search

A multi-step literature search was operated to collect required primary studies for inclusion in the current research. First, the below databases were used for the literature search by applying the keywords of "knowledge sharing," "knowledge sharing behavior," "theory of planned behavior" and "theory of reasoned behavior".

• EBSCO;

• ProQuest;

• ScienceDirect;

• Elsevier;

• Sage;

• Emerald insight; and

• Taylor & Francis Online.

Construct	Definition
Attitude	A psychological tendency, based on an individual's previous and present experiences, with which he/she evaluates a behavior ranging from extremely negative to extremely positive
SN	One's perceived social pressure based on normative beliefs, as to whether a particular behavior is accepted, encouraged and performed by significant others
PBC	The extent to which a person perceived his/her ability to perform a particular behavior which is determined jointly by self-efficacy and controllability
Intention	Motivational factors indicating the readiness of an individual to exert efforts to perform a particular behavior for achieving a goal
KSB	A set of discretionary activities of making personal valuable knowledge and experience actively available to others within an organization to foster organizational learning

Table I.
Summarized definitions

Second, chain searching, also known as backward reference searching, was performed to ensure that maximum related studies, based on the considered criteria, had been identified in this meta-analysis. Chain searching involves identifying the studies cited in an article. The flow diagram of the study selection process is presented in Figure 2, and the results of literature searching are detailed in Table II.

Results

The meta-analysis was conducted by using the comprehensive meta-analysis software, version 2.2.064 (CMA2). In meta-analysis research, the statistical outcomes of every study are quantified using an effect-size index (i.e. correlation, odds ratio, etc.) which enables us to compare and interpret all results in the same metric (Cooper and Hedges, 1994; Hunter and Schmidt, 2004). Effect-size index was calculated for each study using statistics such as correlation, *t*-value, sample size, standard error and *p*-value depending on the data provided by the chosen studies.

Descriptive statistics

Participant characteristics, research methodology and countries of the included studies were coded for meta-analysis. The final sample included 46 surveys and just one experimental study. The range of publication dates is from 2003 to 2018 (mode = 2011, median = 2011). In total, 17 countries were presented in the sample illustrated in Table III. Just about 83 per cent
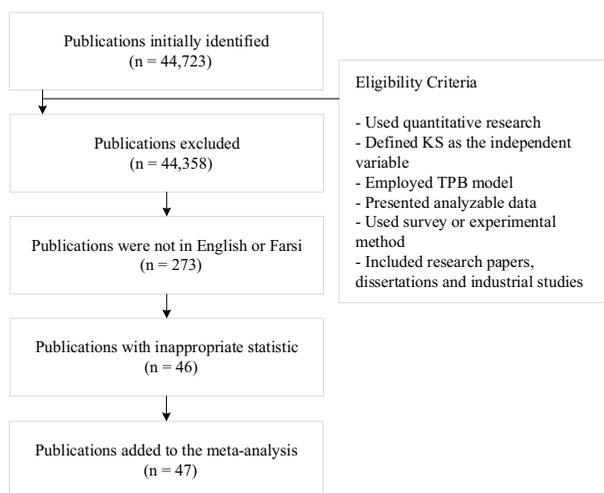

Figure 2.
Flow diagram of the
study selection
process

Criteria	Studies	(%)
Initial hits	44,723	100
Not relevant (based on inclusion and exclusion criteria)	44,358	− 99.18
Not in English or Farsi (Persian)	273	− 0.6
No or inappropriate statistics for meta-analysis	46	− 0.1
Available sample	46	0.1

Table II.
Identification of
included samples

Study (in chronological order)	Sample size	Country	Sample characteristics
Samad (2018)	336	Malaysia	Nurses at a public hospital
Stenius et al. (2015)	200	Finland	Using Webroot online survey in a company
Cheng (2017)	87	USA	Auditors from different accounting firms
Mafabi et al. (2017)	191	Uganda	Nurses and doctors
Safa and Von Solms (2016)	482	Malaysia	The employees of several Malaysian organizations
Arpaci and Baloglu (2016)	1,577	Turkey	Students majoring in information technology
Luturmas and Indarti (2016)	325	Indonesia	Employees from 13 hotels
Hau et al. (2016)	713	Korea	Corporate members of the Knowledge Management Research Center (KMRC)
Stenius et al. (2015)	200	Finland	A large public-sector organization
Wang et al. (2015)	314	Taiwan	Research and development (R&D) engineers from 52 high-technology firms
Chuang et al. (2015)	395	China	50 organizations
Akhavan and Sarkhosh (2015)	85	Iran	An industrial research and development center
Khalil et al. (2014)	363	Syria	School teachers
Verena and Cornelius (2014)	283	Germany	Four manufacturing companies
Alipourdarvishi (2014)	147	Iran	Students at two branches of Islamic Azad University in Tehran
Zhang and Ng (2012)	430	Hong Kong	All professionals working in construction teams in Hong Kong Special Administrative Region (HKSAR) government list
Wu and Zhu (2012)	213	China	Full-time employees enrolled in MBA and senior-level classes
Chennamaneni et al. (2012)	213	Southwest USA	Students enrolled in MBA and senior-level classes
Zhang and Ng (2012)	231	Hong Kong	Construction companies
Olatokun and Elueze (2012)	273	Nigerian	Registered lawyers and legal practitioners in the city of Ibadan
Mahyarni et al. (2012)	190	Indonesia	Lecturers in 16 Islamic universities in Riau province
Ibragimova et al. (2012)	220	Southwest USA	IT professionals in a university
Casimir et al. (2012)	483	Malaysia	Full-time employees from 23 organizations
Jeon et al. (2011)	282	Korea	Four large Korean high-tech production companies
Chen (2011)	300	Taiwan	High school teachers
Sihombing (2011)	127	Indonesia	Full-time and part-time faculty members in a private university
Shu and Chuang (2011)	217	Taiwan	Online survey
Hau and Kim (2011)	1,244	Korea	The user community of an online game developer
Teh and Yong (2011)	116	Malaysia	IT industrial practitioners
Teh et al. (2010)	400	Malaysia	Students at a university
Wei (2010)	213	China	Senior students
Tsai and Cheng (2010)	225	Taiwan	Software engineers

Table III.
Sample characteristics

Study (in chronological order)	Sample size	Country	Sample characteristics
Tohidinia and Mosakhani (2010)	502	Iran	10 of the 50 main oil companies
Zhikun and Fungfai (2009)	199	China	A-level architectural designers
Chatzoglou and Vraimaki (2009)	1,276	Greece	Bank employees
Chen et al. (2009)	396	Canada	Full-time senior college students and MBA students
He-feng (2009)	320	China	Knowledge organizations
Kuo and Young (2008)	304	Taiwan	Teachers
Kuo and Young (2008) – Study 1	235	Taiwan	Teachers
Kuo and Young (2008) – Study 2	304	Taiwan	Teachers
Bock et al. (2005)	259	Korea	30 organizations in 16 industries
So and Bolloju (2005)	170	–	Working IT professionals
Lin and Lee (2004)	154	Taiwan	720 senior managers
Ryu et al. (2003)	334	Korea	Chiefs of Graduate Medical Education (GME) Department of the 43 tertiary hospitals

Table III.

of the included studies targeted professionals in different industries as their populations. Table IV summarizes the descriptive statistics of the included studies.

Heterogeneity tests
Testing the heterogeneity is crucial in meta-analysis studies. The absence or the absence of true heterogeneity identifies the proper statistical model that should be applied in a meta-analysis study. Whenever the results of the chosen studies only differ by the sampling error (homogeneous case), the fixed-effects model is proper for attaining an average effect size. Conversely, meta-analysis can be calculated by using random-effect in case the included studies' results differ by more than the sampling error (Hedges and Olkin, 1985; Cooper and Hedges, 1994). Three different heterogeneity tests are commonly used in meta-analysis studies for assessing whether there is true heterogeneity; the tests are listed as follow:

- Tau-square is a statistical test for qualifying the true heterogeneity which consists of estimating the between-study variance (Huedo-Medina *et al.*, 2006).
- Q-test is a statistical test introduced by Cochran (1954) which is calculated by summing the squared deviations of each research's effect size from the overall effect estimate (Huedo-Medina *et al.*, 2006). Q-test weighs the contribution of each study by its inverse variance. Rejecting the homogeneity hypothesis mainly results in the random-effect model for the meta-analysis that includes both within- and between-study variability. In contrast, fixed-effects would be suitable for meta-analyzing.
- I-square is a statistical test proposed by Higgins and Thompson (2002) which measures the extent of true heterogeneity by dividing the difference between the result of the Q-test and its degrees of freedom (k-1) by the Q-value itself and multiplied by 100 (Huedo-Medina *et al.*, 2006).

Table V states the outcome of the heterogeneity tests. Q-value for all the studied hypotheses was significant ($p < 0.001$) which means that there is no true heterogeneity between studies. The amount of calculated I-squared in hypotheses is significantly higher than 75, which means that the extent of the absence of heterogeneity is high in each hypothesis, and hence, it can be deduced that the results of the I-squared test aligned with Q-test's findings. Finally, the resulted tau-squared in all included studies investigating the research hypotheses in which their amount is far less than 0.19, which reveals the absence of true heterogeneity in every single hypothesis. To conclude, all the heterogeneity tests confirmed the absence of

Category	Characteristic	No. of studies	(%) of studies
Participant characteristics	Students	5	10.63
	Professionals	39	82.98
	Students and professionals	3	6.38
Research method	Survey	46	97.87
	Experiment	1	2.13
Scope of KS	Inter-organizational	13	27.66
	Intra-organizational	34	72.34
Study continent of origin	Asia	33	70.22
	Africa	2	4.25
	North America	4	8.51
	Europe	4	8.51
	Middle East	4	8.51

Table IV.
Characteristics of included studies

heterogeneity between the included studies. Thus, the random-effect model is proper for meta-analysis calculations.

Publication bias analysis
The reliability of the conclusions of the meta-analysis strongly depends on publication bias (Begg and Berlin, 1988). Publication bias mainly results from reporting bias which arises when the submission of research findings is influenced by the nature and direction of results (Sterne *et al.*, 2011). Statistically significant "positive" findings are more likely to be reported, published in high impact journals and cited by others (Hopewell *et al.*, 2007). Thus, results that are negative or non-significant may be filtered, manipulated or presented as positive results (Turner *et al.*, 2008). Rosenthal (1979) claimed that researchers tend to not submit studies with insignificant or negative results, called "the file drawer effect," which may overstate the effect size in a meta-analysis. To assess publication bias, the funnel plot, the trim and fill method, the fail-safe *n* and rank correlation (Talebi, 2013) were applied.

Funnel plot
The funnel plot (Figures 3-7) is a graphical scatter plot of the effect estimates from individual studies against some measure of each study's size or precision. In this plot, the larger, most powerful studies were placed toward the top (Sterne *et al.*, 2011). An asymmetrical funnel plot would suggest publication bias (Whitehead, 2002). In the absence of publication bias, the plot presents a symmetrical inverted funnel. Figures 3-7 illustrate the funnel plot of the included studies for every single hypothesis. By investigating the presented funnel plots, it is found that there is no evidence of asymmetry unless in studies investigating the relationship between PBC and KSB. Therefore, there are no publication bias in the included studies examining the relationship between attitude and intention (toward KS), SN and intention, PBC and intention and finally intention and KSB. However, there is publication bias in reporting the relationship between PBC and actual KSB. The trim and fill method, presented in the next session, defines to what extent this bias would influence the results of this meta-analysis study.

The trim and fill method
The trim and fill algorithm is based on the formalization of the qualitative approach using the funnel plot (Figures 3-7). First, it trims off the asymmetric outlying part of the funnel plot after calculating the number of studies placed in the asymmetric part. Second, the symmetric remainder is used to estimate the true center of the funnel, and then the trimmed studies and their missing counterparts are replaced around the center. Then the final estimate of the true mean and its variance are calculated based on the filled funnel plot (Duval and Tweedie, 2000).

Hypotheses	Q-value	*p*-value	I^2	Tau^2	Standard error	Heterogeneity result
Attitude > intention	628.945	0.000	93.322	0.048	0.016	ABOTH
SN > intention	617.531	0.000	94.170	0.049	0.016	ABOTH
PBC > intention	373.011	0.000	94.102	0.062	0.025	ABOTH
Intention > KSB	532.713	0.000	94.556	0.060	0.022	ABOTH
PBC > KSB	213.060	0.000	94.368	0.066	0.036	ABOTH

Note: ABOTH = absence of true heterogeneity

Table V.
Results of
heterogeneity tests

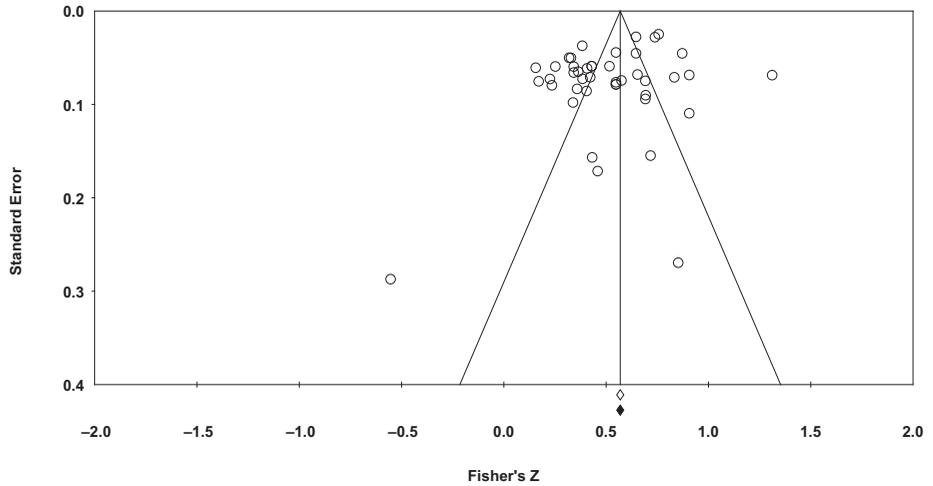**Funnel Plot of Standard Error by Fisher's Z**

Figure 3.
The funnel plot of
standard error of
chosen studies
investigating
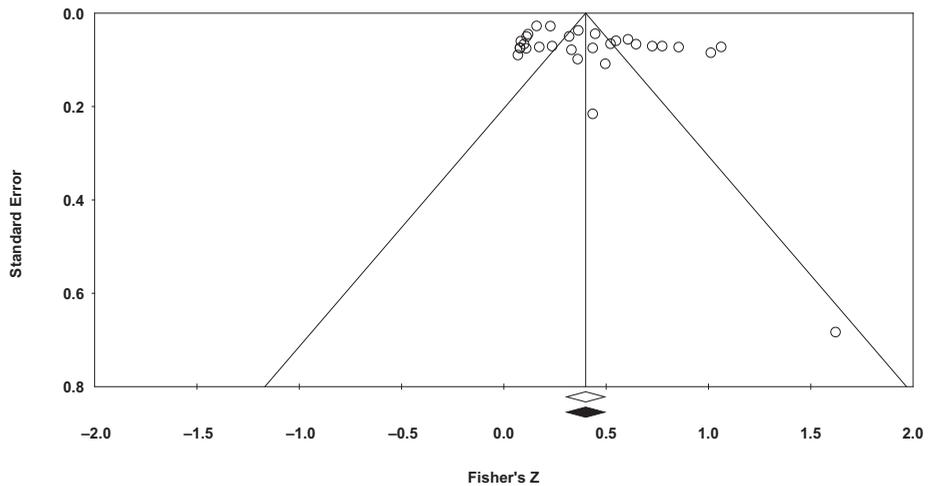attitude > KSI

Funnel Plot of Standard Error by Fisher's Z

Figure 4.
The funnel plot of
standard error of
chosen studies
investigating
KSI > KSB

The illustrated results in Table VI reveal that there are 12 studies containing publication bias and would make a difference in the calculated effect size of the included studies investigating the relationship between SN and KSI. If these studies included this meta-analysis, the results would shift to the right side of the mean, in which the effect size would change from 0.281 to 0.362, and the lower and upper limits would increase from 0.211 to 0.297 and from 0.348 to 0.423, respectively. The same state also exists for the included studies about the relationship between attitude and KSI. In case if the unseen publication is
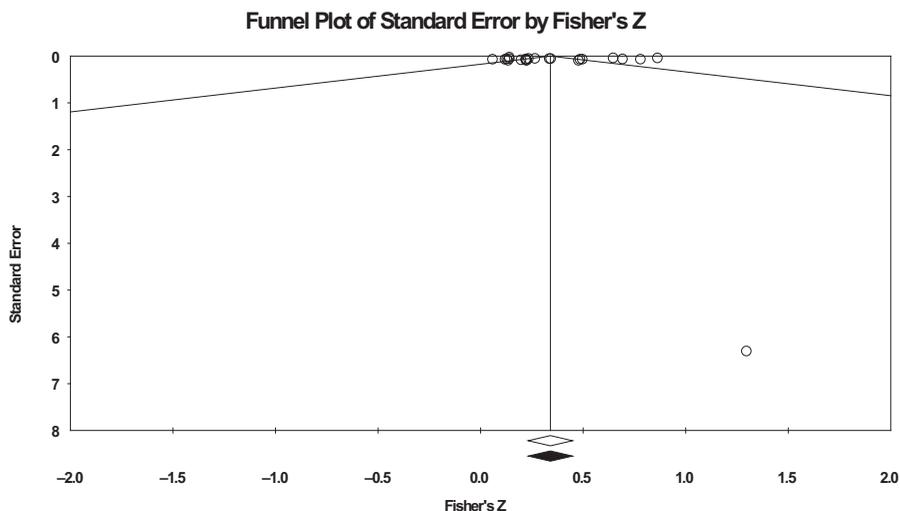
Funnel Plot of Standard Error by Fisher's Z

Figure 5.
The funnel plot of
standard error of
chosen studies
investigating
PBC > KSI

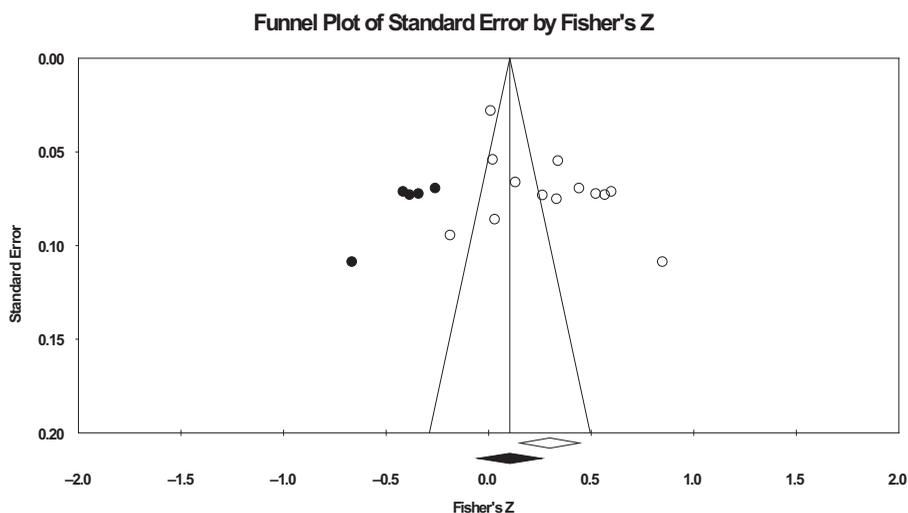**Funnel Plot of Standard Error by Fisher's Z**

Figure 6.
The funnel plot of
standard error of
chosen studies
investigating
PBC > KSB

added to this research, the effect size would grow from 0.477 to 0.499 with the modest change to the right side of the mean in lower and upper limits.

The fail-safe N
The fail-safe N, also referred to as "file drawer analysis," is proposed by Rosenthal (1979). A meta-analysis reports a significant *p*-value based on k studies. The test computes the extent of missing studies to which the *p*-value would no longer be significant. For this, the mean

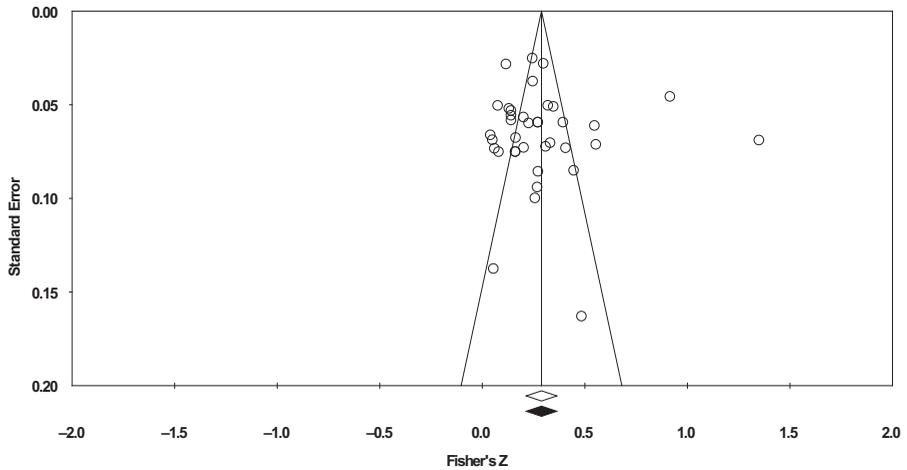**Funnel Plot of Standard Error by Fisher's Z**

Figure 7.
The funnel plot of
standard error of
chosen studies
investigating
SN > KSI

Trim and fill method	Studies trimmed		Studies trimmed	Random-effect model		
	To left of mean	To right of mean		Point estimate	Lower limit	Upper limit
Attitude > intention	0	2	OV	0.477	0.420	0.529
			AV	0.492	0.437	0.544
SN > intention	0	12	OV	0.281	0.211	0.348
			AV	0.362	0.297	0.423
PBC > intention	0	0	OV	0.327	0.228	0.420
			AV	0.327	0.228	0.420
Intention > KSB	0	0	OV	0.380	0.298	0.456
			AV	0.380	0.298	0.456
PBC > KSB	0	0	OV	0.289	0.152	0.415
			AV	0.289	0.152	0.415

Table VI.
The trim and
fill method

Notes: OV = observed values; AV = adjusted values

effect of the missing studies is assumed to be zero. While conducting the test, if only a few studies (say, ten) should emerge to nullify the effect, then the effect is indeed zero. However, if a larger number of studies (say, 5,000) are required to nullify the effect, there would be less reason for concern about the meta-analysis outcomes (Rosenthal, 1979).

Simply said, the results stated in Table VII explain that 13,459 studies with converse results are required to change the findings of this meta-analysis about the relationship between attitude and KSI (*H1*). Similarly, 8,375; 3,771; 8,123 and 713 further discordant studies are required to impair the findings of *H2* to *H5* testing, respectively.

Rank correlation
Begg and Mazumdar (1994) proposed a formal publication bias test, called "rank correlation" test, which is used based on Kendall's tau (Talebi, 2013). The test is performed

to test for correlation between t and its variance among the selected studies (Begg and Mazumdar, 1994).

In this test, the significant negative tau is concluded as the likelihood of publication bias. Investigating the noted results in Table VIII asserts that there is no publication bias regarding the included studies investigating the research hypotheses.

Hypotheses testing
Table IX declares the results of meta-analyzing the data presented by the included studies for each hypothesis. Further investigation is reported in the following sections.

For *H1*, by using the random-effect model for meta-analyzing, the effect size of the relationship between attitude and KSI was calculated as 0.477 with the lower and upper

Fail-safe N	k	z-value	NOMS
Attitude > intention	43	54.780	13,549
SN > intention	37	29.551	8,375
PBC > intention	23	25.172	3,771
Intention > KSB	30	32.309	8,123
PBC > KSB	13	14.647	713

Notes: k = Number of observed studies; NOMS = Number of required missing studies that would bring p-value to > alpha (= 0.05)

Table VII.
The fail-safe N test

Hypotheses	KS	KT without CC		KT with CC		Result
		Tau	z-value	Tau	z-value	
Attitude > intention	19	0.021	0.199	0.200	0.188	NPB
SN > intention	54	0.081	0.706	0.080	0.693	NPB
PBC > intention	−1	−0.004	0.026	0.000	0.000	NPB
Intention > KSB	95	0.219	1.69	0.217	1.677	NPB
PBC > KSB	16	0.205	0.976	0.192	0.915	NPB

Notes: KS = Kendall's S statistic; KT without CC = Kendall's tau without continuity correlation; KT with CC = Kendall's tau with continuity correlation; NPB = No publication bias; SN = Subjective norms; PBC = Perceived behavioral control; KSI = Knowledge sharing intention; KSB = Knowledge sharing behavior

Table VIII.
The rank correlation test

Hypothesis	Prediction	N	k	Correlation	LL	UL	p-value
Attitude > intention	+		43	0.477	0.421	0.529	0.000
SN > intention	+		37	0.281	0.211	0.348	0.000
PBC > intention	+		23	0.328	0.228	0.420	0.000
Intention > KSB	+		30	0.380	0.298	0.456	0.000
PBC > KSB	+		13	0.289	0.152	0.416	0.000

Notes: SN = Subjective norms; PBC = Perceived behavioral control; KSI = Knowledge sharing intention; KSB = Knowledge sharing behavior; N = Cumulative sample size; k = Number of studies cumulated; correlation is calculated based on random-effect model; LL = Lower limit (CI = 95%); UL = Upper limit (CI = 95%)

Table IX.
Hypotheses testing results

limits of 0.421 and 0.529, respectively. Although the calculated effect size of the study conducted by Teh and Yong (2011) was not significant (z-value = 1.920), the summarized z-value shows that the meta-analysis effect size is significant (z-value = 14.478). Overall, this meta-analysis acknowledges the relationship between attitude and KSI (*H1*), and it predicts that their correlation is 0.477. Regarding the fail-safe N result, 13,549 research studies with the discordant results are needed to make this relationship insignificant. Thus, the finding is reliable. Supporting the information, Table I states the findings including the analysis of the 43 included studies.

For *H2*, the calculated effect size based on the random-effect model for the relationship between SN and KSI was calculated as 0.281 with the lower and upper limits of 0.211 and 0.348, respectively. The calculated effect size in some studies was not significant (So and Bolloju, 2005; Kuo and Young, 2008: the fourth research model; Sihombing, 2011; Zhang and Ng, 2012; Khalil *et al.*, 2014). However, the summarized z-value shows that the meta-analysis effect size is significant (z-value = 7.588). Overall, this meta-analysis acknowledges the relationship between SN and KSI (*H2*), and it predicts that their correlation is 0.281. Considering the fail-safe N result (Table VII), 8,375 research studies with the discordant result are required to shift the p-value by more than 0.05, which means the finding is reliable. Supporting the information, Table II shows the findings including the analysis of 37 chosen studies.

For *H3*, the effect size of the correlation between PBC and KSI was calculated as 0.328 with the lower and upper limits of 0.228 and 0.420, respectively. Although the calculated effect size of the study conducted by Akhavan and Sarkhosh (2015), Chennamaneni *et al.* (2012), Mahyarni *et al.* (2012) and So and Bolloju (2005) were not significant (z-values = 1.409, 1.604, 0.811 and 0.206, respectively), the summarized z-value claims that the meta-analysis effect size is significant (z-value = 6.170). By the conclusion, this meta-analysis asserts the significant correlation between PBC and KSI (*H3*), and it predicts that this correlation would be 0.328. Regarding the fail-safe N result (Table VII), 3,771 research studies with the discordant result are needed to make this relationship insignificant. Thus, the finding is reliable. Supporting the information, Table III details the findings including the analysis of 23 included studies.

For *H4*, the calculated effect size based on the random-effect model for the relationship between KSI and actual KSB was calculated as 0.380 with the lower and upper limits of 0.298 and 0.456, respectively. The calculated effect size in some studies was not significant (Kuo and Young, 2008; Kuo and Young, 2008; Olatkun and Nwafor, 2011). However, the summarized z-value emphasize that the meta-analysis effect size is significant (z-value = 8.438). Overall, this meta-analysis confirms that the relationship between KSI and actual KSB (*H4*), and it predicts that the correlation is 0.380. Considering the fail-safe N result (Table VII), 8,123 research studies with the discordant result are required to shift the p-value by more than 0.05, which means the finding is reliable. Supporting the information, Table IV depicts the findings including the analysis of 30 chosen studies.

For *H5*, the effect size of the correlation between PBC and actual KSB was calculated as 0.289 with the lower and upper limits of 0.152 and 0.416, respectively. Although the calculated effect size of the studies conducted by Chatzoglou and Vraimaki (2009) and Kuo and Young (2008) were not significant (z-value = 0.357 and 0.349, respectively), the summarized z-value claims that the meta-analysis effect size is significant (z-value = 4.030). By the conclusion, this meta-analysis asserts the significant correlation between PBC and KSB (*H5*), and it predicts that this correlation would be 0.289. Regarding the fail-safe N result, 713 research studies with the discordant result are needed to make this relationship insignificant. Thus, the finding is reliable. Supporting the information, Table V details the findings including the analysis of 13 included studies.

**Discussion**

Summary of results and limitations

This meta-analysis predicts that KSB would be influenced by KSI and PBC. Moreover, KSI itself would be derived from the attitude toward KS, supportive SN and PBC. Figure 8 summarizes the results.

This investigation is a quantitative meta-analysis summary of the studies conducted to clarify KSB in the context of the TPB. The goal of this investigation is to generate a generalizable and integrated prediction of KSB based on the TPB regarding the discord findings of the studies conducted on this topic. One important limitation of this research was ignoring the antecedents of attitude, SN and PBC, because this research just focused on the application of TPB in KSB. Therefore, future research may be conducted on the determinants of these constructs. A second limitation was the language bias. In total, 273 studies were eliminated from this meta-analysis because of the language barrier. Those studies were in other languages except English and Farsi (Persian). Hence, the other researches can improve the results of this meta-analysis considering other related studies in other languages. Although these excluded studies are much less than the calculated fail-safe N and cannot change the results, they can improve the quality of findings.

Implications

The primary implication of this meta-analysis is to deeply interpret the essence of KSB and its determinant, by which managers can encourage the conduction of this valuable behavior in their organizations. As regards the importance of KS as a knowledge process, understanding this behavior plays a significant role in implementing successful KM practices.

After deep investigation, the results emphasize that a positive attitude has the strongest influence on enhancing KSI comparing other factors. Hence, managers can develop positive attitudes by incentivizing internally and externally the KSBs to enhance positive attitudes. Next, PBC has the highest influence on the intention of KS. Thus, managers can develop training programs to develop the knowledge competency of employees to know how they can participate in KS. Finally, the SNs' influence on KS suggests managers to prepare a supportive environment for the emergence of KS. Whenever managers cultivate such an environment, KSI is expected to end up in KSB.
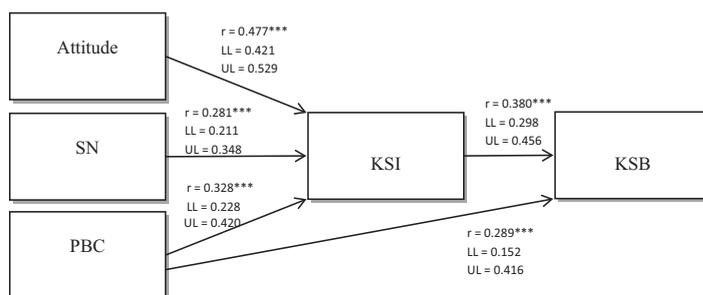
Notes: SN = Subjective norms; PBC = Perceived behavioral control;
KSI = Knowledge sharing intention; KSB = Knowledge sharing behavior

Figure 8.
The results of the
meta-analysis
research

Conclusion

This research reviewed conducted research studies, investigating the application of the TPB to describe KSB. The results of this meta-analysis contribute to the KSB by helping managers to understand the psychological antecedent of KS and the importance of each component. Based on the findings, it can be concluded that attitude, PBC and subjective norms have a positive influence on KSI. The components were named in a descending trend regarding their impact. Moreover, KSI predicts KSB with PBC. Overall, the TPB can be used as a psychological model to predict KSB in organizations.

This research has two limitations worthy to be considered in future research. First, this investigation ignores the antecedents of the TPB's constructs, for example, self-efficacy as a predictor of PBC. Hence, future research may investigate the antecedents of attitudes toward KS, SN and PBC for expanding the provided model. The second limitation this research encountered was the quality of measures for KSB. The investigation reveals that there is potential that participants fall into "cooperation bias" and overestimate their tendency to share knowledge. Therefore, this limitation can be addressed in future studies by measuring the actual KSB in the workplace.

References

Afshar Jalili, Y., Sadeghi, N., Fakhimi, S. and Beik-khakhian, B. (2011), "How can we systematically manage lessons learned in projects?", *2nd International Conference on Construction and Project Management*, Vol. 15, pp. 112-119.

Afshar Jalili, Y. (2019), "I rather share my knowledge: Applying gamification approach and nudge theory to develop an incentive system", *VINE Journal of Information and Knowledge Management Systems*, doi: 10.1108/VJIKMS-04-2019-0052.

Afshar Jalili, Y. and Salemipour, F. (2019), "Group organizational citizenship behavior and knowledge sharing: the moderating role of workgroup emotional climate", *VINE Journal of Information and Knowledge Management Systems*, Vol. 50 No. 1, pp. 117-135.

Afshar-Jalili, Y. and Ghaleh, S. (2018), "Predicting knowledge sharing behavior based on people's early core beliefs", *The IUP Journal of Knowledge Management*, Vol. 16 No. 4, pp. 29-50.

Ahmad, F. (2017), "Knowledge sharing networks: Language diversity, its causes, and consequences", *Knowledge and Process Management*, Vol. 24 No. 2, pp. 139-151, doi: 10.1002/kmp.1539.

Ajzen, I. (1985), "'From intentions to actions: a theory of planned behavior", in Kuhl, J. and Beckmann, J. (Eds), *Action-Control: From Cognition to Behavior*, Springer, Heidelberg, pp. 11-39.

Ajzen, I. (1988), *Attitudes, Personality and Behavior*, Open University Press: Milton Keynes.

Ajzen, I. (1991), "Theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Ajzen, I. (2002), "Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior", *Journal of Applied Social Psychology*, Vol. 32 No. 4, pp. 665-683.

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.

Akhavan, P. and Sarkhosh, S.M.H. (2015), "Examining the effects of motivational and organizational determinants on knowledge-sharing behavior (case study in an industrial research and development center)", *Iranian Journal of Information Processing Management*, Vol. 30 No. 4, pp. 1051-1084.

Alavi, M. and Leinder, D.E. (2001), "Knowledge management and knowledge management systems: conceptual foundations and research issues", *Mis Quarterly*, Vol. 25 No. 1, pp. 107-136.

Alipourdarvishi, Z. (2014), "Providing a combined model of knowledge sharing intention among IAU faculty", *Information Technology Management*, Vol. 6 No. 1, pp. 107-126.

Armitage, C.J. and Conner, M. (2001), "Efficacy of the theory of planned behaviour: a meta-analytic review", *British Journal of Social Psychology*, Vol. 40 No. 4, pp. 471-499.

Arpaci, I. and Baloglu, M. (2016), "The impact of cultural collectivism on knowledge sharing among information technology majoring undergraduates", *Computers in Human Behavior*, Vol. 56, pp. 65-71.

Begg, C.B. and Berlin, J.A. (1988), "Publication bias: a problem in interpreting medical data", *J R Statist Soc A*, Vol. 151 No. 3, pp. 419-463.

Begg, C.B. and Mazumdar, M. (1994), "Operating characteristics of a rank correlation test for publication bias", *Biometrics*, Vol. 50 No. 4, pp. 1088-1101.

Bock, G., Robert, W. and Kim, Y. (2005), "Behavioral intention formation in knowledge sharing: examining the", *MIS Quarterly*, Vol. 29 No. 1, pp. 87-111.

Card, N.A. (2012), *Applied Meta-Analysis for Social Science Research*, The Guilford Press, New York, NY, doi: 10.15713/ins.mmj.3.

Casimir, G., Ng, Y.N.K. and Cheng, C.L.P. (2012), "Using IT to share knowledge and the TRA", *Journal of Knowledge Management*, Vol. 16 No. 3, pp. 461-479, doi: 10.1108/13673271211238779.

Chatzoglou, P.D. and Vraimaki, E. (2009), "Knowledge-sharing behaviour of bank employees in Greece", *Business Process Management Journal*, Vol. 15 No. 2, pp. 245-266. doi: 10.1108/14637150910949470.

Chen, C.-C. (2011), "Factors affecting high school teachers' knowledge-sharing behaviors", *Social Behavior and Personality: An International Journal*, Vol. 39 No. 7, pp. 993-1008, doi: 10.2224/sbp.2011.39.7.993.

Cheng, X. (2017), "Applying the theory of planned behavior to influence auditors' knowledge-sharing behavior", Graduate Theses and Dissertations, University of South Florida Scholar Commons, available at: http://scholarcommons.usf.edu/etd/6691

Chennamaneni, A., Teng, J.T.C. and Raja, M.K. (2012), "A unified model of knowledge sharing behaviours: theoretical development and empirical test", *Behaviour and Information Technology*, Vol. 31 No. 11, pp. 1097-1115, doi: 10.1080/0144929X.2011.624637.

Choi, B. and Lee, H. (2003), "Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination", *Journal of Management Information Systems*, Vol. 20 No. 1, pp. 179-228.

Chua, A. (2003), "Knowledge management system architecture: a bridge between knowledge management consultants and technologists", *International Journal of Information Management*, Vol. 24 No. 1, pp. 87-98.

Chuang, S.S., Chen, K.S. and Tsai, M.T. (2015), "Exploring the antecedents that influence Middle management employees' knowledge-sharing intentions in the context of total quality management implementations", *Total Quality Management and Business Excellence*, Vol. 26 Nos 1/2, pp. 108-122, doi: 10.1080/14783363.2013.809941.

Cochran, W.G. (1954), "The combination of estimates from different experiments", *Biometrics*, Vol. 10 No. 1, pp. 101-129.

Connelly, C.E. and Kelloway, K.E. (2003), "Predictors of employees' perceptions of knowledge sharing cultures", *Leadership and Organization Development Journal*, Vol. 24 No. 5, pp. 294-301, doi: 10.1108/01437730310485815.

Cooper, H. and Hedges, L.V. (1994), *The Handbook of Research Synthesis*, Russell Sage Foundation: New York, NY.

Cox, J. (2012), "Information systems user security: a structured model of the knowing-, doing gap", *Computers in Human Behavior*, Vol. 28 No. 5, pp. 1849-1858, doi: 10.1016/j.chb.2012.05.003.

Dainty, A.R., Qin, J. and Carrillo, P.M. (2005), "HRM strategies for promoting knowledge sharing within construction project organizations: a case study", in Kazi, A.S., *Knowledge Management in the Construction Industry: A Socio-Technical Perspective*, Idea Group, Hershey, PA, pp. 18-23.

Davenport, T.H. and Prusak, L. (1998), *Working Knowledge: How Organizations Manage What They Know, Knowledge Creation Diffusion Utilization*, Harvard Business Press, Boston, MA, doi: 10.1109/EMR.2003.1267012.

Dixon, N.M. (2000), *Common Knowledge: How Companies Thrive by Sharing What They Know*, Harvard Business School Press, Boston, MA.

Donnely, R. (2019), "Aligning knowledge sharing interventions with the promotion of firm success: the need for SHRM to balance tensions and challenges", *Journal of Business Research*, Vol. 94, pp. 344-352.

Duval, S. and Tweedie, R. (2000), "Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis", *Biometrics*, Vol. 56 No. 2, pp. 455-463.

Foss, N., Husted, K. and Michailova, S. (2010), "Governing knowledge sharing in organizations: levels of analysis, governance mechanisms, and research directions", *Journal of Management Studies*, Vol. 47 No. 3, pp. 455-482.

Gagne, M. and Deci, E.L. (2005), "Self-determination theory and work motivation", *Journal of Organizational Behavior*, Vol. 26 No. 4, pp. 331-362, doi: 10.1002/job.322.

Hameed, Z., Khan, I.U., Sheikh, Z., Islam, T., Rasheed, M.I. and Naeem, R.M. (2019), "Organizational justice and knowledge sharing behavior: the role of psychological ownership and perceived organizational support", *Personnel Review*, Vol. 48 No. 3, pp. 748-773, doi: 10.1108/PR-07-2017-0217.

Hansen, S. and Avital, M. (2005), "Share and share alike: the social and technological influences on knowledge sharing behavior", *Sprouts : Working Papers on Information Systems*, Vol. 5 No. 13, pp. 1-19.

Hau, Y.S. and Kim, Y.G. (2011), "Why would online gamers share their innovation-conducive knowledge in the online game user community? Integrating individual motivations and social capital perspectives", *Computers in Human Behavior*, Vol. 27 No. 2, pp. 956-970, doi: 10.1016/j.chb.2010.11.022.

Hau, Y.S. and Kim, B. and Lee, H. (2016) "What drives employees to share their tacit knowledge in practice?", *Knowledge Management Research & Practice*, Vol. 14, pp. 295-308, doi: 10.1057/kmrp.2014.32.

Hedges, L.V. and Olkin, I. (1985), *Statistical Methods for Meta-Analysis*, Academic Press, Boston, MA.

He-Feng, X.I.E. (2009), "The determinations of employee 's knowledge sharing behavior: an empirical study based on the theory of planned behavior", *2009 International Conference on Management Science and Engineering*, IEEE, pp. 1209-1215.

Hepler, J. (2015), "A good thing isn't always a good thing: dispositional attitudes predict non-normative judgments", *Personality and Individual Differences*, Vol. 75, pp. 59-63.

Higgins, J.P.T. and Thompson, S.G. (2002), "Quantifying heterogeneity in a Meta-analysis", *Statistics in Medicine*, Vol. 21 No. 11, pp. 1539-1558.

Hooff, V. D B. and Hendrix, L. (2004), "'Eagerness and willingness to share: the relevance of different attitudes towards knowledge sharing", *Proc., Organizational Knowledge, Learning and Capabilities*, Innsbrick.

Hopewell, S., Clarke, M.J., Stewart, L. and Tierney, J. (2007), *Time to Publication for Results of Clinical Trials*, 2nd ed., Cochrane Database of Systematic Reviews, No. 2, doi: 10.1002/14651858.MR000011.pub2.

Huedo-Medina, T.B., Sánchez-Meca, J., Marín-Martínez, F. and Botella, J. (2006), "Assessing heterogeneity in meta-analysis", *Psychological Methods*, Vol. 11 No. 2, pp. 193-206, doi: 10.1037/1082-989X.11.2.193.

Hunter, J.E. and Schmidt, F.L. (2004), *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings*, 2nd ed., Sage, New York, NY.

Husted, K. and Michailova, S. (2002), "Knowledge sharing in Russian companies with western participation", *Management International*, Vol. 6 No. 2, pp. 17-28.

Ibragimova, B., Ryan, S.D., Windsor, J.C. and Prybutok, V.R. (2012), "Understanding the antecedents of knowledge sharing: an organizational justice perspective", *Informing Science*, Vol. 15, pp. 183-205.

Idrus, M.S. and Rochman, F. (2012), "Knowledge factors of knowledge sharing intention and behavior", *Asia Pacific Management and Business Application*, Vol. 1 No. 2, pp. 103-115.

Igbinovia, M.O. (2018), "Predictors of knowledge sharing behaviour on sustainable development goals among library personnel in Nigeria", *IFLA Journal*, Vol. 44 No. 2, pp. 119-131, doi: 10.1177/0340035218763445.

Chen, I.Y., Chen, N.S. and Kinshuk, (2009), "Examining the factors influencing participants' knowledge sharing behavior in virtual learning communities", *Educational Technology and Society*, Vol. 12 No. 1, pp. 134-148.

Jeon, S., Kim, Y.G. and Koh, J. (2011), "An integrative model for knowledge sharing in communities-of-practice", *Journal of Knowledge Management*, Vol. 15 No. 2, pp. 251-269, doi: 10.1108/13673271111119682.

Khalil, T., Atieh, K., Mohammad, A.U. and Bagdadlian, F. (2014), "Examining the social and technical factors influencing school teachers knowledge sharing intentions in a teachers online professional community", *Electronic Journal of Knowledge Management*, Vol. 12 No. 3, pp. 157-165.

King, W.R. and Marks, P.V.J. (2008), "Motivating knowledge sharing through a knowledge management system", *Omega*, Vol. 36 No. 1, pp. 131-146.

Kuo, F. and Young, M. (2008), "Predicting knowledge sharing practices through intention: a test of competing models", *Computers in Human Behavior*, Vol. 24 No. 6, pp. 2697-2722, doi: 10.1016/j.chb.2008.03.015.

Lee, W.K. (2014), "The temporal relationships among habit, intention and is uses", *Computers in Human Behavior*, Vol. 32, pp. 54-60, doi: 10.1016/ j.chb.2013.11.010.

Li, Z., Li, M. and Li, J. (2008), "An empirical research on the influencing factors of knowledge sharing willingness among virtual community members", *2008 4th International Conference on Wireless Communications, Networking and Mobile Computing*, pp. 1-4, doi: 10.1109/WiCom.2008.2622.

Lin, H. and Lee, G. (2004), "Perceptions of senior managers toward knowledgesharing behaviour", *Management Decision*, pp. 108-125, doi: 10.1108/00251740410510181.

Ling, F.Y., Ke, Y., Kumaraswamy, M.M. and Wang, S. (2013), "Key relational contracting practices affecting performance of public construction projects in China", *Journal of Construction Engineering and Management*, Vol. 142, pp. 1-12, doi: 10.1061/(ASCE)CO.1943-7862.

Luturmas, J.R. and Indarti, N. (2016), "Underlying factors of attitude and intention towards knowledge sharing among employees: the case of the hotel business in Ambon ", *Journal of Indonesian Economy and Business*, Vol. 31 No. 1, pp. 292-306.

Mafabi, S., Nasiima, S., Muhimbise, E.M., Kasekende, F. and Nakiyonga, C. (2017), "The mediation role of intention in knowledge sharing behavior", *VINE Journal of Information and Knowledge Management Systems*, Vol. 47 No. 2, pp. 172-193, doi: 10.1108/VJIKMS-02-2016-0008.

Mahyarni, M., Idrus, M.S., Rohman, F. and Noermijati, N. (2012), "Knowledge factors of knowledge sharing intention and behavior", *Asia-Pacific Management and Business Application*, Vol. 1 No. 2, pp. 103-115.

Markus, M.L. (2001), "Towards a theory of knowledge reuse: types of knowledge reuse situations and factors in reuse success", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 57-94.

Nickerson, J. and Zenger, T. (2004), "A knowledge-based theory of the firm: the problem-solving perspective", *Organization Science*, Vol. 15 No. 6, pp. 617-632.

Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation", *Organization Science*, Vol. 5 No. 1, pp. 14-37.

O'Dell, C. and Grayson, C.J. (1998), "If only we knew what we know: identification and transfer of internal best practices", *California Management Review*, Vol. 40 No. 3, pp. 154-174.

Olatkun, W. and Nwafor, C. (2011), "The effect of extrinsic and intrinsic motivation on knowledge sharing intentions of civil servants in Ebonyi state, Nigeria", *Information Development*, Vol. 28 No. 3, pp. 1-19.

Olatokun, W.M. and Elueze, I.N. (2012), "Analysing lawyers' attitude towards knowledge sharing", *SA Journal of Information Management*, Vol. 14 No. 1, pp. 1-11, doi: 10.4102/sajim.v14i1.507.

Oliveira, M., Curado, C. and Henriques, P.L. (2019), "Knowledge sharing among scientists: a causal configuration analysis", *Journal of Business Research*, Vol. 101, pp. 777-782, doi: 10.1016/j.jbusres.2018.12.044.

Philsoophian, M., Akhavan, P., Ghorbani, S. and Afshar, Y. (2016), "The Delphi method for selection of KM strategies based on the level of KM maturity: a case of OICO, Iran", *IUP Journal of Knowledge Management*, Vol. 14 No. 4, pp. 7-17.

Reychav, I. and Weisberg, J. (2009), "Good for workers, good for companies: how knowledge sharing benefits individual employees", *Knowledge and Process Management*, Vol. 16 No. 4, pp. 186-197.

Rosenthal, R. (1979), "The 'file drawer problem' and tolerance for null results", *Psychological Bulletin*, Vol. 86 No. 3, pp. 638-641.

Ryu, S., Ho, S.H. and Han, I. (2003), "Knowledge sharing behavior of physicians in hospitals", *Expert Systems with Applications*, Vol. 25 No. 1, pp. 113-122.

Safa, N.S. and Von Solms, R. (2016), "An information security knowledge sharing model in organizations", *Computers in Human Behavior*, Vol. 57, pp. 442-451, doi: 10.1016/j.chb.2015.12.037.

Samad, S. (2018), "Theory of planned behavior and knowledge sharing among nurses in patient computer management system: the role of distributive justice", *Management Science Letters*, Vol. 8, pp. 427-436, doi: 10.5267/j.msl.2018.4.003.

Senge, P. (1998), "Knowledge sharing", *Executive Excellence*, Vol. 15 No. 6, pp. 11-12.

Shadish, W.R., Cook, T.D. and Campbell, D.T. (2002), *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*, Houghton Mifflin, Boston, MA.

Sheppard, B.H., Hartwick, J.O.N. and Warshaw, P.R. (1988), "The theory of reasoned action: a meta-analysis of past research with recommendations for modifications and future research", *Journal of Consumer Research*, Vol. 15 No. 3, pp. 325-343.

Shu, W. and Chuang, Y.-H. (2011), "Why people share knowledge in virtual communities", *Social Behavior and Personality: An International Journal*, Vol. 39 No. 5, pp. 671-690, doi: 10.2224/sbp.2011.39.5.671.

Sihombing, S.O. (2011), "Understanding knowledge sharing behavior: an examination of the extended model of theory of planned behavior", *The Winners*, Vol. 12 No. 1, pp. 24-39.

Singh, S.K., Gupta, S., Busso, D. and Kamboj, S. (2019), "Top management knowledge value, knowledge sharing practices, open innovation and organizational performance", *Journal of Business Research*, doi: 10.1016/j.jbusres.2019.04.040.

So, J.C.F. and Bolloju, N. (2005), "Explaining the intentions to share and reuse knowledge in the context of IT service operations", *Journal of Knowledge Management*, Vol. 9 No. 6, pp. 30-41.

So, J.C.F. and Bolloju, N. (2010), "Explaining the intentions to share and reuse knowledge in the context of IT service operations", *Journal of Knowledge Management Industrial Management*, Vol. 9 No. 4, pp. 30-41, doi: 10.1108/13673270510629945.

Stenius, M., Hankonen, N., Haukkala, A. and Ravaja, N. (2015), "Understanding knowledge sharing in the work context by applying a belief elicitation study", *Journal of Knowledge Management*, Vol. 19 No. 3, pp. 497-513, doi: 10.1108/JKM-12-2014-0523.

Sterne, J.A., Sutton, A.J., Ioannidis, J.P., Terrin, N., Jones, D.R., Lau, J., Carpenter, J., Rücker, G., Harbord, R.M., Schmid, C.H. and Tetzlaff, J. (2011), "Recommendations for examining and interpreting funnel plot asymmetry in meta-analyses of randomized controlled trials", *BMJ*, Vol. 343 No. 7818, pp. 1-8, doi: 10.1136/bmj.d4002.

Sussman, R. and Gifford, R. (2019), "Causality in the theory of planned behavior", *Personality and Social Psychology Bulletin*, Vol. 45 No. 6, pp. 920-933, doi: 10.1177/0146167218801363.

Talebi, M. (2013), "Study of publication bias in a meta-analysis using trim and fill method", *International Research Journal of Applied and Basic Sciences*, Vol. 4 No. 1, pp. 31-36, doi: 10.1177/0266242612465454.

Teh, P.L., Ho, J.S.Y., Yong, C.C. and Yew, S.Y. (2010), "Does internet self-efficacy affect knowledge sharing behavior?", *IEEM2010 - IEEE International Conference on Industrial Engineering and Engineering Management*, pp. 94-98, doi: 10.1109/IEEM.2010.5674429.

Teh, P.-L. and Yong, C.-C. (2011), "Knowledge sharing in is personnel: organizational behavior's perspective", *Journal of Computer Information Systems*, Vol. 51 No. 4, pp. 11-21, doi: 10.1080/08874417.2011.11645497.

Tohidinia, Z. and Mosakhani, M. (2010), "Knowledge sharing behaviour and its predictors", *Industrial Management and Data Systems*, Vol. 110 No. 4, pp. 611-631, doi: 10.1108/02635571011039052.

Tsai, M. and Cheng, N. (2010), "Expert systems with applications programmer perceptions of knowledge-sharing behavior under social cognitive theory", *Expert Systems With Applications*, Vol. 37 No. 12, pp. 8479-8485, doi: 10.1016/j.eswa.2010.05.029.

Turner, E.H., Matthews, A.M., Linardatos, E., Tell, R.A. and Rosenthal, R. (2008), "Selective publication of antidepressant trials and its influence on apparent efficacy", *New England Journal of Medicine*, Vol. 358 No. 3, pp. 252-260.

Verena, N. and Cornelius, H. (2014), *R&D Employee's Intention to Exchange Knowledge Within Open Innovation Projects*, available at: http://hdl.handle.net/10419/96525

Vries, D. R. E., Hooff, V. D B. and Ridder, D. J. A. (2006), "Explaining knowledge sharing: the role of team communication styles, job satisfaction and performance beliefs", *Communication Research*, Vol. 33 No. 115, p. 135.

Wang, H.-K., Yen, Y.-F. and Tseng, J.-F. (2015), "Knowledge sharing in knowledge workers: the roles of social exchange theory and the theory of planned behavior", *Innovation*, Vol. 17 No. 4, pp. 450-465, doi: 10.1080/14479338.2015.1129283.

Wei, L.W. (2010), "Knowledge sharing behavior in organization: an empirical investigation", in *2nd International Workshop on Intelligent Systems and Applications*, pp. 1-4, doi: 10.1109/IWISA.2010.5473500.

Whitehead, A. (2002), *Meta-Analysis of Controlled Clinical Trials*, John Wiley, West Sussex.

Van Wijk, R., Jansen, J.J. and Lyles, M.A. (2008), "Inter-and intra-organizational knowledge transfer: a meta-analytic review and assessment of its antecedents and consequences", *Journal of Management Studies*, Vol. 45 No. 4, pp. 830-853.

Wu, Y. and Zhu, W. (2012), "An integrated theoretical model for determinants of knowledge sharing behaviours", *Kybernetes*, Vol. 41 No. 10, pp. 1462-1482, doi: 10.1108/03684921211276675.

Yang, J.-T. (2010), "Antecedents and consequences of knowledge sharing in international tourist hotels", *International Journal of Hospitality Management*, Vol. 29 No. 1, pp. 42-45.

Zhang, P. and Ng, F.F. (2012), "Analysis of knowledge sharing behaviour in construction teams in Hong Kong", *Construction Management and Economics*, Vol. 30 No. 7, pp. 557-574, doi: 10.1080/01446193.2012.669838.

Zhikun, D. and Fungfai, N. (2009), "Knowledge sharing among architects in a project design team: an empirical test of theory of reasoned action in China", *Chinese Management Studies*, Vol. 3 No. 2, pp. 130-142, doi: 10.1108/17506140910963639.

Corresponding author
Yasha Afshar Jalili can be contacted at: yasha.afshar@gmail.com