

Meta-Analytic Review of the Antecedents of Knowledge Sharing: Focus on Public vs. Private Organizations and IT vs. Non-IT Facilitation

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Abstract

This paper summarises the quantitative findings of prior empirical studies. Meta-analytic techniques are used to examine the antecedents of organisational knowledge sharing behaviour (KSB), with a focus on comparing public vs. private organisations and information technology (IT) vs. non-IT facilitation. The meta-analysis tests the efficacy of the theory of planned behaviour in a knowledge sharing (KS) context and identifies the effectiveness of the respective organisational antecedents in fostering KS. Public organisations are an important area where KS has received relatively little attention. After identifying the effect sizes of the relationships examined in all the studies, we consider the effects of public vs. private sectors as moderators on the antecedents of knowledge sharing intention (KSI) and KSB. We include IT facilitation as our second moderator to examine whether all the antecedents are contingent on IT facilitation. Our results indicate that KSI has the largest influence on KSB, and that attitude towards KS has the largest influence on KSI. The results demonstrate the presence of moderating variables as well. This study demonstrates that private organisations provide better environments for employees to positively change their KSI, as compared to public organisations. Enhancing face-to-face communication might be more effective for KS since the impact of IT facilitation was not significant.

Keywords: knowledge sharing, meta-analysis, public organization, private organization, theory of planned behaviour

1. Introduction

A number of studies demonstrated the significance of knowledge sharing behaviour (KSB) in organization; however, there is a relative lack of significant knowledge sharing (KS) within public firms compared to KS in private firms. Many prior efforts were made to find approaches and mechanisms to enhance KS in private firms (Bock, Zmud, Kim, and Lee, 2005; Chow, Deng, and Ho, 2000). However, very few studies investigated what actually influences individual knowledge sharing intention (KSI) and KSB in public firms. Studies on public organisations included benchmarking of knowledge management, KS, knowledge management initiatives, and knowledge management practices (Liebowitz & Chen, 2003; Syed-Ikhsan & Rowland, 2004). Liebowitz and Chen (2003) found that KS in a government context presents unique challenges since government organizations are typically hierarchical and bureaucratic that makes KS difficult. According to Liebowitz and Chen (2003), most people seem reluctant to share knowledge because they think 'knowledge is power' and fear loss of rank after sharing knowledge. According to New Public Management (NPM), public organisations should import the managerial processes from the private sector, emulating their successful techniques. However, critics of NPM argue that the differences between public and private sectors are so great that the practices cannot be transferred from one sector to the other (Boyne, 2002). Boyne (2002) further explains that there is no established body of knowledge on successful management strategies in the private sector that public agencies can draw upon (Boyne, 2002). Thus, a strategy designed especially for the public sector is required to fill the gaps in KS.

Information technology (IT) presents various unique opportunities to overcome the barriers of space and time in KS (Dimmick, Kline, and Stafford, 2000; Hammer & Mangurian, 1997). The use of IT in KS can lead to hyper-personal interactions, i.e. communications with a richer level of social relationships, stronger identification

with the group, and more collective behaviour (Walther, 1996). The objective of this paper is to explore which factors affect the intention of knowledge workers to share their knowledge and whether IT facilitations and type of organization (public vs. private) moderate these relationships.

Knowledge sharing has led to various KS theories. The theory of planned behaviour (TPB) is one of the most influencing theories and has received considerable attention in the literature. According to Ajzen (1985) knowledge sharing behaviour is determined by an individual intention to perform an action. Individual intention has three basic antecedents: attitude toward behaviour, subjective norms, and perceived behavioural control, which can be further decomposed into controllability and self-efficacy. The present meta-analysis considers KSI and KSB in the context of the TPB. This paper contributes to the existing literature by using the meta-analysis method to examine how KSI and KSB in private and public sector organisations as well as with IT and non-IT facilitations relate differently to their antecedents.

Meta-analysis is particularly appropriate with empirical studies having diverging results. It allows empirical generalisations across multiple studies (Hunter and Schmidt, 2004) and enables researchers to estimate the true relationships among the study variables. The evidence obtained can be used to generate a more comprehensive list of attributes and to assess their relative effects on KS. Finally, this can be applied to detect moderating effects. This review explicitly distinguishes KSB in different organisational types (public vs. private) and in contexts with or without IT facilitation to provide new insights into how both these moderators change the relative importance of the antecedents of KSB. The agenda of the paper is as follows. First, we discuss the set of antecedents and their relationship with KSB based on theoretical investigations. Next, we develop the database for our meta-analysis. Subsequently, we use meta-analysis to provide a quantitative summary of the mean values and range of effects for the antecedents of KSI and KSB. We provide empirical results at private and public organisational levels of analysis and additionally examine IT vs. non-IT facilitation as moderators for the relationships found. We conclude with a discussion of the implications and directions for future research. In the following section, we describe these categories, along with their associated theoretical explanations for KS, and link each antecedent to a hypothesis.

2. Theoretical Development

2.1 Theory of Planned Behavior and Knowledge Sharing

The TPB is the most preferred intention–behaviour model within the knowledge management field. Intention refers to the degree to which people are willing to try or how much of effort they plan to exert to perform the behaviour (Ajzen, 1991). Regarding antecedents of the intention, attitude towards behaviour is defined as the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question. Subjective norms (SNs) towards behaviour are defined as the perceived social pressure to perform a particular behaviour. Perceived behavioural control refers to the amount of control over the achievement of personal goals that is introduced to deal with situations in which people may lack complete volitional control over a particular behaviour (Ajzen, 1985, 1988). Previous research has revealed several control factors that can influence a person's control over a given behaviour (Ajzen, 1988). These include individual differences (such as abilities and skills) and the degree to which individuals have control over their actions in the form of will power. The former (i.e. individual differences) is generally recognised as perceived self-efficacy and the latter as controllability (Ajzen, 2002). In the formulation of the TPB, perceived self-efficacy and controllability serve as antecedents to intention as well as actual behaviour (Ajzen, 2002). However, due to data constraints, we examined only the relationship between self-efficacy and KSB.

2.2 Knowledge Sharing Intention and Knowledge Sharing Behaviors

The interrelation between intention and behaviour to share knowledge is important for organisational learning and a firm's competitive advantage (Teo, 2005). In all types of organisations, competitive advantage derives from individuals who possess specific knowledge and from the organisation's ability to leverage this knowledge. The intention construct is central not only to the TPB but also to the theory of reasoned action (TRA) (Ajzen and Fishbein, 1975, 1980). Intentions capture the motivational factors that influence a behaviour and indicate how hard people are willing to try to perform that behaviour (Ajzen, 1991). In applications of the TRA/TPB, researchers have not always employed measures that clearly tap the intention construct. Warshaw and Davis (1985) noted several different ways of measuring intentions and distinguishing measures of behavioural intentions (e.g. 'I intend to perform behaviour x'). Thus the hypothesis 1 examines the relationship between KSI and KSB.

H1: KSI is positively associated with KSB.

2.3 Attitude and KSI

A person's attitude towards an object influences the overall pattern of his/her response to the object; however, it need not predict any given action. A person's intention is a function of his/her attitude towards performing the behaviour (Ajzen & Fishbein, 1977). It follows that a single act is predictable from the attitude towards that act if there is a high correlation between KSI and KSB. People's actions are systematically related to their attitude through their intention. Thus, we propose our second hypothesis.

H2: Attitude is positively associated with KSI.

2.4 Subjective Norm and Attitude

Subjective norm reflects participants perception of whether the behavior is accepted, encouraged and implemented by participant's circle of influence (Pavlou & Fyenson, 2006). The literature suggests a positive relationship between SN and intended behavior. Bock et al. (2005) conducted a survey with thirty organizations to test a KS model. Results suggested that SN has significant influence on KSI. One's social environment will better place of information to reduce uncertainty and help you to determine whether behaviors are within the rules and acceptable. The present meta-analysis, therefore, considered the type of measurement of SN-KSI correlations.

H3: SN is positively associated with KSI.

2.5 Knowledge Sharing Self-Efficacy and KSB

Self-efficacy is a form of self-evaluation that influences decisions about what behaviours to undertake. In general, perceived self-efficacy plays an important role in influencing individuals' motivation and behaviour (Bandura, 1982, 1986). People with high self-efficacy will be more likely to perform related behaviour than those with low self-efficacy. Recently, the concept of self-efficacy has been applied to knowledge management to validate the effect of personal efficacy belief in KS, i.e. knowledge sharing self-efficacy (KSSE). Our expectations of positive outcomes of behaviour will be fruitless if we doubt our capability to successfully execute the behaviour. This is an important issue in KS because low self efficacy may cause complexity in sharing existing knowledge among members of an organisation. A knowledge producer must also have the perceived capabilities to complete it. These capabilities include authoring knowledge content, codifying knowledge into "knowledge objects" by adding context, contributing personal knowledge to the organisational database, and sharing personal knowledge in formal interactions with/ across teams/work units or in informal interactions among individuals. Several researchers examined the effect of KSSE on KSI. Following Bock and Kim (2002) and Kankanhalli, Tan and Wei (2005), we recognise that self-efficacy is a critical determinant for users' behaviour in various contexts. Therefore, this study uses KSSE as a behavioural control variable to deal with situations in which people face the challenge of combining and exchanging knowledge among individuals in the organisation.

H4: KSSE is positively associated with KSB.

2.6 Organizational Type and Role of IT

In order to be more precise and to resolve inconsistent findings when investigating KSB, we add two potential contingency factors: public vs. private sector organisation and IT vs. non-IT facilitation. Previous studies reported that different types of organisations and technology facilitations could influence knowledge management. The effect of different antecedents of KSI and KSB may vary across contexts.

Organisational type (public and private) is expected to function as the moderator, although there have been conflict findings in previous studies. Liebowitz and Chen (2003) showed that in government organisations, most people seem reluctant to share their knowledge because knowledge is the power paradigm for moving up the ranks. Knowledge management in private organisation is culture driven, while the level of accountability and regulation are stricter in the public sector (McAdams & Reid, 2000).

H5a: The relationship between an individual's KSI and KSB differs across public and private sector organisations.

H5b: The relationship between an individual's attitude and KSI differs across public and private sector organisations.

H5c: The relationship between an individual's SN and KSI differs across public and private sector organisations.

H5d: The relationship between an individual's KSSE and KSB differs across public and private sector organisations.

Prior studies showed that another moderator, IT facilitation exists. IT-facilitated KS may be different from KS without IT facilitation. Information technology is used at a broader level to heighten the level of cooperation between people and groups (Alavi & Leidner, 2001). Further, IT has the potential to acquire, store, process, retrieve, and transfer the knowledge that enables KS even if people are geographically far or close. Thus, we explore whether IT accounts for the moderating effect of social exchange factors in KS.

H6a: The relationship between an individual's KSI and KSB differs according to IT and non-IT facilitations.

H6b: The relationship between an individual's Attitude and KSI differs according to IT and non-IT facilitations.

H6c: The relationship between an individual's SN and KSI differs according to IT and non-IT facilitations.

H6d: The relationship between an individual's KSSE and KSB differs according to IT and non-IT facilitations.

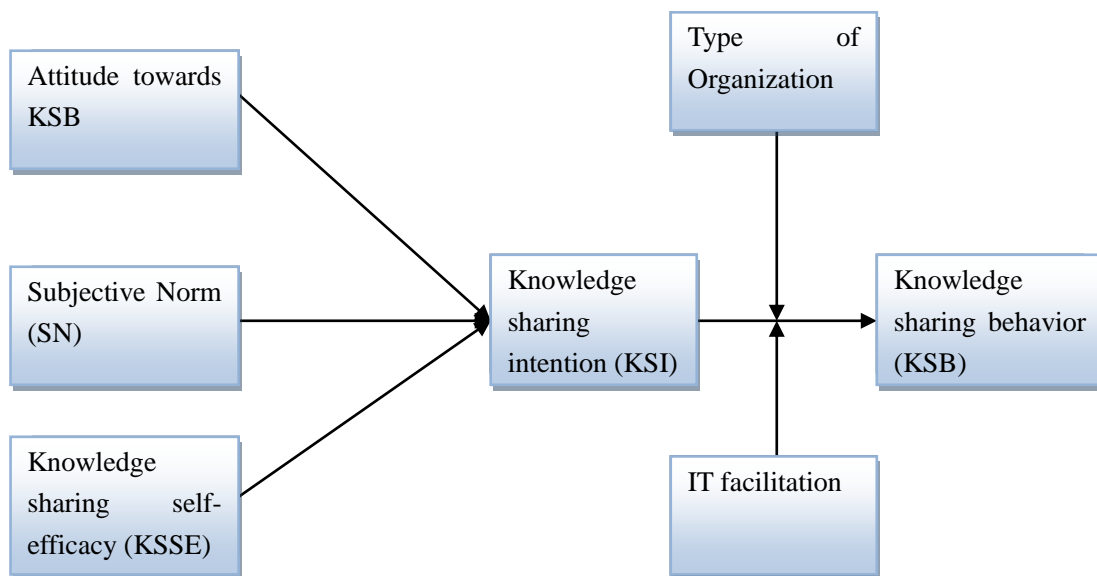


Figure 1. Research model

Notes: Research Model based on Theory of Planned Behavior by Ajzen, 1991.

3. Methodology

3.1 Data Collection

For identifying the literature relevant to this meta-analysis, we used EBSCO Academic Search Premier, Google Scholar, and the Social Science Research Network. The keyword search terms 'KS', 'knowledge management', and 'knowledge systems' were used; we used the keywords 'knowledge shar*', 'information shar*', and 'knowledge transfer' for Google Scholar. Searches in additional databases did not reveal additional comparable KS-based publications. The reference lists of these articles were reviewed to find additional articles for possible inclusion. When an article was identified, it was compared against the established inclusion criteria to determine its suitability for the meta-analysis. We scanned the results for papers containing analysable quantitative data (i.e. correlations, *t*-tests), KSI or KSB as the dependent variable, and at least one measured or manipulated independent variable. We limited the search to publications in English. In addition to peer-reviewed journal publications, our sample included working papers because unpublished studies are less likely to include significant results, and their omission could bias the meta-analysis results towards significance (Rothstein, Sutton, & Borenstein, 2005).

Table 1 presents the studies included in our sample. Removing the irrelevant publications yielded a sample of 56 usable studies.

Table 1. Studies used in meta-analysis

Study	Sample Size	Country	Sample Characteristics	Type of organization	IT context
1. Bock et al.(2005)	154	Korea	University students employed by 27 organizations	Public	Non-IT
2. Bock & Kim (2002)	467	Korea	Employees of 4 large organizations	Public	Non-IT
3. Cabrera et al. (2006)	372	Spain	Employees of an information technology company	Private	IT
4. Chen et al, (2009)	396		Full time senior college student and MBA student		Non-IT
5. Chiu et al. (2006)	310	Taiwan	IT virtual community members	Private	IT
6. Cho et al (2010)	223		wikipedian		IT
7. Choi et al. (2008)	164	Korea	KM employees from 2 manufacturing companies	Private	Non-IT
8. Chow & Chan (2008)	190	Hong Kong	Managers from D&B Key Decision Makers 2004/05 directory	Private	Non-IT
9. Cockrell (2010)	424	U.S.	Certified Management Accountants	Private	IT
10. Connelly & Kelloway (2003)	126	Canada	MBA, MPA students at 4 universities, undergraduate students, & individuals who are not students		Non-IT
11. Faraj & Wasko (2010)	1023	U.S.	Individuals posting to online forum discuss computer tech. issues	Private	IT
12. Fey & Furu (2008)	164	Finland & China	Managers of subsidiaries owned by multi-national corporations (MNCs)	Private	IT
13. Thakadu et al. (2013)	120	Botswana	community-based natural resources management projects	Public	Non-IT
14. Gupta & Govindarajan (2000)	374	U.S., Japan, Europe	Presidents & managers of MNCs	Private	IT
15. Hsu et al (2007)	274	Taiwan Honkon China	Wikipedians		IT
16. He and Wei (2009)	362		Memembers of Marketin, R&D, Mfg	private	Non-IT
17. Jeon et al. (2011)	179	Korea	Members of 70 CoP	private	IT
18. Jiacheng et al. (2010)	200	U.S., China	R&D team members	Private	Non-IT
19. Kankanhalli et al. (2005)	150	Singapore	KM practitioners from public organizations	Public	Non-IT
20. Kim & Ju (2008)	70	Korea	Faculty at a 4-year, private university	Public	Non-IT
21. Kuo & Young (2008b)	264	Taiwan	Elementary & Jr. high teachers	Public	Non-IT
22. Lawson et al. (2009)	111	U.K.	Purchasing managers from 750 manufacturing firms	Private	Non-IT
23. Lee et al. (2006)	42	Unknown	Organizations implementing KM systems		IT
24. Lin、 (2008)	130	Taiwan	MBA students	private	Non-IT
25. Lin (2007)	318	Taiwan	Management information systems students	Private	IT
26. Lin & Lee (2004)	154	Taiwan	Senior managers from the 2,000 largest firms in Taiwan	Private	Non-IT
27. Lin, H. (2007)	172	Taiwan	Survey of 50, Top 1000 firms in 2005 Common Wealth magazine	Private	IT
28. Liu (2008)	325	Taiwan	University students		Non-IT

29. Liu & Liu (2008)	371	Taiwan	Research & development professionals	Private	IT
30. Liu & Liu (2011)	368	Taiwan	Research & development professionals	Private	IT
31. Lu et al. (2006)	246	China	MBA student n firm employees	Private	Non-IT
32. Monteiro et al. (2008)	171	Sweden	Marketing managers of MNC subsidiaries & executives of the respective headquarters	Private	IT
33. Nelson & Coopriider (1996)	86	U.S.	Information system departments & its line customers in 7 firms	Private	IT
34. Quigley et al (2007)	120		Undergraduate students		Non-IT
35. Ryan et al. (2010)	428	U.S., Japan	Chief Information Officers		IT
36. Ryu et al (2003)	286	South Korea	Physician in hospital	Public	Non-IT
37. Salim et al.(2011)	113	Pakistan	Manager n non mangers	Private	Non-IT
38. Seba et al (2012)	519	Dubai	Police force	Public	Non-IT
39. Schultz (2003)	229	U.S., Denmark	Heads of subsidiary subunits	Private	Non-IT
40. Siemens (2008)	191	U.S.	Professional, technical, & line workers from 4 companies	Private	Non-IT
41. Srivastav et al. (2006)	498	US	Hotel mangers	Private	Non-IT
42. Sohail et, al (2009)		Malaysia	University teaching staffs	Public n Private	Non-IT
43. Taylor & Murthy (2009)	69	Various	Accounting academics using online networks of practice		IT
44. Taylor & Wright (2004)	132	U.K	Healthcare providers		Non-IT
45. Tsai (2002)	24	Unknown	Directors & senior deputy directors of units of a large petrochemical company	Private	Non-IT
46. Hoff & Ridder (2004)	417	Holland	Five various organizations		Non-IT
47. Wah et al. (2007)	169-190	Singapore	Tertiary educational institution (staff, admin., & students)	Public	Non-IT
48. Wasko & Farajj 2005	604	US	US legal professional association	Online users	IT
49. Wang (2004)	85	Taiwan	University students		Non-IT
50. Willem & Buelens (2009)	408	U.S., Japan	Energy and finance companies' employees	Private	
51. Willem & Buelens (2007)	358	Belgium		Public	Non-IT
52. Yahya & Goh (2002)	300	Malaysia	Company managers	Private	Non-IT
53. Yang &Lai (2011)	219		Wikipedian		IT
54. Yang & Chen (2007)	256	Taiwan	Company managers	Private	Non-IT
55. Zboralski (2009)	222	Unknown	Community of practice members of multinational firms	Private	IT
56. Zhang and Ng (2013)	256	Hongkong	Construction company	Private	Non-IT

3.2 Meta-Analysis Procedures

We coded demographics (organisation type), sample size, and countries of study. The coded methodological characteristics included research design and data source (survey, experiment, archival), independent variables, and dependent variable (KSB or KSI). Each paper was coded separately with comparisons for accuracy. This study largely followed the protocols of Cooper and Hedges' (1994) and Lipsey and Wilson's (2001) approaches to meta-analysis. Effect sizes were the correlation coefficients, averaged across studies; we followed Hunter et al.'s (1982) guidelines for stating the overall significance of each pairwise relationship.

Table 2. KSB and its antecedent constructs and measures

Construct	Definition or Operationalization
Knowledge Sharing Behaviour	Exchanging the acquired knowledge among other members of the organization.
Intention to share knowledge	The degree to which knowledge would be shared, either by the individual or management.
Attitude towards KS	The degree of one's positive feelings about sharing one's knowledge.
Subjective Norm (SN)	Participants' beliefs about others' expectations regarding KS or perceived social pressure to perform a behaviour.
Knowledge sharing self-efficacy (KSSE)	Participants' beliefs about the value their KS provides.

The size-adjusted correlation was calculated for the sample. To estimate the effect sizes of the relationships, the correlation coefficient (r) was calculated; specifically, the corrected correlation coefficients (i.e. Fischer's Z-transformed correlations) were weighted with the product of sample size and the reliability coefficients for correlated variables. The weighted coefficients were then summed up and divided by the sum of the weights; the result is an estimate of the true population correlation; the result is an estimate of the true population correlation. Effect sizes were weighted and computed using the Comprehensive Meta-Analysis software (Borenstein, Hedges, Higgins, and Rothstein, 2005). Following previous meta-analyses, we provide meta-analytic estimates where at least three independent effect sizes were available.

For each study, coders determined the zero-order effect sizes in the form of correlations (Cooper and Hedges, 1994). When correlations were unavailable, other statistics (e.g. t -tests) were transformed into correlations following Lipsey and Wilson (2001). Although a wide range of statistics are appropriate for meta-analysis, findings generated by multivariate analyses would generally be excluded (Lipsey & Wilson, 2001). Multivariate relationships across studies complicate the analysis as the regression coefficients from each analysis are assumed to estimate a different population parameter. Following Lipsey and Wilson (2001), several studies that included variables of interest were excluded because their findings were generated by multiple regression, discriminant analysis, factor analysis, and structural equation modelling. After identifying studies with the appropriate statistics, we retained independent variables used in two or more studies.

3.2.1 Q-Statistic: Effect Size Variability across Studies

The Q-statistic measures whether the effect sizes of different studies estimate the same population effect size (Lipsey & Wilson, 2001). A significant Q-statistic may be associated with unique study characteristics (such as differences in participant characteristics) and could indicate that the between-study variability in effect sizes is greater than expected based on sampling error alone. Accordingly, we test for and report (where significant) moderator effects (e.g. public vs. private or IT vs. non-IT facilitation) (Lipsey & Wilson, 2001).

3.2.2 Moderator Analyses

Two types of moderating variables were considered: type of organisation (H5) and IT facilitation (H6). Moderator variables were included in the analysis if (1) they evidenced a significant Q-statistic, indicating high, between-study variability; (2) they were investigated in more than five studies ($k > 5$); and (3) at least two studies were represented at each level of a moderator (e.g. private vs. public sector organisations).

Finally, the moderators (organisational type and IT facilitation) were analysed in relation to the remaining antecedents for KSI and KSB.

4. Results

4.1 Correlation Analysis

Table 3 presents the results of the meta-analysis of the antecedents of KSI and KSB. We obtained 37 effect sizes for the antecedents of KSB, including 8 effects involving KSI, 14 effects related to attitude, 8 effects concerning SN, and 7 effects related to KSSE. Additionally, we obtained 29 effect sizes for organisational type and 39 effect sizes for IT facilitation as the moderating effects. The range of total N across r reported in Table 3 varies from 1709 to 3973. Support for the hypotheses for all the examined relationships were established when the 95% confidence intervals (CI) around the correlation effect r did not contain zero. Thus, Table 3 supports hypotheses H1 to H4.

Table 3. KSB and KSI relations

Relationship	No of studies (k)	Total N	True Population effect size (r)	Z Value	Lower Limit	Upper Limit	Q value	SE	Variance
KSI- KSB	8	2126	0.416***	6.750	0.304	0.516	59.557	0.019	0.00
Attitude- KSI	14	3973	0.467***	5.818	0.359	0.639	473.459	0.056	0.003
SN- KSI	8	1709	0.405***	3.514	0.188	0.584	188.676	0.068	0.004
KSSE – KSB	7	1771	0.268***	2.961	0.093	0.428	87.942	0.036	0.001

The statistical significance of the correlations was inferred from the combined Z scores for each construct.

According to the classical hypothesis (H1), KSI influences KSB. We obtained a positive significant correlation (r) for the relationship between KSI and KSB ($r = 0.416$; $p < 0.001$). Regarding the relationship between attitude and KSI, the meta-analytic evidence summarised in Table 3 reveals that attitude is positively associated with KSI. The effect of size on KSI was studied extensively ($k = 14$; total $N = 3.973$).

Our study showed that a significant relationship ($r = 0.405$; $p < 0.001$) exists between SN and KSI; the magnitude of the effect was positive. As it would take 1709 studies with a true population effect of $r = 0.405$ to sufficiently widen the reported confidence interval to justify inclusion, the effect we found is robust. In addition, the meta-analytic results corroborate the importance of self-efficacy in KSB. As expected, from the above-average number of studies ($k = 7$), we obtained a positive association between KSSE and KSB ($r = 0.268$; $p < 0.001$).

These results support hypotheses H1 to H4. Effect sizes for KS antecedents indicate that KSI has the largest influence on KSB, and attitude towards KS has the largest influence on KSI.

4.2 Moderating Effects

We examined whether the effects of antecedents are contingent on organisation type (H5a to H5d) and IT/non-IT facilitation (H6a to H6d). The number of studies on KSI and KSB in the public sector ($k = 11$) and in the private sector ($k = 35$) were comparable. We tested the significance of the differences in effect sizes by computing z values; the effect sizes differed across public and private sectors (Table 4). To investigate the moderating effect of organisational type (public vs. private), the homogeneity estimate (Q value) for each relationship was calculated based on the Hedges and Olkin (1985) procedure. The only Q-statistic that could be interpreted was Q-between, the one between groups (the combined effect of public vs. private organisations).

Regarding the effect of KSI on KSB, the effect size of the number of relations was slightly greater for the private sector ($r = 0.402$; $p < 0.001$) than for the public sector ($r = 0.535$; $p < 0.001$). Similarly, the effect size for attitude-KSI was higher for the private sector ($r = 0.572$; $p < 0.001$) than for the public sector ($r = 0.445$; $p < 0.005$); this suggests that the attitude-KSI relationship is stronger in private organisations. In contrast, the relationship between SN and KSI proved to be stronger in public organisations ($r = 0.559$; $p < 0.001$) than in private organisations ($r = 0.216$; $p < 0.001$).

The organisation type moderator was examined using the differences between the two groups (public: $k = 11$; private: $k = 35$); the Q-between public and private organisation was statistically significant ($p < 0.001$) in all the relationships except the KSI-KSB relation. This shows that the relationship between employees' KSB and KSI does not differ as much as that between public and private organisations. The relationships between attitude and KSI ($p < 0.01$) as well as between KSSE and KSB ($p < 0.01$) were significantly stronger in private organisations compared to public organisations, whereas the relationship between SN and KSI was significantly weaker in private organisations.

Thus, the results support H5b, H5c, and H5d but do not support H5a.

Table 4. Moderator analysis (public vs. private)

Pair wise Relation	No of studies (k)	Total N	True Population effect size (r)	Z Value	95% CI LL and UL	Q value	P value for Q	SE	Variance	Qbet/P value
KSI- KSB Public	4	1119	0.351	12.200	0.173 0.594	51.502	0.000	0.039	0.002	1.662/ 0.197
KSI- KSB Private	3	788	0.403	6.698	0.316 0.535	6.193	0.045	0.014	0.000	
Attitude- KSI Public	6	2160	0.445	22.1212	0.410 0.478	402.314	0.000	0.155	0.024	9.507** 0.002
Attitude- KSI Private	5	975	0.535	18.520	0.489 0.579	52.620	0.000	0.052	0.003	
SN-KSI Public	3	559	0.559	16.640	0.506 0.608	86.735	0.000	0.197	0.039	61.129***
SN- KSI Private	4	763	0.216	6.020	0.147 0.283	37.358	0.000	0.055	0.003	0.00
SE- KSB Public	2	414	0.120	2.442	0.024 0.215	1.682	0.195	0.013	0.000	35.837***/ 0.00
SE- KSB Private	2	1040	0.455	13.291	0.395 0.510	21.452	0.000	0.083	0.007	

Notes: k = number of samples in which relationship was estimated; Total N = cumulative N for all k studies; Sample-weighted mean r = mean of uncorrected correlations weighted by sample size (N); Corrected mean r = mean of correlations individually corrected for unreliability; 95% CI = confidence interval around the mean correlation; z value difference = the z value associated with the difference in means between the groups;; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

In order to investigate the effect of IT facilitation as a moderator, the homogeneity estimate (Q) for each relationship was calculated based on the Hedges and Olkin (1985) procedure. We further divided the sample into two groups, IT vs. non-IT facilitation (as shown in the categories in Table 5), to separately test the effect of the independent variables. The effect of IT facilitation was examined based on the differences between the two groups using IT ($k = 22$) and non-IT ($k = 36$) facilitation.

Table 5. Moderator analysis (IT vs. Non-IT)

Pair wise Relationship	No of studies (k)	Total N	True Population effect size (r)	Z Value	95% CI, LL and UL	Q value	P value (Q)	SE	Variance	Q between/ P value
KSI-KSB (IT)	5	1351	0.392	11.169	0.329 0.452	5.931	0.091	0.004	0.001	2.062/0.151
KSI-KSB (Non-IT)	4	1171	0.360	12.847	0.309 0.409	53.946	0.000	0.056	0.023	
Attitude-KSI (IT)	6	1826	0.400	18.024	0.361 0.438	86.777	0.000	0.039	0.001	25.269/0.000
Attitude- KSI (NON-IT)	8	2147	0.520	26.554	0.488 0.550	363.994	0.000	0.121	0.015	
SN- Intention (IT)	3	577	0.474	14.010	0.416 0.527	107.485	0.000	0.246	0.061	17.816/0.000
SN- Intention (NON-IT)	6	1761	0.304	15.169	0.299 0.357	63.375	0.000	0.116	0.013	
SE-KSB (IT)	5	1387	0.352	13.605	0.304 0.397	77.084	0.000	0.053	0.003	10.814/0.001

Notes: k = number of samples in which relationship was estimated; Total N = cumulative N for all k studies; Sample-weighted mean r = mean of uncorrected correlations weighted by sample size (N); Corrected mean r = mean of correlations individually corrected for unreliability; 95% CI = confidence interval around the mean correlation; z value difference = the z value associated with the difference in means between the groups;; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

As illustrated in Table 5, the effect sizes differed with IT facilitation and non-IT facilitation. The effect size of the relationships for KSI and KSB was slightly larger with IT facilitation ($r = 0.392$; $p < 0.001$) compared to non-IT ($r = 0.360$; $p < 0.001$), but the Q-between was insignificant. Thus, there was no statistical difference between IT and non-IT facilitation for the relationships. On the contrary, the effect size for attitude-KSI was lower with IT facilitation ($r = 0.400$; $p < 0.05$) than with non-IT facilitation ($r = 0.520$; $p < 0.001$). The effect size for SN and KSI was significant with IT ($r = 0.474$; $p < 0.002$) but insignificant with non-IT facilitations ($r = 0.304$; $p < 0.058$). Similarly, the effect size for KSSE and KSB was significant with IT ($r = 0.352$; $p < 0.005$) but insignificant with non-IT facilitation ($r = 0.174$; $p < 0.316$). For these three pairs of relationships, the significant Q-between shows that IT facilitation moderates the relationships.

These results (which are similar to those of the organisational type moderation analysis) support H6b, H6c, and H6d supported but do not support H6a.

5. Discussion

The present meta-analysis provides evidence supporting the use of the theory of planned behaviour (TPB) for predicting KSI and KSB. In particular, the results of the moderation analysis provide additional insights.

According to the moderation analysis, organisational type has very little effect on the relationships between KSI and KSB. This insignificant moderation suggests that the different conditions between the two types do not matter once the KSI levels are set. However, according to the ranges of the 95% confidence interval, public organisations cover far wider areas due to larger standard error, especially for lower effect size. This means that employees in public organisations may be more vulnerable to different conditions or these conditions are more diverse for this organisational type; however, we cannot identify these conditions clearly in the present study. On the other hand, the relationships between attitude and KSI as well as between KSSE and KSB are found to be stronger in private organisations than in public organisations. This could indicate that private organisations provide better environments (such as organisational and/or social support) for employees to change their KSI more positively, which is possible when they have a positive attitude. This suggests that greater confidence does lead more directly to KSB in private organisations, since an enabling organisational environment is more readily available in private organisations than in public ones. The relative lack of an enabling environment in public organisations could be attributed to the fact that government organisations are typically hierarchical and bureaucratic; these characteristics make sharing more difficult. Lastly, the relationship between SN and KSI is significantly weaker in private organisations compared to public organisations. This result indicates that employees in public organisations are more caring towards their surroundings; in other words, employees in public organisations are more affected by social pressure compared to those in private organisations.

Using IT facilitation as another moderator, the effect of KSI on KSB was found to be not very different in the cases with and without it. Thus, once employees have a certain level of KSI, IT facilitation does not matter much. For instance, if the employees have high KSI and IT facilitation is not available, they would make more efforts to overcome the difficulties caused by the lack of IT facilitation and solve the problems in some manner. As a result, their KSB is not very different from those of employees with high KSI who are supported by IT facilitation. In the case of employees having low KSI, if IT facilitation is not available, they may not be motivated enough to change their behaviour more positively compared to those who have low KSI but are supported by IT. The remaining moderation analyses showed that IT facilitation provides employees with advantages. With IT facilitation, attitude and SN are reflected more into KSI, and KSSE is more effective in predicting KSB, because IT may reduce difficulties in the KS process (excluding those in the relationship between KSI and KSB).

6. Conclusion

In this paper, we reported the findings from a meta-analysis of 57 published studies that examined the relationship between KSB and its antecedents. We predicted that certain antecedents influence KSI and KSB. Attitude and SN affected KSB indirectly through KSI, while self-efficacy affected KSB directly. The results of the moderator analysis suggest that KS was relatively easier in private organisations than in public organisations. The fact that SN influences KSI in public organisations more than it does in private ones showed that public sector employees are influenced by the expectations of others more than private employees are. Another interesting observation is the moderating role of IT facilitation. Having IT facilitation as a moderator showed significant results with all the relationships, except in the relationship between KSI and KSB.

6.1 Limitations and Future Research

This meta-analysis was subject to a number of limitations, which also indicate opportunities for future research.

First, this study examined factors only from TPB related to KS. Given the nature of meta-research and the limitations of existing data, a comprehensive study that includes all potential factors is not feasible at this point. Future research could examine the effects of the factors that were not included in this study. Second, we need to investigate the existence of other moderators such as knowledge type, organisational context, and so on, as suggested by the results of the sub-sample analyses.

Finally, the findings of this study depend on the findings reported in prior literature. The limited coding procedure resulted in a certain amount of confusion. Since different studies could define constructs differently, the relationship establishment could be misleading, which could lead to a potentially wrong conclusion. Although we have taken all possible precautions to ensure proper coding, the inherent limitations of the meta-analysis method remain.

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