Motivated to share? Development and validation of a domain-specific scale to measure knowledge-sharing motives

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Abstract

Purpose – This paper aims to develop and validate a scale to measure knowledge-sharing motives at work. It is aimed to construct a scale which is explicitly different from knowledge-sharing behavior and to develop a comprehensive and domain-specific scale for this special kind of work motivation.

Design/methodology/approach – The constructed scale was tested in two studies. Survey data (n = 355) were used to perform an exploratory factor analysis. Results were further tested on survey data from the core public sector (n = 314) and the health sector (n = 315). A confirmatory factor analysis confirms the results in both samples. The developed scale was further validated internally and externally.

Findings – The analysis underlines that knowledge-sharing motivation and knowledge-sharing behavior are different constructs. The data suggest three dimensions of knowledge-sharing motives: appreciation, growth and altruism and tangible rewards. While it is suggested that the developed scale works in the public as well as the private sector context, it is found that knowledge sharing of public employees is merely driven by "growth and altruism" and "appreciation of coworkers."

Originality/value – No comprehensive and reproducible scale to measure knowledge-sharing motives, which is different from behavior and domain-specific as well, was available in the literature. Therefore, such a scale has been constructed in this study. Furthermore, this study uses samples from different organizational sectors to deepen the understanding of knowledge sharing in context.

Keywords Knowledge sharing, Scale development, Motive, Work motivation, Knowledge-sharing motivation

Paper type Research paper

Introduction

Organizational knowledge management activities frequently fail. Especially in the age of digital transformation, it is taken for granted that technical solutions will work and that employees want to share their knowledge within these systems (Friedrich *et al.*, 2020). However, a central requirement of knowledge management is the employees' willingness to share their knowledge. A high knowledge-sharing motivation (KSM) ideally leads to knowledge-sharing behavior (KSB), and shared knowledge can then be conserved, diffused

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and used. This study focuses on this important precondition of knowledge management and, in particular, knowledge sharing: KSM.

Motivation psychology differentiates between *motivation* and *intention* regarding decisions and subsequent *behavior*. In the literature on knowledge management, this distinction between motivation, intention and behavior does not appear. Even when KSM is mentioned specifically, in many cases, the actual behavior, a behavioral intention or an attitude toward knowledge sharing is measured instead.

In this article, a scale to measure KSM was developed, which is explicitly distinct from constructs measuring planned or intended behavior. The constructed scale was validated in two studies: a 2017 Web survey of 350 respondents from the German public sector and a 2018 Web survey of 629 German public employees in the core administration (n = 314) and the health sector (n = 315). Results of an exploratory factor analysis suggest that KSM and KSB, as pre- and postactional stages in human behavior, can indeed be clearly distinguished and should be treated differently in measurements. The developed scale to measure KSM showed high internal consistency and three dimensions could be identified. These dimensions were confirmed by confirmatory factor analysis, and the estimated model showed a good model fit and was proven to be valid both internally and externally.

This study adds three important contributions to the literature: *First*, the difference between behavior and motivation in the context of knowledge sharing is conceptualized and empirically proven in this study, which is missing in the literature on knowledge management to date. It is important to differentiate motivation from behavior when, for example, empirically analyzing determinants of knowledge sharing of individuals.

Second, this study strengthens the relevant but understudied topic of knowledge sharing in public administration research. Knowledge is an important resource for public organizations. However, in contrast to other resources such as finances or personnel, this topic remains scarce in the public administration literature. This study deepens our understanding of knowledge sharing and its drivers in the public sector.

Third, by investigating a more specific form of work motivation, this study advances the literature on general work motivation. By arguing that general work motivation is not always a good predictor of specific work behaviors, such as knowledge sharing, this study adds to the literature on the need for more specific forms of (work) motivation, hence domain-specific motivation (Martin, 2008). This study links the beginning literature on domain-specific motivation with the knowledge management literature.

The paper is organized as follows. First, the state of research concerning knowledge sharing and KSM is discussed. It is focused on the empirical measurement of KSM. Subsequently, the theoretical framework is presented, deriving the hypothesis on the differentiation between motivation and behavior. Additionally, possible dimensions of KSM are derived from models and empirical findings on human needs and motives in the setting of work motivation. Finally, after a description of scale development and validation methods, results are presented and discussed.

State of research

Knowledge sharing and knowledge-sharing motivation

Knowledge sharing is the exchange of knowledge among individuals, teams, units or organizations (Lin, 2007). In this context, knowledge is usually defined as selected and interpreted information (Nonaka and Takeuchi, 1995). The term "knowledge sharing" is usually used to describe a unidirectional exchange of knowledge, such as when one person explains a work procedure to a coworker or records knowledge about a process in a

guideline. Knowledge sharing can also be bi- or even multidirectional, such as in team meetings or consulting processes. In this study, however, knowledge sharing is defined as the donation of knowledge on the individual level.

Knowledge sharing is one critical part of knowledge management. As Law and Ngai (2008, p. 2343) point out, "[s]imply put, a lack of sharing may inhibit or hinder knowledge management." Ultimately, knowledge sharing is seen as a determinant of individual and organizational learning (Nugroho, 2018), performance (Lin *et al.*, 2020; Pandey *et al.*, 2021), job and life satisfaction (Kianto *et al.*, 2016; Ahmad and Karim, 2019; Fischer and Döring, 2022) and innovative capability (Wang and Hu, 2020).

Knowledge sharing is influenced by multiple determinants. These determinants can be either internal or external factors. *External* factors found to determine knowledge sharing are the organizational context in terms of in-group collectivism, uncertainty avoidance, performance orientation and power distance (Nguyen *et al.*, 2019), human resource practices for knowledge sharing (Andreeva and Sergeeva, 2016), job autonomy (Llopis and Foss, 2016), gamification of knowledge management systems (Friedrich *et al.*, 2020) or perceived fairness within an organization or the community (Cai *et al.*, 2022). *Internal* determinants of knowledge sharing are, for example, a positive mood (Tang *et al.*, 2020), age (Nguyen *et al.*, 2019) or motivation (Zenk *et al.*, 2021). The latter is called "knowledge-sharing motivation." The term is usually used to describe the motivation of the person who donates knowledge.

KSM has been confirmed to explain KSB (Henttonen *et al.*, 2016). This is consistent with the literature on work behavior in general (Pinder, 1998), which shows that motivation is one, but not the only, determinant of behavior.

Work motivation and the process of human action

The motivation to share knowledge is a special kind of work motivation. Motivation can be defined as "a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behavior and to determine its form, direction, intensity, and duration" (Pinder, 1998, p. 11). A basic assumption of process models of motivation is the distinction between motivation, volition, intention and behavior as stages in the process of human action. This succession of stages in human action is widely accepted and also used in the literature aside from work motivation (e.g. prosocial activity: Schott *et al.*, 2017).

However, motivation cannot be observed directly and must, therefore, be inferred (Kanfer, 2012, p. 456). That is frequently done with behavioral measures, which "is often problematic since performance is not univocally determined by motivation, and is also determined by employee knowledge and skills and/or the availability (or lack) of external resources (e.g. equipment) necessary for successful performance" (Kanfer, 2012, p. 457).

Nevertheless, it is this distinction between motivation and behavior which does not occur in the literature on knowledge sharing. When the motivation to share knowledge is operationalized, in many cases, the actual behavior or a behavioral intention is measured (Table A1). This missing differentiation is problematic: by not distinguishing KSM and KSB in measurement systematically, the measurement of both constructs is not valid and the former cannot be analyzed as a determinant of the latter in a sound way.

Models of knowledge-sharing motivation

Findings on knowledge-sharing motives are rather fragmented and often investigate single motives only instead of comprehensive models integrating multiple motivation factors (Nguyen *et al.*, 2019). However, a first comprehensive model was developed by Lin (2007).

She identified expected rewards, reciprocal benefits, self-efficacy and enjoyment in helping others as determinants of knowledge-sharing intentions. She already pointed to fundamental differences between extrinsic motivators (rewards and reciprocal benefits) and intrinsic motivators (self-efficacy and helping others). However, her model cannot be used as a conceptualization of KSM as, for example, self-efficacy is rather related to ability than motivation. Moreover, Nguyen *et al.* (2021) mention that the focus on these four single determinants might be too limited.

An initial theoretical model of KSM that actually deals with motivation instead of behavior was developed by Gagné (2009). She proposed a continuum of KSM following the continuum from a motivation via controlled motivation to autonomous motivation referring to self-determination theory (Deci and Ryan, 2008). Lam and Lambermont-Ford (2010) and Law *et al.* (2017) similarly developed a model of KSM but did not propose and test a precise measurement construct.

Many authors build on this idea of situating KSM on the continuum from intrinsic to extrinsic motivation based on self-determination theory (Llopis and Foss, 2016; Andreeva and Sergeeva, 2016). However, in doing so, they use rather broad operationalizations and define intrinsic KSM by, for example, liking or enjoying to share knowledge. While the results of these studies can tell us whether knowledge sharing is extrinsically or intrinsically motivated, they cannot tell us why exactly people share their knowledge – what are their exact motives (Todorova and Mills, 2018)?

Hung *et al.* (2011) constructed a measure that can be understood as motivation (in contrast to behavior), and that is more specific about the motives to share. They designed "knowledge-sharing altruism" as a mixture of helpfulness and one's pleasure in sharing knowledge and "knowledge-sharing reciprocity" as the expectation of reciprocal knowledge sharing. Gu and Gu (2011) suggested a more comprehensive construct for measuring KSM. They identify four dimensions of KSM: existence, relationship, growth and norm motivation. The precise wording of these items, even on inquiry, was not revealed by the authors. Therefore, it is not possible to replicate their items.

Reinholt *et al.* (2011) and Chen *et al.* (2012) both used their own scale to measure KSM, but they neither analyzed dimensions nor validated their scale. Instead, they compiled items into an index to use them directly as an independent variable in their model.

Stenius *et al.* (2017) tested Gagné's (2009) model of KSM and suggested that identified motivation better explains KSB than intrinsic motivation does. However, they used a general measure of autonomous motivation to measure its influence on KSB instead of developing items specific to knowledge sharing. This also applies to Gagné *et al.* (2019), who showed that identified and intrinsic motivation explain KSB, while externally regulated motivation explains knowledge hiding behavior. Furthermore, Stenius *et al.* (2017) limited KSB to active knowledge sharing in work meetings. While it is worthwhile to provide an example of knowledge sharing to respondents, this may influence the results. As Fischer (2018a) pointed out, knowledge sharing assumes different behavioral patterns – proactive or responsive (on request), direct (person-to-person) or indirect (person-to-medium) sharing. Stenius *et al.* (2017) focused on proactive and direct knowledge sharing. Other motives might determine other types of KSB.

As can be seen from this review of the literature on KSM and its measurement (see Table A1 for a summary), there remains a gap in the literature when it comes to measuring knowledge-sharing motives differently than behavior or a behavioral intention and in a domain-specific way. Hence, to measure a comprehensive set of *specific motives* rather than motivation in general.

If motivation is measured in general instead, as is done, for example, by Gagné *et al.* (2019), Llopis and Foss (2016), Andreeva and Sergeeva (2016) or Reinholt *et al.* (2011), we cannot finally understand the theoretical mechanisms behind knowledge sharing. It is argued here that if KSM comprises motives related to this special kind of work motivation, one can more easily explain what drives employees to share knowledge and derive work designs or management interventions fostering this behavior. Hence, it is worthwhile to construct a domain-specific KSM based on specific motives. A similar discussion can be found in the literature on children's motivation to learn in school, where it was shown that general motivational measures could not represent different intrinsic motivations in reading and mathematics (Wigfield *et al.*, 2004, p. 300).

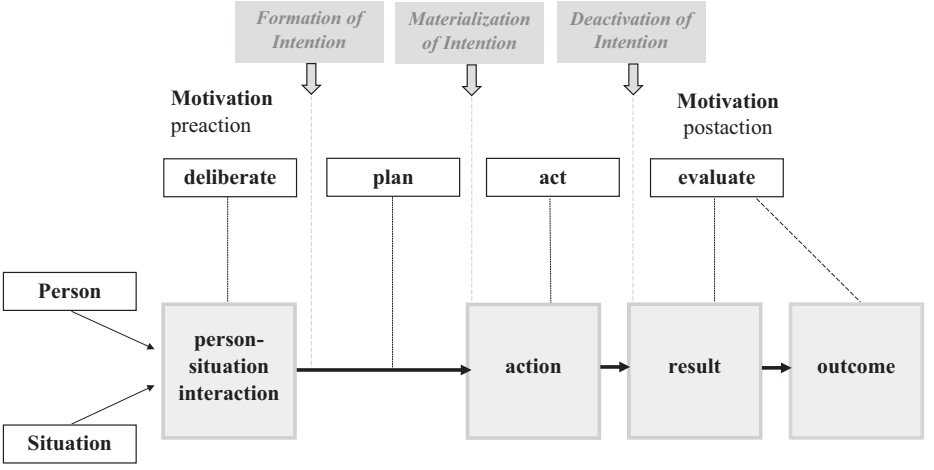
Theory

Theories on (work) motivation examine either the process or content of motivation. This study's theoretical model is derived from both lines of thought.

Motivation as a process

When motivation is analyzed from a process perspective, the focus is usually on how motivation results in behavior. Heckhausen's (1989) Rubicon model is a frequently used approach to examining different stages of human action. In his model, represented in Figure 1, motivation forms a predecisional stage derived from personal preferences and situational incentives and their interdependence. Motivation affects *intention*-building processes and resulting *behavior* but is not the sole cause of intention and behavior (Pinder, 1998).

By translating this model into the context of knowledge sharing, it can be expected that KSM derives from the interaction of personal motives and situational influences. Thereby, KSM is at a preactional and even predecisional stage of human action. Intention-building processes then control which motivational tendencies – there may be others besides KSM – are transferred into action. Therefore, a decision is first formed (knowledge-sharing intention) and then influenced again by personal and situational variables and transferred



Source: Adapted from Heckhausen and Heckhausen (2010, p. 8)

Figure 1.
Stages of human action in the Rubicon model and the terms

into action (KSB). Results and outcomes of this behavior, in turn, influence future KSM. This transfer of the Rubicon model to the knowledge-sharing context is outlined in Figure 2.

Content of motivation

Content theories of motivation focus on motivation itself and its underlying personal motives. Personal motives are drivers of motivation and behavior and are based on human needs, e.g. physical and mental health, friendship or autonomy. As already shown in the literature review above (see also Table A1), several motives are discussed in the literature to affect knowledge sharing. Most of them refer to Alderfer's (1972) existence, relatedness and growth (ERG) theory and McClelland's (1987) basic human needs (achievement, affiliation and power).

First, *relatedness and affiliation* are discussed as drivers of knowledge sharing (Amayah, 2013; Nguyen, 2019). "[. . .] Their satisfaction depends on a process of sharing or mutuality. People are assumed to satisfy relatedness needs by mutually sharing their thoughts and feelings" (Alderfer, 1969, p. 146). Simultaneously, Kianto *et al.* (2016) argue that knowledge sharing fosters job satisfaction because knowledge donors experience a feeling of being valuable and important to their colleagues and organization. The relatedness motive also refers to the idea of reciprocity in knowledge sharing. Lin (2007), for example, found that the expectation of reciprocal knowledge sharing and strengthening of relationships increases knowledge-sharing intentions and produces more positive attitudes about knowledge sharing. However, in their meta-analysis, Nguyen *et al.* (2019) found reciprocity to be the weakest determinant of KSB compared to more intrinsic motives or rewards.

Second, motives of *achievement and power* are also discussed as determinants of knowledge sharing (Amayah, 2013) and, even more, of knowledge hoarding (Willem and Buelens, 2006). Power motivation is "a desire to influence, control, or impress others" (Fodor, 2010, p. 3). Accordingly, the desire to be recognized as an expert through knowledge sharing is based on the power motive. Hosen *et al.* (2021), for example, found reputation to be an important motivator for knowledge sharing.

Achievement motivation can include both the hope of success and the fear of failure (Pang, 2010). Accordingly, if the achievement motive drives knowledge sharing, individuals might either share their knowledge if they expect to succeed in the workplace through this behavior or they might avoid knowledge sharing out of fear that their mistakes might be detected or that they might not be able to share their knowledge successfully. Andreeva and

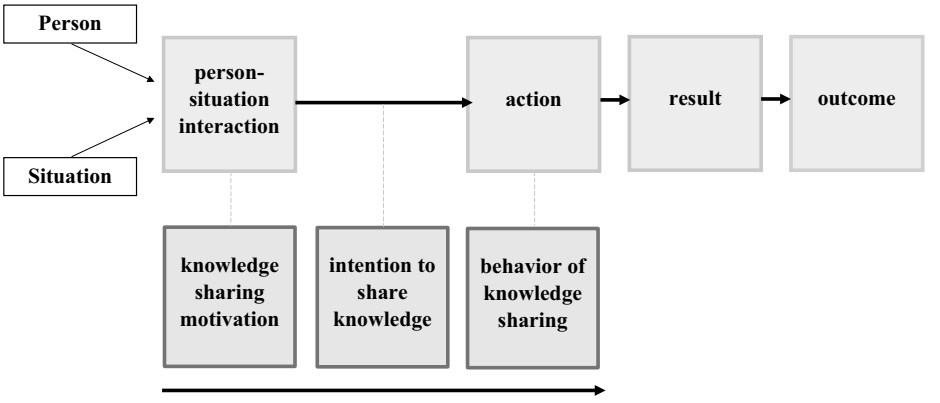


Figure 2.
Motivation, intention and behavior of sharing knowledge in the Rubicon model

Sergeeva (2016) operationalized extrinsic motivation to share knowledge under the umbrella of such an achievement and power motive and showed a slightly positive influence on KSB. Rewards and enhanced job security are examples to fulfill these achievement needs.

Third, *growth and personal development* are also expected to serve as motives for knowledge sharing. "Growth needs include all the needs which involve a person making creative or productive effects on himself and the environment" (Alderfer, 1969, p. 146). They belong to the power motive if growth is seen as career promotion at the workplace. If growth is instead seen as individual learning, it constitutes a more intrinsic form of motivation. Such a learning goal orientation is related to the desire to connect additional and demanding behaviors (Thomas and Gupta, 2022). One might get the impression that such a need is rather related to the collection than the donation of knowledge. However, individuals with strong learning and development need to focus on the development of new skills and the mastery of new situations. Sharing knowledge might constitute such a challenge (Thomas and Gupta, 2022). Additionally, as knowledge sharing is often seen as a reciprocal process, by sharing knowledge individuals might also count on getting "new knowledge" back.

Fourth, Gu and Gu (2011) also found that knowledge sharing can be motivated by just *following organizational or societal norms,* even though knowledge sharing might not be mandatory. However, individuals perform that behavior because they have a feeling of obligation (Thomas and Gupta, 2022). According to Lindenberg (2001, p. 335), such a "feeling that one must follow a particular rule" can be categorized as normative intrinsic motivation. Individuals always choose reference groups to follow in terms of beliefs and behavior. Hence, these reference groups can produce social pressure either in favor or against knowledge sharing (Choi *et al.*, 2020). Chen *et al.* (2018), for example, find too that knowledge sharing takes place because it is perceived as a requirement.

Fifth, *altruism,* which is based on prosocial motives, is also discussed as a driver for sharing knowledge. Prosocial motives are "the desire to expend effort to benefit other people" (Grant, 2008, p. 48). Hence, when a person enjoys helping others and feels good when he or she can be of help, such a motive might drive sharing own knowledge to help others. Lin (2007) showed such a positive influence of enjoying to help others on knowledge sharing intentions. However, Hung *et al.* (2011) could not show prosocial motives to affect KSB in a sample of students.

The above-described possible motives for knowledge sharing extracted from the literature served as a basis for developing measurement items for the scale to measure KSM. Item generation, scale development and initial validation are described in the following chapter.

Method

The main approach of this paper is to develop a scale for measuring "knowledge-sharing motivation" that is domain-specific and explicitly distinct from constructs measuring behavior. Scale development is usually divided into three general steps (DeVellis, 2017): *first,* items have to be generated; *second,* a scale combining these items has to be developed; and *third,* this scale has to be evaluated. The procedure used in every step of this scale development process relied on guidelines provided by Boateng *et al.* (2018) and DeVellis (2017).

Item generation

Development of items and their wording to measure knowledge-sharing motives relied on existing research. Boateng *et al.* (2018) describe that as the deductive approach to scale development. Possible motives for knowledge sharing retrieved from the literature served as

a basis as well as existing scales for single motives of knowledge sharing (Table A1). Based on the literature review, it was chosen to incorporate motives referring to relatedness, achievement, growth, norms and altruism. Some of these dimensions are debated in the literature and findings are inconsistent (e.g. the impact of rewards or norms). However, Boateng *et al.* (2018, p. 5) recommend including items that are "broader and more comprehensive than one's own theoretical view of the target (and that) content should be included that ultimately will be shown to be tangential or unrelated to the core construct."

For each dimension, a larger set of items was developed (altogether 40 items). This suits the recommendation to start with an item pool twice as long as the final scale (Weiner, 2013). As recommended by DeVellis (2017) and Boateng *et al.* (2018), this larger set of items was reviewed in two steps: first by academic peers and, after excluding and rephrasing some of the items, by employees as representatives of the target population. This review again led to excluding and reformulating items. The formulation of this first reduced set of items is displayed in Table A2.

Study 1: scale development

These preliminary items were tested using a Web survey composed of the developed items for measuring *KSM* (16 items), *KSB* (seven items) and demographics. KSB is measured to separate the construct from KSM and to validate the scale. Most of the items were measured with a five-point Likert scale. Items forming a matrix were randomly rotated to exclude priming or order effects. The survey started with items on motivation, followed by items on behavior. This order was chosen to avoid respondents' sense-making of their behavior.

KSB was measured according to the scale of Bock and Kim (2001). The provided items were adapted to the organizational context and complemented by items suggested in peer review and pretest. All items referred to knowledge sharing on the same hierarchical level (with coworkers instead of superiors or subordinates). One of the seven items reads: "How often do you share the following types of information with your coworkers: reports and official documents like a record?" Instead of Bock and Kim (2001), who measured these items with a five-point scale ranging from "very rarely" to "very frequently," it was decided to use a time-specific, seven-point scale ranging from "less than once a month" to "several times a day."

Data were collected from a sample of German public employees enrolled in an online panel. The sample consists of employees working on different federal levels (federal, federal state, municipality) in different fields of activity in the core administration and on different management levels (executive officer, leader, manager). From 514 respondents, early drop-outs and screen-outs due to another profession have been removed, resulting in 355 cases. According to Comrey and Lee (1992, p. 217), this sample size is appropriate for factor analysis and scale development. Table 1 gives a summary of the sample.

Study 2: further validation

To confirm the dimensions of KSM resulting from this first study, a second Web survey was designed and tested on two samples, employees from the core public administration (n = 314) and employees from the health sector (n = 315), to confirm the results in another field of work. Table 2 shows a description of the samples.

KSM was measured by a set of items that proved useful in Study 1. Some items were reformulated to widen the answer distribution. *KSB* was measured according to a set of items measuring the mode of knowledge sharing (direct/indirect and proactive/responsive).

Several measures were used to validate the scale of knowledge-sharing motives. First of all, a general measure to assess KSM (four items) was used to analyze the convergent validity of the developed construct. One of these general items reads: "I enjoy sharing my work-related knowledge with my coworkers." *Job satisfaction* and *proactiveness* are related constructs that

were used to validate the scale. Job satisfaction was used because a significant relationship to knowledge sharing had been identified (Kianto *et al.*, 2016). It was measured according to Fischer and Lück (1997), as they established a proven short scale of general job satisfaction.

As knowledge sharing is often not forced by an organization, it is seen as a proactive work behavior (Tuan, 2017). Hence, knowledge sharing should, to some extent, correlate with a proactive personality or personal initiative (Hon *et al.*, 2022). Hence, to further prove validity, proactivity was measured according to the construct of personal initiative by Frese *et al.* (1997). All used items are displayed in Table A8.

Results

Study 1: distinguishing between motivation and behavior

It was derived from the theoretical model that KSM is substantially different from KSB [1]. This hypothesis was tested using factor analysis to determine whether and by how many latent factors this set of variables is underlain. An exploratory factor analysis using a varimax rotation that produces orthogonal factors was performed. It was expected that the components, i.e. motivation and behavior, are not correlated.

A correlation matrix for all items used to measure KSM and KSB was inspected and showed very mixed patterns of correlations (Table A5). Nevertheless, assumptions for factor analysis are fulfilled (Bartlett's test of sphericity, $p = 0.00$; Kaiser–Meyer–Olkin measure of sampling adequacy, KMO = 0.88) [2].

An initial exploratory factor analysis brought up four components (Kaiser criterion: eigenvalues higher than one). Horn's parallel analysis [3] suggested extracting three factors. Table A6 shows the factor loadings of this analysis. Behavioral and motivational items do not overlap. Both constructs are selective. Hence, KSM and KSB can be distinguished as different components in the process of knowledge sharing.

Study 1: scale of knowledge-sharing motivation

Data from Study 1 were analyzed using exploratory factor analysis to explore latent dimensions of KSM. As can be seen from Table A3, all items suggested for measuring KSM vary to an acceptable extent and are not markedly different in their distribution. Therefore, they can be considered to be consistent (DeVellis, 2017, p. 143).

All but two items are intercorrelated highly enough. The two problematic items are the ones on (financial) rewards, which correlate strongly with each other but not significantly

Variable	*N*	Mean	SD	Minimum	Maximum
Age	311	44.2	10.4	21	65
Female	312	0.47	0.5	0	1
Supervisory status	312	0.26	0.44	0	1
Years of tenure	311	21.29	11.41	0	47

Table 1. Sample description (Study 1)

Variable	*N*	Mean	SD	Minimum	Maximum
Age	609	45.10	10.29	22	80
Female	618	0.61	0.49	0	1
Supervisory status	615	0.29	0.45	0	1
Years of tenure	615	20.20	11.23	0	47

Table 2. Sample description (Study 2)

with all other items. They also score low on item-scale correlation (Table A7). However, there are no opposing correlations (positive and negative coefficients for one item at the same time) that would suggest inconsistency (DeVellis, 2017, p. 142). Therefore, it was chosen to keep the discussed items preliminarily on the scale. Assumptions for factor analysis are fulfilled (Bartlett's test of sphericity, $p = 0.00$; KMO = 0.89).

Exploratory factor analysis (EFA). In the first step, exploratory factor analysis was performed with all items suggested for measuring KSM to identify underlying dimensions. The general item on KSM (KSM1) was excluded from this analysis because it was designed as an overall measure. Items deviating from a normal distribution (KSM1, KSM2, KSM3, KSM4, KSM7, KSM8) and items with high values for uniqueness (low h^2) (KSM11, KSM13) were excluded. A factor analysis revealed three factors with eigenvalues higher than one (Kaiser criterion) underlying the KSM construct. However, the third factor has an eigenvalue only slightly above one (1.09). Although parallel analysis suggests extracting two factors, three factors were extracted here because the adjusted eigenvalue is rather close to the threshold (0.9).

Table 3 shows the rotated factor loadings (Promax rotation). All items load selectively on a single factor and show reasonable factor loadings. The first factor consists of three items that refer to reputation, respect and recognition as an expert and is, therefore, named "appreciation motivation." The second factor consists of three items that refer to helping others and individual growth. This dimension is named "growth and altruism." The third factor consists of two items on rewards and is named "tangible reward." Therefore, a three-dimensional structure of KSM is suggested.

Study 2: validation of the developed scale

Confirmatory factor analysis (CFA). In the second step, a confirmatory factor analysis using data from Study 2 was performed [4]. Figure 3 shows a graphical representation of the first-order model built from the results of the exploratory factor analysis. Assumptions for factor analysis were met (Bartlett's test of sphericity: $p = 0.00$; KMO = 0.944) and no opposing item correlations exist (Table A10).

Multivariate normality, as an assumption for the use of confirmatory factor analysis based on maximum likelihood estimation (MLE), was tested. The data did not meet this assumption. Therefore, MLE was used with a Satorra–Bentler correction of standard errors (Satorra and Bentler, 1994) and compared to results from an asymptotic distribution-free estimation (ADF) instead of MLE (Browne, 1984).

To assess the models, standardized root mean square residual (SRMR) was examined, an absolute fit index that is less sensitive to sample size than other fit indices based on chi^2. Furthermore, two noncentrality-based indices were reported [root mean square error of

Table 3.
Factor loadings of KSM

Variable	Factor1	Factor2	Factor3	h^2
KSM10	*0.7224*	−0.0219	0.1524	0.5752
KSM14	*0.6864*	0.1441	−0.0041	0.6242
KSM6	*0.6693*	0.0867	−0.1242	0.5063
KSM16	−0.0033	*0.7811*	−0.0106	0.6039
KSM12	0.1010	*0.6565*	0.0819	0.5603
KSM15	0.2385	*0.5277*	−0.0503	0.4931
KSM9	−0.0512	0.0386	*0.7770*	0.5968
KSM5	0.0702	−0.0213	*0.7605*	0.6013

Notes: Principal factors, oblique Promax; $N = 343$

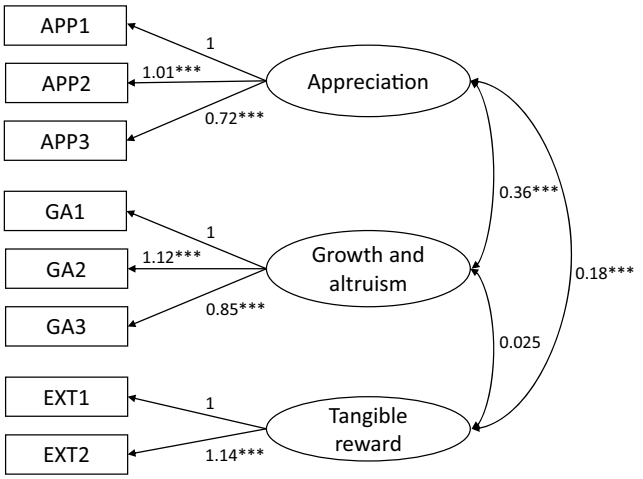


Figure 3.
Structural equation model of dimensions of KSM (ADF estimation, $N = 629$)

approximation (RMSEA) and comparative fit index (CFI)]. The estimated model shows a very good fit with all estimation methods (Table 4).

When confirmatory factor analysis (CFA) was performed for the two samples (core administration and health sector) separately, the model fit was still good. In the core administration sample, all measures met the usual threshold (RMSEA = 0.074, CFI = 0.962 and SRMR = 0.043) and, in the health sector sample, measures for model fit were even better (RMSEA = 0.053, CFI = 0.982, SRMR = 0.038).

Additionally, it was compared whether a single-factor model performed better in a CFA than the three-factor model. The difference in the two models' Akaikean (AIC) and Bayesian information criteria (BIC) was higher than the suggested thresholds: AIC three-factor model = 12,053.904; AIC single-factor model = 12,281.047; ΔAIC = 227.566; BIC three-factor model = 12,173.895; BIC single-factor model = 12,387.706; ΔBIC = 213.811 [5]. Accordingly, there was no support for the conclusion that the single-factor model works better than the three-factor model. Calculating the average variance extracted (AVE) from each dimension showed that two factors met the recommended threshold (appreciation AVE = 0.53, growth and altruism AVE = 0.55) but had a value slightly too low for the third factor (extrinsic reward AVE = 0.42). However, as AVE is a fairly conservative measure and the overall fit of the model was good, the value is still acceptable.

As can be seen from Figure 3, the first (appreciation) and second factors (growth and altruism) are interrelated in the model (cov = 0.36, $p = 0.00$). Other factor interrelations are not that pronounced (appreciation and tangible reward: cov = 0.18, $p = 0.00$) or even not significant (growth and altruism and tangible reward: cov = 0.025, $p = 0.37$). These results fit with the distinction between different kinds of extrinsic and intrinsic motivations found

Fit index	MLE	MLE with Satorra–Bentler correction	ADF	Threshold
RMSEA/RMSEA_SB	0.065	0.056	0.074	<0.8
CFI/CFI_SB	0.972	0.975	0.911	>0.9
SRMR	0.036	0.036	0.064	<0 0.08

Note: $N = 629$

Table 4.
Model fit

in self-determination theory (Deci and Ryan, 2008). Whereas "tangible reward motivation" forms the most controlled kind of extrinsic motivation (so-called "external regulation"), appreciation motivation is still extrinsic but is a form of introjected regulation and thereby close to "growth and altruism," which is intrinsically regulated. Thus, no mean index should be built from the items comprising the developed scale in further research.

Validation. To gauge the validity of the developed scale, a range of variables theoretically connected to KSM are included in the structural equation model (Table 5).

All dimensions of the developed scale correlate partly with an overall measure for KSM. Therefore, the scale comprising three dimensions shows convergent validity and is useful for measuring KSM. The greatest influence on the four-item index of a general measure of KSM comes from the dimension covering growth and altruism, and the motive covering tangible rewards has a negative influence on KSM (Table 5, Column 2). At least in the used sample of public employees, "growth and altruism" is the best predictor for KSB measured by both the mode of sharing and its degree of proactiveness (Table 5, Columns 2 and 3). Responsive KSB is better explained by appreciation (Table 5, Column 4).

Different dimensions of the KSM construct do also correlate with related measures. It was expected that not every dimension would correlate with the related constructs in the same way, as they are theoretically different. Indeed, the data show enough discriminant validity of the developed scale for KSM compared to related constructs (see Table 5).

To further assess discriminant validity, some demographic variables (age, gender, tenure, education level) that should not be correlated to KSM were analyzed (Table A11). They were correlated pairwise with predicted factor scores for the dimensions of KSM. Neither of the analyzed variables was significantly correlated to one of the construct's dimensions. This result further underlines the discriminant validity of the developed construct. The dimensional structure of KSM and its item wording can be found in Table 6.

Discussion

It was the purpose of this paper to develop a construct to measure knowledge sharing in a way that distinguishes motivation from behavior. Exploratory factor analysis showed that KSM and KSB could clearly be distinguished as separate components. This result is congruent with the literature, where distinctions between knowledge-sharing attitude and behavior and between knowledge-sharing outcomes and motivation (Hung *et al.*, 2011) were found. This result also corresponds with the literature on motivation and work behavior in general (Kanfer, 2012). Thus, the results of this study show that the *pre- and post-actional stages* in the process of knowledge sharing can be distinguished. Therefore, they should be measured with different constructs in future. At the same time, motivation should also not be confused with an attitude toward knowledge sharing as a behavioral result.

By confirming that behavior and motivation are different constructs, it was revealed that a scale to measure KSM in a nonbehavioral way was needed. As discussed in this article, no comprehensive and reproducible scale of KSM incorporating specific knowledge-sharing

Table 5.
Bivariate correlations of KSM and several measures

KSM dimension	KSM general (GEN1-4)	KSB mode (KSB1-4)	KSB proact. (KSB5-6)	KSB respons. (KSB7-8)	Job satisfaction	Proactivity
Appreciation	*0.164 (0.09)*	*0.275 (0.020)*	0.003 (0.979)	*0.442 (0.002)*	−0.160 (0.322)	0.004 (0.969)
Growth/altruism	*0.727 (0.000)*	*0.255 (0.013)*	*0.552 (0.000)*	*0.230 (0.074)*	*−0.378 (0.039)*	*0.344 (0.000)*
Tangible reward	*−0.193 (0.001)*	−0.061 (0.403)	0.075 (0.293)	−0.051 (0.538)	*0.153 (0.037)*	*0.154 (0.001)*

Notes: ADF estimation, univariate models. Coefficients, *p*-values in parentheses; $N = 620$

Table 6.
Dimensions of KSM and their item wording

Factor 1: appreciation	Factor 2: growth and altruism	Factor 3: tangible reward
If I share my work-related knowledge with my coworkers, . . .	If I share my work-related knowledge with my coworkers, . . .	If I share my work-related knowledge with my coworkers, . . .
. . . I am perceived as an expert. (APP1)	. . . I gain satisfaction from helping others to solve problems. (GA1)	. . . it should also be rewarded. (EXT1)
. . . I enjoy acknowledgment and respect. (APP2)	. . . I enjoy being able to help others with it. (GA2)	. . . I deserve a monetary reward. (EXT2)
. . . they acknowledge my expertise. (APP3)	. . . I personally grow and evolve. (GA3)	

Note: Items are presented in the order of their loadings in EFA

motives was available. Therefore, it was the purpose of this study to develop a scale measuring KSM in such a domain-specific way. Based on existing results about knowledge-sharing motives from the literature, a scale was constructed. This initial scale contained items referring to different motives for human behavior, namely, relatedness as a social motive, achievement, growth and development, prosocial and normative motives. An exploratory factor analysis derived three dimensions that can be described as appreciation motivation, growth motivation and altruism and tangible reward motivation. These dimensions show high factor loadings and are distinctive, which indicates that construct validity and reliability have been achieved. This is confirmed by the results of a confirmatory factor analysis, which shows a good model fit. The resulting dimensions of KSM (appreciation, growth and altruism and tangible rewards) fit perfectly with Alderfer (1972), who claims that ERG theory are groups of needs that explain human behavior.

The *first factor* in KSM derived from the data refers to reputation, respect and recognition as an expert as a motive for sharing knowledge. This "appreciation motivation" is identified as a form of extrinsic motivation (Deci and Ryan, 2008). The dimension covers instrumental ("seen as an expert") and affective motives ("enjoy reputation and respect"). This dimension is very close to the basic motives of achievement and power and should not be confused with relationship or affiliation. Choi *et al.* (2020) recently found that appreciation by others enhances knowledge sharing intentions as well as positive attitudes toward knowledge sharing. However, they interpret appreciation not as a motive to share knowledge but rather as social pressure (if you want to be liked, you have to fulfill the norm). However, whether seen as external pressure or a motive, it becomes clear that the appreciation motive to knowledge sharing forms a rather extrinsic motivation that is closer to rewards than enjoyment, for example. Similarly, Nguyen *et al.* (2022) and Hosen *et al.* (2021) show that the enhancement of reputation significantly influences knowledge sharing.

The *second factor* refers to helping others by knowledge sharing and growing individually through this behavior. The dimension again covers affective motives. This "growth and altruism motivation" is a form of intrinsic motivation that is internally regulated and is the most autonomous form of motivation. This dimension comprises motives that are close to the basic motives of competence and autonomy (growth) (Ryan and Deci, 2000) as well as prosocial motives (altruism). Thereby, growth and appreciation (first factor) are theoretically very close. The theoretical proximity to the first factor is also represented by the high correlation between the two factors (Figure 3). However, growing individually is significantly different than being appreciated by others, because the latter depends (extrinsically) on others and goes back to the power motive. Individual growth is instead

motivated intrinsically and does not depend on other people. Furthermore, the first factor strictly points to success in career terms, while the second factor refers to the development of personality independent of the job. This developmental motive to share knowledge is also closely related to what Lin (2007) termed as self-efficacy to share knowledge.

The prosocial part of this dimension is very close to what Hung *et al.* (2011) designed as the altruistic motivation to share knowledge and Olatokun and Nwafor (2012) as enjoyment in helping others. That motive of helping others was also identified as a determinant of knowledge sharing by Lin (2007). Similarly, Amayah (2013) found a (low) degree of empathy in an organization to be a barrier to knowledge sharing, which might be related to prosocial motives and helping behavior. The fact that altruism and growth load onto the same dimension fits with self-determination theory, as both motives are intrinsic. Furthermore, both refer to motives based on pleasure and enjoyment. Furthermore, Xia and Yang (2020) showed recently that such a prosocial motivation to share knowledge is an important precondition so that ethical leadership can foster knowledge sharing. Hence, leaders can actively build on such a motive to share knowledge and enhance it by serving as a role model.

The *third factor* covers instrumental motives ("financial remuneration") and is close to the existence motive (Alderfer, 1972) as well as achievement and power-related motivation. Because the factor lacks items on job security and other existence-related measures, it was identified as "tangible reward" to underline this difference. There is also some similarity with the dimension "traction motivation" by Chen *et al.* (2012), but they include not only economic but also social exchange in this dimension. In this study, social exchange is instead a rationale for the dimension "appreciation."

This third dimension is a form of externally regulated extrinsic motivation. Similarly, Amayah (2013) identified rewards as determinants of knowledge sharing in the public sector context, as Lin (2007) did for the private sector. However, several studies also found no or even negative effects of rewards on knowledge sharing (Bock and Kim, 2001).

The fact that these items on rewards form a dimension of KSM in this study does not mean that this dimension is a booster of KSB. As it was shown by validating the scale, a negative correlation with a general measure of KSM and no or even negative effects on KSB were detected in this study. This fits with the recent results of Gagné *et al.* (2019), who found extrinsically regulated motivation to be more highly correlated to knowledge hiding rather than sharing. However, Nguyen *et al.* (2021) suggested that there might be a context effect in place concerning the impact of rewards. They showed extrinsic rewards to have a positive effect on knowledge sharing in private sector organizations, whereas in public sector organizations, intrinsic motivators worked more effectively. However, Fischer (2022) found that rewards – if at all – impact sharing of explicit knowledge but do not affect sharing of implicit knowledge. Hence, managerial actions aimed to foster certain motives to share knowledge should make sure that the right kind of KSB is targeted.

It is assumed that the constructed scale can be used regardless of the sampled organizations and is not sector specific. This assumption is supported by the robust model fit in a very typical public sector sample (core public administration) as well as a sample which is often characterized as fulfilling a public task in a private sector context (health care). However, the impact of each dimension of KSM on the subsequent behavior might differ according to the organizational context. For example, it can be assumed that altruism will have less influence on KSB, whereas rewards might have a stronger impact in the private sector.

Not all theoretically suggested dimensions could be confirmed with these data. This might be due to item wording, which might not have been strong or distinctive enough or might have caused socially desirable answering such that some items became skewed.

Conclusion

This study provides evidence on the distinction between KSM and KSB, which has to be considered in the measurement of KSM. The developed scale to measure KSM in this way contains three dimensions, and measures of construct validity and reliability have been reasonable.

These results contribute to the *literature on knowledge sharing* in three ways: first, the theoretical difference between motivation and behavior was confirmed empirically and should be recognized in the future as a strong argument against behavioral measures of KSM. Second, a scale to measure KSM without behavioral items was constructed transparently so that other researchers can use these efforts as a basis for their research. Third, KSM was constructed as a domain-specific motivation based on specific motives, which makes it easier to derive work designs or management interventions to foster KSB.

The distinction between KSM and KSB adds methodological support to the increasing use of experimental research as well as ethnographical studies, which are both able to capture performed behavior apart from self-reported motivation. This study underlines the need for distinguished measurement strategies for different stages in the process of human behavior. As social science research on the microlevel moves forward to more sophisticated methods, it is worth debating if the constructs in use measure what we want to measure or if they intermingle, for example, motivational and behavioral patterns.

This study also comes with limitations. First, limitations may result from the research design. Respondents recruited themselves into the online panel and the sample. Results may be biased because respondents may already represent individuals with a strong motivation to share knowledge. Furthermore, surveys on the topic of knowledge sharing may suffer from social desirability and self-serving bias. Second, limitations derive from the context of this study. Some results might be due to the German public sector context. Third, the factors occurring from this analysis contain only two or three variables and should, therefore, be treated with caution. Future research should enhance the scale by testing further items.

These limitations and the steps of scale development accomplished in this study lead to suggestions for further research. *First* of all, the tested scale has to be further validated using other samples, ideally in different contexts and countries. Future research might concentrate particularly on the question of whether the constructed scale for measuring KSM in a public sector context is replicable in the private sector. *Second*, motives for knowledge sharing might have a different influence on KSB. For instance, Lam and Lambermont-Ford (2010) assume that extrinsic motivation supports the sharing of explicit knowledge, and intrinsic motivation fosters the sharing of implicit knowledge. Gagné (2009) also expects that while an intrinsic motivation to share knowledge "will likely lead to a high quantity of sharing, it may not necessarily lead to the most useful knowledge sharing" (574). Hence, scoring high on the "growth and altruism" dimensions of KSM might cause a lot of knowledge sharing that might not always be useful for the receiver. Individuals scoring high on the "appreciation" motive might examine the usefulness of their knowledge sharing because their colleagues may not appreciate their sharing. *Third*, based on these motives found for knowledge sharing, work designs and management interventions related to these motives should be tested to promote knowledge sharing. In this case, an experimental approach would be worthwhile.

According to Law and Ngai (2008), employees who are motivated to share their knowledge represent the most important precondition for knowledge management. It is important to know whether and how employees are motivated to share their knowledge to take steps to support and strengthen this motivation. However, comprehensive scales to identify the strength of employees' KSM and their specific motives were missing so far. It is aimed to contribute to the literature by developing a valid scale measuring KSM.

Notes

1. Descriptive statistics for KSM are provided in Table A3; descriptive statistics for items on behavior are provided in Table A4.
2. To test the appropriateness of factor analysis, the Stata package "factortest" by Joao Pedro Azevedo was used.
3. Parallel analysis produces eigenvalues adjusted for the sample error-induced inflation of factors. To perform parallel analysis in Stata, the package "paran" by Alexis Dinno was used.
4. Descriptive statistics can be found in Table A9.
5. AIC and BIC can only be calculated using MLE instead of ADF estimation.

References

Agyemang, F., Dzandu, M.D. and Boateng, H. (2016), "Knowledge sharing among teachers. The role of the Big Five Personality traits", *VINE: Journal of Information and Knowledge Management Systems*, Vol. 46 No. 1, pp. 64-84.

Ahmad, F. and Karim, M. (2019), "Impacts of knowledge sharing: a review and directions for future research", *Journal of Workplace Learning*, Vol. 31 No. 3, pp. 207-230.

Alderfer, C.P. (1969), "An empirical test of a new theory of human needs", *Organizational Behavior and Human Performance*, Vol. 4 No. 2, pp. 142-175.

Alderfer, C.P. (1972), *Existence, Relatedness, and Growth: Human Needs in Organizational Settings*, Free Press, New York, NY.

Amayah, A.T. (2013), "Determinants of knowledge sharing in a public sector organization", *Journal of Knowledge Management*, Vol. 17 No. 3, pp. 454-471.

Andreeva, T., Sergeeva, A. (2016), "The more the better . . . or is it? The contradictory effects of HR practices on knowledge-sharing motivation and behaviour", *Human Resource Management Journal*, Vol. 26 No. 2, pp. 151-171.

Boateng, G.O., Neilands, T.B., Frongillo, E.A., Melgar-Quiñonez, H.R. and Young, S.L. (2018), "Best practices for developing and validating scales for health, social, and behavioral research: a primer", *Frontiers in Public Health*, Vol. 6.

Bock, G.-W. and Kim, Y.-G. (2001), "Breaking the myths of rewards: an exploratory study of attitudes about knowledge sharing", *Pacis 2001 Proceedings*, Vol. 78, pp. 1112-1125.

Browne, M.W. (1984), "Asymptotically distribution-free methods for the analysis of covariance structures", *British Journal of Mathematical and Statistical Psychology*, Vol. 37 No. 1, pp. 62-83.

Cai, Y., Yang, Y. and Shi, W. (2022), "A predictive model of the knowledge-sharing intentions of social Q&A community members: a regression tree approach", *International Journal of Human–Computer Interaction*, Vol. 38 No. 4, pp. 324-338.

Chen, C.-S., Chang, S.-F. and Liu, C.-H. (2012), "Understanding knowledge-sharing motivation, incentive mechanisms, and satisfaction in virtual communities", *Social Behavior and Personality: An International Journal*, Vol. 40 No. 4, pp. 639-647.

Chen, H., Baptista Nunes, M., Ragsdell, G. and An, X. (2018), "Extrinsic and intrinsic motivation for experience grounded tacit knowledge sharing in Chinese software organisations", *Journal of Knowledge Management*, Vol. 22 No. 2, pp. 478-498.

Choi, G., Nam, C., Kim, S., Jung, H.J. and Lee, C.H. (2020), "Where does knowledge-sharing motivation come from? The case of third-party developer in mobile platforms", *Journal of Knowledge Management*, Vol. 24 No. 7, pp. 1681-1704.

Comrey, A.L. and Lee, H.B. (1992), *A First Course in Factor Analysis*, 2nd ed., Taylor and Francis, Hoboken.

Deci, E.L. and Ryan, R.M. (2008), "Self-determination theory. A macrotheory of human motivation, development, and health", *Canadian Psychology/Psychologie Canadienne*, Vol. 49 No. 3, pp. 182-185.

DeVellis, R.F. (2017), *Scale Development: Theory and Applications*, Fourth Edition, SAGE, Los Angeles, London, New Delhi, Singapore, Washington, DC, Melbourne.

Fischer, C. (2018a), "Beraten statt archivieren. Wie öffentlich beschäftigte ihr wissen am arbeitsplatz teilen", [advising instead of archiving. How public employees share their knowledge in the workplace]", *Der Moderne Staat – Zeitschrift Für Public Policy, Recht Und Management*, Vol. 11 No. 2-2018, pp. 285-307.

Fischer, C. (2018b), "Motivated to share? Development and validation of a domain-specific scale to measure knowledge-sharing motives", available at: https://doi.org/10.31219/osf.io/r5xba

Fischer, C. (2022), "Incentives can't buy me knowledge: the missing effects of appreciation and aligned performance appraisals on knowledge sharing of public employees", *Review of Public Personnel Administration*, Vol. 42 No. 2, pp. 368-389.

Fischer, C. and Döring, M. (2022), "Thank you for sharing! How knowledge sharing and information availability affect public employees' job satisfaction", *International Journal of Public Sector Management*, Vol. 35 No. 1, pp. 76-93.

Fischer, L. and Lück, H.E. (1997), "Allgemeine arbeitszufriedenheit, [general job satisfaction]", *Zusammenstellung Sozialwissenschaftlicher Items Und Skalen (ZIS)*, available at, doi: 10.6102/zis1 (accessed 20 March 2020).

Fodor, E.M. (2010), "Power motivation", in Brunstein, J.C. and Schultheiss, O.C. (Eds), *Implicit Motives*, Oxford University Press, New York, NY, pp. 3-29.

Frese, M., Fay, D., Hilburger, T., Leng, K. and Tag, A. (1997), "The concept of personal initiative: operationalization, reliability and validity in two German samples", *Journal of Occupational and Organizational Psychology*, Vol. 70 No. 2, pp. 139-161.

Friedrich, J., Becker, M., Kramer, F., Wirth, M. and Schneider, M. (2020), "Incentive design and gamification for knowledge management", *Journal of Business Research*, Vol. 106, pp. 341-352.

Fullwood, R., Rowley, J. and Delbridge, R. (2013), "Knowledge sharing amongst academics in UK universities", *Journal of Knowledge Management*, Vol. 17 No. 1, pp. 123-136.

Gagné, M. (2009), "A model of knowledge-sharing motivation", *Human Resource Management*, Vol. 48 No. 4, pp. 571-589.

Gagné, M., Tian, A.W., Soo, C., Zhang, B., Ho, K.S.B. and Hosszu, K. (2019), "Different motivations for knowledge sharing and hiding: the role of motivating work design", *Journal of Organizational Behavior*, Vol. 40 No. 7.

Grant, A.M. (2008), "Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity", *Journal of Applied Psychology*, Vol. 93 No. 1, pp. 48-58.

Gu, Q. and Gu, Y. (2011), "A factorial validation of knowledge-sharing motivation construct", *Journal of Service Science and Management*, Vol. 04 No. 01, pp. 59-65.

Heckhausen, H. (1989), *Motivation Und Handeln, Springer-Lehrbuch, Zweite, Völlig Überarbeitete Und Ergänzte Auflage*, Springer, Berlin, Heidelberg.

Heckhausen, J. and Heckhausen, H. (Eds.) (2010), *Motivation und Handeln, [Motivation and action], Springer-Lehrbuch*, 4, überarbeitete und erweiterte Auflage, Springer-Verlag Berlin Heidelberg, Berlin, Heidelberg.

Henttonen, K., Kianto, A. and Ritala, P. (2016), "Knowledge sharing and individual work performance: an empirical study of a public sector organisation", *Journal of Knowledge Management*, Vol. 20 No. 4, pp. 749-768.

Hon, A.H.Y., Fung, C.P.Y. and Senbeto, D.L. (2022), "Willingness to share or not to share? Understanding the motivation mechanism of knowledge sharing for hospitality workforce", *Journal of Hospitality Marketing and Management*, Vol. 31 No. 1, pp. 77-96.

Hosen, M., Ogbeibu, S., Giridharan, B., Cham, T.-H., Lim, W.M. and Paul, J. (2021), "Individual motivation and social media influence on student knowledge sharing and learning performance: evidence from an emerging economy", *Computers and Education*, Vol. 172.

Hung, S.-Y., Durcikova, A., Lai, H.-M. and Lin, W.-M. (2011), "The influence of intrinsic and extrinsic motivation on individuals' knowledge sharing behavior", *International Journal of Human-Computer Studies*, Vol. 69 No. 6, pp. 415-427.

Kanfer, R. (2012), "Work motivation: theory, practice, and future directions", in Kozlowski, S.J. (Ed.), *The Oxford Handbook of Organizational Psychology*, Oxford University Press, Oxford, Vol. 1, pp. 455-495.

Kianto, A., Vanhala, M. and Heilmann, P. (2016), "The impact of knowledge management on job satisfaction", *Journal of Knowledge Management*, Vol. 20 No. 4, pp. 621-636.

Lam, A. and Lambermont-Ford, J.-P. (2010), "Knowledge sharing in organisational contexts. A motivation-based perspective", *Journal of Knowledge Management*, Vol. 14 No. 1, pp. 51-66.

Law, C.C. and Ngai, E.W. (2008), "An empirical study of the effects of knowledge sharing and learning behaviors on firm performance", *Expert Systems with Applications*, Vol. 34 No. 4, pp. 2342-2349.

Law, K.K., Chan, A. and Ozer, M. (2017), "Towards an integrated framework of intrinsic motivators, extrinsic motivators and knowledge sharing", *Journal of Knowledge Management*, Vol. 21 No. 6, pp. 1486-1502.

Lin, H.-F. (2007), "Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions", *Journal of Information Science*, Vol. 33 No. 2, pp. 135-149.

Lin, C.-P., Huang, H.-T. and Huang, T.Y. (2020), "The effects of responsible leadership and knowledge sharing on job performance among knowledge workers", *Personnel Review*, Vol. 49 No. 9, pp. 1879-1896.

Lindenberg, S. (2001), "Intrinsic motivation in a new light", *Kyklos*, Vol. 54 Nos 2/3, pp. 317-342.

Llopis, O. and Foss, N.J. (2016), "Understanding the climate – knowledge sharing relation: the moderating roles of intrinsic motivation and job autonomy", *European Management Journal*, Vol. 34 No. 2, pp. 135-144.

McClelland, D.C. (1987), *Human Motivation*, Cambridge Univ. Press, Cambridge.

Martin, A.J. (2008), "How domain specific is motivation and engagement across school, sport, and music? A substantive–methodological synergy assessing young sportspeople and musicians", *Contemporary Educational Psychology*, Vol. 33 No. 4, pp. 785-813.

Nguyen, T.-M. (2019), "Do extrinsic motivation and organisational culture additively strengthen intrinsic motivation in online knowledge sharing?", *VINE Journal of Information and Knowledge Management Systems*, Vol. 50 No. 1, pp. 75-93.

Nguyen, M., Malik, A. and Sharma, P. (2021), "How to motivate employees to engage in online knowledge sharing? Differences between posters and lurkers", *Journal of Knowledge Management*, Vol. 25 No. 7, pp. 1811-1831.

Nguyen, T.-M., Ngo, L.V. and Gregory, G. (2022), "Motivation in organisational online knowledge sharing", *Journal of Knowledge Management*, Vol. 26 No. 1, pp. 102-125.

Nguyen, T.-M., Nham, T.P., Froese, F.J. and Malik, A. (2019), "Motivation and knowledge sharing: a meta-analysis of main and moderating effects", *Journal of Knowledge Management*, Vol. 23 No. 5, pp. 998-1016.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Nugroho, M.A. (2018), "The effects of collaborative cultures and knowledge sharing on organizational learning", *Journal of Organizational Change Management*, Vol. 31 No. 5, pp. 1138-1152.

Olatokun, W. and Nwafor, C.I. (2012), "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. 216-234.

Pandey, J., Gupta, M., Behl, A., Pereira, V., Budhwar, P., Varma, A., Hassan, Y. and Kukreja, P. (2021), "Technology-enabled knowledge management for community healthcare workers: the

effects of knowledge sharing and knowledge hiding", *Journal of Business Research*, Vol. 135, pp. 787-799.

Pang, J.S. (2010), "The achievement motive: a review of theory and assessment of *n* achievement, hope of success, and fear of failure", in Brunstein, J.C. and Schultheiss, O.C. (Eds), *Implicit Motives*, Oxford University Press, New York, NY, pp. 30-70.

Pinder, C.C. (1998), *Work Motivation in Organizational Behavior*, Prentice Hall, Upper Saddle River, NJ.

Reinholt, M., Pedersen, T. and Foss, N.J. (2011), "Why a central network position isn't enough. The role of motivation and ability for knowledge sharing in employee networks", *Academy of Management Journal*, Vol. 54 No. 6, pp. 1277-1297.

Ryan, R.M. and Deci, E.L. (2000), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American Psychologist*, Vol. 55 No. 1, pp. 68-78.

Satorra, A. and Bentler, P.M. (1994), "Corrections to test statistics and standard errors in covariance structure analysis", *In Latent Variables Analysis: Applications for Developmental Research*, SAGE, Thousand Oaks, CA, pp. 399-419.

Schott, C., Neumann, O., Bärtschi, M. and Ritz, A. (2017), "Public service motivation, prosocial motivation altruism and prosocial behavior: towards disentanglement and conceptual clarity", *Conference paper for IRSPM Annual Conference*, Budapest.

Siemsen, E., Roth, A. and Balasubramanian, S. (2008), "How motivation, opportunity, and ability drive knowledge sharing. The constraining-factor model", *Journal of Operations Management*, Vol. 26 No. 3, pp. 426-445.

Stenius, M., Haukkala, A., Hankonen, N. and Ravaja, N. (2017), "What motivates experts to share? A prospective test of the model of knowledge-sharing motivation", *Human Resource Management*, Vol. 56 No. 6, pp. 871-885.

Tang, C., Lu, X. and Naumann, S.E. (2020), "Intrinsic motivation and knowledge sharing in the mood–creativity relationship", *Journal of Management and Organization*, Vol. 1, pp. 1-13.

Thomas, A. and Gupta, V. (2022), "The role of motivation theories in knowledge sharing: an integrative theoretical reviews and future research agenda", *Kybernetes*, Vol. 51 No. 1, pp. 116-140.

Todorova, N. and Mills, A.M. (2018), "Why do people share?", *International Journal of Knowledge Management*, Vol. 14 No. 3, pp. 1-20.

Tuan, L.T. (2017), "HR flexibility and job crafting in public organizations. The roles of knowledge sharing and public service motivation", *Group and Organization Management*, Vol. 10 No. 4.

Wang, C. and Hu, Q. (2020), "Knowledge sharing in supply chain networks: effects of collaborative innovation activities and capability on innovation performance", *Technovation*, Vols 94-95.

Wei, J., Stankosky, M., Calabrese, F. and Lu, L. (2008), "A framework for studying the impact of national culture on knowledge sharing motivation in virtual teams", *VINE: Journal of Information and Knowledge Management Systems*, Vol. 38 No. 2, pp. 221-231.

Weiner, I.B. (Ed.) (2013), *Handbook of Psychology*, 2nd ed., Wiley, Hoboken, NJ.

Wigfield, A., Guthrie, J.T., Tonks, S. and Perencevich, K.C. (2004), "Children's motivation for reading: domain specificity and instructional influences", *The Journal of Educational Research*, Vol. 97 No. 6, pp. 299-310.

Willem, A. and Buelens, M. (2006), "Knowledge sharing in public sector organizations. The effect of organizational characteristics on interdepartmental knowledge sharing", *Journal of Public Administration Research and Theory*, Vol. 17 No. 4, pp. 581-606.

Xia, Z. and Yang, F. (2020), "Ethical leadership and knowledge sharing: the impacts of prosocial motivation and two facets of conscientiousness", *Frontiers in Psychology*, Vol. 11, p. 581236.

Zenk, L., Hynek, N., Edelmann, N., Virkar, S., Parycek, P. and Steiner, G. (2021), "Exploring motivation to engage in intraorganizational knowledge sharing: a mixed-methods approach", *Kybernetes*, Vol. 51 No. 13, pp. 18-32.

Table A1.
Measures of KSM in the literature

Appendix

Authors	Construct/dimensions	Items
Scales (at least partly) measuring behavior or intention		
Siemsen *et al.* (2008)	Motivation to share	I had no intention to share this knowledge with my coworker I was motivated to share what I know with my coworker I really wanted to share this knowledge with my coworker
Wei *et al.* (2008)*	Commitment to knowledge sharing	Internalization Identification Compliance
Fullwood *et al.* (2013)	Attitude toward knowledge sharing	I do not enjoy sharing my knowledge Sharing my knowledge with other organizational members is valuable experience Sharing my knowledge with other organizational members is a wise move I share my knowledge in an appropriate and effective way
Henttonen *et al.*, 2016	Knowledge-sharing propensity	At the end of each day, I feel that I have learned from other members from my organization by exchanging and combining ideas I am capable of sharing my expertise to bring new projects or initiatives to fruition I am willing to exchange and combine ideas with their coworkers It is rare for me to exchange and combine ideas to find solutions to problems
Scales measuring an "attitude towards knowledge sharing" resulting from the behavior		
Bock and Kim (2001)	Attitude toward knowledge sharing	My knowledge sharing with other organizational members is good My knowledge sharing with other organizational members is harmful My knowledge sharing with other organizational members is an enjoyable experience My knowledge sharing with other organizational members is valuable to me My knowledge sharing with other organizational members is a wise move

(*continued*)

Table A1.

Authors	Construct/dimensions	Items
Agyemang *et al.* (2016)	Attitude toward knowledge sharing	If I share my knowledge with other teachers, I feel very beneficial If I share my knowledge with other teachers, I feel very pleasant If I share my knowledge with other teachers, I feel very meaningful It is a wise move if I share my knowledge with my coworkers
Choi (2020)	Attitude toward knowledge sharing	My knowledge sharing with other developers is good My knowledge sharing with other developers is valuable My knowledge sharing with other developers is beneficial
Models of KSM without measurement items		
Gagné (2009)		
Lam and Lambermont-Ford (2010)		
Law *et al.* (2017)		
Scales measuring motivation		
Lin *et al.* (2007)	Expected organizational rewards	I will receive a higher salary in return for my knowledge sharing I will receive a higher bonus in return for my knowledge sharing I will receive increased promotion opportunities in return for my knowledge sharing I will receive increased job security in return for my knowledge sharing
	Reciprocal benefits	I strengthen ties between existing members of the organization and myself I expand the scope of my association with other organization members I expect to receive knowledge in return when necessary I believe that my future requests for knowledge will be answered

(*continued*)

Table A1.

Authors	Construct/dimensions	Items
	Knowledge self-efficacy	I am confident in my ability to provide knowledge that others in my organization consider valuable
		I have the expertise required to provide valuable knowledge for my organization
		It does not really make any difference whether I share my knowledge with colleagues
		Most other employees can provide more valuable knowledge than I can. (Reverse coded)
	Enjoyment in helping others	I enjoy sharing my knowledge with colleagues
		I enjoy helping colleagues by sharing my knowledge
		It feels good to help someone by sharing my knowledge
		Sharing my knowledge with colleagues is pleasurable
Hung *et al.* (2011)	Altruism	I enjoy sharing my knowledge with others through a group meeting
		I enjoy helping others by sharing my knowledge through a group meeting
		It feels good to help someone else by sharing my knowledge through a group meeting
		Sharing my knowledge with others through a group meeting gives me pleasure
	Reciprocity	When I share my knowledge through a group meeting, I believe that I will get an answer when I give an answer
		When I share my knowledge through a group meeting, I expect somebody to respond when I'm in need
		When I contribute knowledge to a group meeting, I expect to get back knowledge when I need it
Gu and Gu (2011)*	Existence motivation	Increased salary/bonus
		Receive reward
		Enhance job security
	Relationship motivation	Hold group membership
		Recognized expertise
		Get status as expert
		Reputation and esteem

(*continued*)

Table A1.

Authors	Construct/dimensions	Items
	Growth motivation	Learning more knowledge and growth and development
		Achievement
		Good feeling from sharing knowledge
	Norm motivation	Responsibility to share
		Knowledge as a public good, shared by people
		Knowledge belongs to organizations rather than to individuals
Reinholt *et al.* (2011)	Intrinsic motivation	Why do you share knowledge? . . . because I enjoy it
		. . . because I like it
	Identified motivation	. . . because I find it personally satisfying
		. . . because I think it is an important part of my job
	Controlled motivation	. . . It may help me get promoted
		. . . I want my supervisor(s) to praise me
		. . . I want my colleague(s) to praise me
		. . . I want to avoid negative reactions from the head of my department
		. . . I might get a reward
Chen *et al.* (2012)	Traction motivation	I will receive monetary rewards in return for my knowledge sharing
		I will receive additional rewards in return for me sharing knowledge
		When I share my knowledge through this virtual community, I expect somebody to respond when I'm in need
	Relation motivation	My knowledge sharing would get me well acquainted with new members in this virtual community
		My knowledge sharing would strengthen the ties between existing members in this virtual community and myself
		My knowledge sharing would expand the scope of my association with other members in this virtual community
	Interest motivation	My knowledge sharing would increase productivity in this virtual community
		My knowledge sharing would draw willing cooperation from existing members in the future
		My knowledge sharing would help this virtual community achieve its performance objectives

(*continued*)

Table A1.

Authors	Construct/dimensions	Items
Andreeva and Sergeeva (2016)	Intrinsic motivation to share knowledge	I like sharing knowledge I think sharing knowledge is an important part of my job I find it personally satisfying
	Extrinsic motivation to share knowledge	I share knowledge because I want my supervisor to praise me I share knowledge because I want to get a reward I share knowledge because it might help me get promoted
Llopis and Foss (2016)	Intrinsic motivation to share knowledge	I find it personally satisfying I enjoy doing so I like sharing knowledge
Stenius *et al.* (2017)	Autonomous motivation to share knowledge	. . . because I enjoy it . . . because it is an important part of my job
Gagné *et al.* (2019)	External regulation	I share my knowledge with colleagues at work. . . . . . because I risk losing my job if I don't share my knowledge . . . to avoid being criticized by others
	Introjected regulation	. . . because sharing my knowledge makes me feel more important . . . because others will respect me more
	Autonomous motivation	. . . because I think it is very important for me to share what I know with my colleagues . . . because it makes my team, unit or organization more successful, and this is very important to me . . . because it is fun to talk about things I know . . . because I enjoy talking about things that I feel passionate about

Note: *No concrete wording available, even on request

Table A2. Operationalization table (Study 1)

Variables items	Scale
Knowledge-sharing motivation ***Overall measure*** I like to share my work-related knowledge. (KSM 1) ***Relationship motivation*** If you share your knowledge with coworkers, you are appreciated. (KSM 2) If you share your knowledge with coworkers, your know-how will be recognized. (KSM 6) If you share your knowledge with coworkers, you will be seen as an expert. (KSM 10) If you share your knowledge with coworkers, you enjoy reputation and respect. (KSM 14) ***Achievement motivation*** If you share your knowledge with coworkers, you deserve financial remuneration. (KSM 5) If somebody shares his/her knowledge with coworkers, it should be rewarded. (KSM 9) If you share your knowledge with coworkers, you increase your job security. (KSM 13) ***Growth motivation (***Gu and Gu, 2011***)*** If I share my knowledge it constitutes success for me. (KSM 4) If you share your knowledge you grow individually and undergo personal development. (KSM 15) I feel good when I am able to share my knowledge. (KSM 8) ***Norm motivation*** To share your own knowledge with coworkers is part of a good task fulfillment. (KSM 3) Knowledge is a public good which should be shared by everybody. (KSM 7) My work-related knowledge does not belong to me alone but to my organization. (KSM 11) ***Altruism (***Hung *et al.*, 2011***)*** Through sharing knowledge, I enjoy helping others. (KSM 12) It fills me with joy to help others solve problems. (KSM 16)	**Five-point Likert scale** (1 = strongly disagree, . . . 5 = strongly agree)
Knowledge-sharing behavior (Bock and Kim, 2001**)** How often do you share the following types of information with your coworkers: . . . Reports and official documents like a record? (KSB 1) . . . Instructions or guidelines for certain tasks? (KSB 2) . . . Which coworker can be asked regarding certain topics? (KSB 3) . . . Where or how to find information? (KSB 4) . . . Your own experience of getting tasks done? (KSB 5) . . . Your own experience of avoiding problems while completing tasks? (KSB 6) . . . Information you gathered during an apprenticeship or other training programs? (KSB 7)	**Seven-point scale** (reverse coded: 7 = several times a day, 6 = once a day, 5 = several times a week, 4 = once a week, 3 = several times a month, 2 = once a month, 1 = less than once a month, 0 = never)

(*continued*)

Table A2.

Variables items	Scale
Tenure How many years of work experience do you have?	Continuous (0 = less than one year, 1, . . . 55 years)
Career path Public service career path configured from: To which public service pay grade do you belong? (open-ended)	1 = basic/intermediate service 2 = executive service 3 = higher service
Supervisory status Do you have a supervisory status?	1 = Yes 0 = No
Highest level of education What is the highest level of education you have completed? (note: answers from the open answer option (N = 10) were coded and sorted into the classification)	1 = school graduation 2 = vocational education 3 = bachelor's degree 4 = master's degree/diploma/state examination 5 = PhD/doctorate
Age How old are you?	Continuous (18, . . . 80 years)
Gender What is your gender?	1 = female respondent 0 = male respondent

Table A3.
Descriptive statistics and correlation matrix of KSM (Study 1)

Item	*N*	Mean	SD	Min	Max	KSM1	KSM2	KSM3	KSM4	KSM5	KSM6	KSM7	KSM8	KSM9	KSM10	KSM11	KSM12	KSM13	KSM14	KSM15	KSM16
KSM1	354	4.45	0.77	1	5	1															
KSM2	353	4.32	0.80	1	5	0.63*	1														
KSM3	354	4.45	0.73	1	5	0.71*	0.67*	1													
KSM4	353	4.18	0.84	1	5	0.59*	0.53*	0.58*	1												
KSM5	352	3.07	1.19	1	5	−0.05	−0.02	−0.03	0.16*	1											
KSM6	352	4.09	0.87	1	5	0.49*	0.52*	0.53*	0.56*	0.11*	1										
KSM7	353	4.20	0.82	1	5	0.48*	0.31*	0.39*	0.38*	0.1*	0.4*	1									
KSM8	353	4.29	0.79	1	5	0.61*	0.5*	0.52*	0.6*	0.15*	0.62*	0.55*	1								
KSM9	351	3.42	1.07	1	5	−0.05	0.00	−0.03	0.10*	0.7*	−0.01	0.06	0.08	1							
KSM10	351	3.63	0.96	1	5	0.28*	0.38*	0.31*	0.39*	0.31*	0.54*	0.30*	0.47*	0.24*	1						
KSM11	351	3.75	1.05	1	5	0.35*	0.33*	0.34*	0.35*	−0.03	0.39*	0.41*	0.37*	−0.04	0.35*	1					
KSM12	350	4.02	0.85	1	5	0.45*	0.37*	0.35*	0.53*	0.2*	0.43*	0.45*	0.57*	0.17*	0.44*	0.42*	1				
KSM13	349	3.30	1.09	1	5	0.24*	0.27*	0.2*	0.28*	0.23*	0.31*	0.28*	0.32*	0.16*	0.40*	0.38*	0.43*	1			
KSM14	352	3.83	0.89	1	5	0.33*	0.45*	0.34*	0.43*	0.19*	0.57*	0.32*	0.46*	0.13*	0.65*	0.35*	0.48*	0.54*	1		
KSM15	352	4.08	0.83	1	5	0.5*	0.42*	0.47*	0.46*	0.13*	0.50*	0.43*	0.56*	0.1*	0.41*	0.41*	0.49*	0.42*	0.53*	1	
KSM16	352	4.17	0.83	1	5	0.44*	0.34*	0.32*	0.42*	0.13*	0.38*	0.42*	0.55*	0.11*	0.40*	0.37*	0.64*	0.42*	0.51*	0.59*	1

Note: $^{*}p < 0.1$

Table A4.
Descriptive statistics of KSB (Study 1)

Item	*N*	Mean	SD	Min	Max
How often do you share reports and official documents like a record with your coworkers? (KSB1)	326	4.29	2.34	0	7
How often do you share instructions or guidelines for certain tasks with your coworkers? (KSB2)	324	2.88	2.10	0	7
How often do you share which coworker can be asked regarding certain topics with your coworkers? (KSB3)	326	4.22	2.10	0	7
How often do you share where or how to find information with your coworkers? (KSB4)	323	4.45	1.92	0	7
How often do you share your own experience of getting tasks done with your coworkers? (KSB5)	326	4.33	1.92	0	7
How often do you share your own experience of avoiding problems while completing tasks with your coworkers? (KSB6)	326	2.79	2.03	0	7
How often do you share information you gathered during an apprenticeship or other training program with your coworkers? (KSB7)	326	4.29	2.34	0	7

Table A5.
Correlation matrix of KSM and KSB (Study 1)

Item	KSM1	KSM2	KSM3	KSM4	KSM5	KSM6	KSM7	KSM8	KSM9	KSM10	KSM11	KSM12	KSM13	KSM14	KSM15	KSM16	KSB1	KSB2	KSB3	KSB4	KSB5	KSB6	KSB7
KSB1	−0.06	−0.08	−0.02	−0.12*	−0.17*	−0.07	−0.11*	−0.03	−0.10*	−0.09	−0.09	−0.10*	−0.15*	−0.09*	−0.07	−0.08	1						
KSB2	−0.09*	−0.14*	−0.07	−0.13*	−0.12*	−0.15*	−0.09*	−0.13*	−0.09	−0.13*	−0.17*	−0.13*	−0.22*	−0.13*	−0.13*	−0.13*	0.45*	1					
KSB3	−0.07	−0.09*	−0.07	−0.13*	−0.03	−0.18*	−0.12*	−0.18*	−0.01	−0.14*	−0.14*	−0.13*	−0.22*	−0.19*	−0.20*	−0.26*	0.36*	0.46*	1				
KSB4	−0.04	−0.13*	−0.04	−0.05	−0.06	−0.06	−0.09	−0.14*	0.00	−0.11*	−0.11*	−0.03	−0.18*	−0.15*	−0.14*	−0.14*	0.37*	0.49*	0.62*	1			
KSB5	−0.05	−0.09*	−0.01	−0.01	0.07	−0.07	−0.12*	−0.14*	0.04	−0.07	−0.15*	−0.09	−0.14*	−0.11*	−0.16*	−0.11*	0.28*	0.47*	0.48*	0.61*	1		
KSB6	−0.06	−0.09	−0.05	−0.03	0.03	−0.09	−0.09*	−0.11*	0.05	−0.08	−0.14*	−0.11*	−0.17*	−0.10*	−0.17*	−0.12*	0.26*	0.49*	0.50*	0.54*	0.78*	1	
KSB7	−0.05	−0.13*	−0.09	−0.05	−0.08	−0.13*	−0.14*	−0.09*	−0.06	−0.10*	−0.14*	−0.14*	−0.23*	−0.16*	−0.18*	−0.14*	0.19*	0.36*	0.37*	0.45*	0.52*	0.51*	1

Note: $^{*}p < 0.1$

Variable	Factor1	Factor2	Factor3	h^2
KSM8	*0.7916*	−0.0651	0.0910	0.6392
KSM1	*0.7760*	−0.0045	−0.1959	0.6406
KSM3	*0.7282*	0.0342	−0.1802	0.5639
KSM6	*0.7212*	−0.0697	0.0619	0.5288
KSM4	*0.7054*	−0.0100	0.0939	0.5064
KSM15	*0.6973*	−0.1272	0.0908	0.5106
KSM2	*0.6819*	−0.0877	−0.0851	0.4799
KSM12	*0.6798*	−0.0765	0.2641	0.5377
KSM 4	*0.6474*	−0.0910	0.2979	0.5162
KSM16	*0.6433*	−0.1087	0.1592	0.451
KSM7	*0.6047*	−0.0569	0.0875	0.3766
KSM10	*0.5763*	−0.0675	0.3851	0.485
KSM11	*0.5272*	−0.1570	0.0315	0.3036
KSM13	*0.4252*	−0.2088	0.3239	0.3293
KSB5	−0.0305	*0.8277*	0.0956	0.6951
KSB6	−0.0493	*0.8042*	0.0593	0.6527
KSB4	−0.0371	*0.7578*	−0.0410	0.5773
KSB3	−0.1172	*0.6645*	−0.0580	0.4587
KSB3	−0.0942	*0.6243*	−0.1541	0.4224
KSB7	−0.0988	*0.5653*	−0.0670	0.3339
KSB1	−0.0386	*0.4264*	−0.1982	0.2226
KSM5	0.0623	0.0242	*0.7662*	0.5916
KSM9	−0.0014	0.0376	*0.7024*	0.4948
Var. expl. (%)	51.19	27.78	14.14	

Table A6.
Factor loadings of KSM and KSB

Notes: Principal factors, orthogonal varimax, $N = 309$

Item	*N*	Item-rest corr.	Alpha
I like to share my work-related knowledge (KSM1)	338	0.6093	0.8803
If you share your knowledge with coworkers, you are appreciated (KSM2)	338	0.5927	0.8806
To share your own knowledge with coworkers is part of a good task fulfillment (KSM3)	338	0.5710	0.8818
If I share my knowledge it constitutes success for me (KSM4)	338	0.6689	0.8777
If you share your knowledge with coworkers, you deserve financial remuneration (KSM5)	338	0.2296	0.8987
If you share your knowledge with coworkers, your know-how will be recognized (KSM6)	338	0.6537	0.8780
Knowledge is a public good which should be shared by everybody (KSM7)	338	0.5402	0.8824
I feel good when I am able to share my knowledge (KSM8)	338	0.7267	0.8761
If somebody shares his/her knowledge with coworkers, it should be rewarded (KSM9)	338	0.1913	0.8980
If you share your knowledge with coworkers, you will be seen as an expert (KSM10)	338	0.6211	0.8791
My work-related knowledge does not belong to me alone but to my organization (KSM11)	338	0.4896	0.8849
Through sharing my knowledge, I enjoy helping others (KSM12)	338	0.6944	0.8766
If you share your knowledge with coworkers, you increase your job security (KSM13)	338	0.5057	0.8843
If you share your knowledge with coworkers, you enjoy reputation and respect (KSM14)	338	0.6608	0.8777
If you share your knowledge, you grow individually and undergo personal development (KSM15)	338	0.6615	0.8781
It fills me with joy to help others solve problems (KSM16)	338	0.6231	0.8795
Test scale			0.8888

Table A7.
Item-scale correlation of KSM (Study 1)

Table A8.
Operationalization table (Study 2)

Variables items	Scale
Knowledge-sharing motivation	**Five-point Likert scale**
Appreciation	(1 = Strongly disagree, . . . 5 = strongly agree)
If I share my work-related knowledge with my coworkers, . . .	
. . . I am perceived as an expert. (APP1)	
. . . I enjoy acknowledgment and respect. (APP2)	
. . . they acknowledge my expertise. (APP3)	
Growth and altruism	
If I share my work-related knowledge with my coworkers, . . .	
. . . I gain satisfaction from helping others to solve problems. (GA1)	
. . . I enjoy being able to help others with it. (GA2)	
. . . I personally grow and evolve. (GA3)	
Tangible reward	
If I share my work-related knowledge with my coworkers, . . .	
. . . it should also be rewarded. (EXT1)	
. . . I deserve a monetary reward. (EXT2)	
General measure	
Overall, I am willing to share my work-related knowledge with my coworkers. (GEN1)	
I enjoy sharing my work-related knowledge with my coworkers. (GEN2)	
It is part of my job to share my work-related knowledge with my coworkers. (GEN3)	
I share my work-related knowledge with my coworkers because it is customary in my team. (GEN4)	
Knowledge-sharing behavior	**Five-point Likert scale**
Preferred mode of sharing knowledge	(1 = not true at all, . . . 5 = very true)
I share my work-related knowledge. . .	
. . . in personal dialogues with individual people. (KSB1)	
. . . in personally written communication (e.g. letter, e-mail, chats) with individual people. (KSB2)	
. . . in written form in files, reports and databanks. (KSB3)	
. . . orally in team meetings or other forms of group discussions. (KSB4)	
Proactive and responsive behavior	
I share my work-related knowledge. . .	
. . . if I am asked to do so by my coworkers. (KSB5)	
. . . if a manager asks me to do so. (KSB6)	
. . . without have been asked. (KSB7)	
. . . if I have learned something new. (KSB8)	
Job satisfaction	**Five-point Likert scale**
I hardly enjoy my work but you shouldn't expect too much	(1 = not true at all, . . . 5 = very true)

(*continued*)

Table A8.

Variables items	Scale
I fully enjoy my work I am in a rut with my job and nothing can be changed about that My job offers me enough opportunities to use my abilities I am satisfied with the career prospects offered If I were to choose again, I would do the same job over again	
Personal initiative I actively attack problems. Whenever something goes wrong, I search for a solution immediately Whenever there is a chance to get actively involved, I take it I take initiative immediately even when others don't I use opportunities quickly to attain my goals Usually, I do more than I am asked to do I am particularly good at realizing ideas	**5-point Likert scale** (1 = not true at all, . . . 5 = very true)
Tenure How many years of work experience do you have?	Continuous (0 = Less than one year, 1, . . . 55 years)
Career path Public service career path configured from: To which public service pay grade do you belong? (open-ended)	1 = basic/intermediate service 2 = executive service 3 = higher service
Supervisory status Do you have a supervisory status?	1 = yes 0 = no
Highest level of education What is the highest level of education you have completed?	1 = school graduation 2 = vocational education 3 = bachelor's degree 4 = master's degree/diploma/state examination 5 = PhD/doctorate
Age How old are you?	Continuous (18, . . . 80 years)
Gender What is your gender?	1 = female respondent 0 = male respondent

Variable	*N*	Mean	SD	Minimum	Maximum
APP1	629	3.37	0.97	1	5
APP2	629	3.72	0.86	1	5
APP3	629	4.05	0.79	1	5
GA1	629	4.08	0.83	1	5
GA2	629	3.78	0.89	1	5
GA3	629	3.89	0.90	1	5
EXT1	629	3.17	1.15	1	5
EXT2	629	2.10	1.12	1	5
GEN1	628	4.13	0.79	1	5
GEN2	629	3.95	0.90	1	5
GEN3	629	3.72	1.05	1	5
GEN4	628	3.98	0.88	1	5
KSB1	629	4.14	0.77	1	5
KSB2	629	2.83	1.26	1	5
KSB3	629	2.84	1.20	1	5
KSB4	629	3.55	1.09	1	5
KSB5	629	4.18	0.87	1	5
KSB6	629	3.64	1.18	1	5
KSB7	629	3.43	1.06	1	5
KSB8	629	3.74	0.95	1	5
job-sat1	622	2.19	1.11	1	5
job-sat2	622	3.63	0.98	1	5
job-sat3	622	2.59	1.10	1	5
job-sat4	621	3.80	0.90	1	5
job-sat5	621	3.77	0.94	1	5
job-sat6	622	3.02	1.17	1	5
job-sat7	621	3.87	0.91	1	5
job-sat8	622	3.53	1.18	1	5
proactive1	622	3.97	0.77	1	5
proactive2	622	4.06	0.75	1	5
proactive3	622	3.78	0.81	1	5
proactive4	622	3.42	0.91	1	5
proactive5	622	3.63	0.81	1	5
proactive6	622	3.75	0.88	1	5
proactive7	622	3.70	0.80	1	5

Table A9.
Descriptive statistics (Study 2)

Table A10.
Correlation matrix of KSM and KSB (Study 2)

Item	APP1	APP2	APP3	GA1	GA2	GA3	EXT1	EXT2	GEN1	GEN2	GEN3	GEN4	KSB1	KSB2	KSB3	KSB4	KSB5	KSB6	KSB7	KSB8
APP1	1																			
APP2	0.58***	1																		
APP3	0.42***	0.54***	1																	
GA1	0.37***	0.54***	0.42***	1																
GA2	0.45***	0.58***	0.38***	0.64***	1															
GA3	0.33***	0.43***	0.40***	0.50***	0.48***	1														
EXT1	0.24***	0.18***	0.10*	0.00	0.07	0.05	1													
EXT2	0.28***	0.18***	0.04	−0.01	0.03	0.04	0.42***	1												
GEN1	0.34***	0.43***	0.37***	0.59***	0.51***	0.44***	−0.07	−0.09*	1											
GEN2	0.38***	0.49***	0.40***	0.63***	0.58***	0.43***	−0.02	−0.04	0.75***	1										
GEN3	0.24***	0.30***	0.25***	0.32***	0.26***	0.29***	−0.05	0.02	0.48***	0.46***	1									
GEN4	0.25***	0.35***	0.25***	0.35***	0.35***	0.30***	−0.02	−0.04	0.51***	0.49***	0.51***	1								
KSB1	0.30***	0.36***	0.30***	0.42***	0.40***	0.32***	0.01	−0.05	0.50***	0.49***	0.27***	0.37***	1							
KSB2	0.22***	0.17***	0.08*	0.15***	0.19***	0.13***	0.05	0.16***	0.13***	0.15***	0.13***	0.11**	0.21***	1						
KSB3	0.20***	0.21***	0.13**	0.17***	0.15***	0.18***	0.11**	0.20***	0.18***	0.15***	0.22***	0.17***	0.20***	0.54***	1					
KSB4	0.28***	0.32***	0.22***	0.28***	0.24***	0.28***	0.07	0.09*	0.36***	0.33***	0.30***	0.33***	0.3***	0.30***	0.34***	1				
KSB5	0.25***	0.32***	0.30***	0.35***	0.30***	0.24***	0.06	0.01	0.47***	0.43***	0.28***	0.35***	0.46***	0.11**	0.13***	0.29***	1			
KSB6	0.22***	0.25***	0.21***	0.18***	0.20***	0.21***	0.14***	0.04	0.19***	0.22***	0.19***	0.23***	0.22***	0.14***	0.20***	0.30***	0.43***	1		
KSB7	0.25***	0.26***	0.27***	0.28***	0.27***	0.27***	0.02	0.08	0.40***	0.36***	0.31***	0.25***	0.33***	0.27***	0.29***	0.25***	0.19***	0.11**	1	
KSB8	0.28***	0.34***	0.28***	0.43***	0.36***	0.37***	0.04	0.02	0.50***	0.48***	0.41***	0.34***	0.37***	0.20***	0.26***	0.41***	0.37***	0.21***	0.50***	1

Notes: *$p < 0.05$, **$p < 0.01$ and ***$p < 0.001$

Table A11.
Bivariate correlations of KSM dimensions and demographics

KSM dimension	Age	Gender	Tenure	Education level
Appreciation	0.044 (0.461)	−0.024 (0.564)	0.021 (0.726)	*0.091 (0.028)*
Growth/altruism	0.081 (0.173)	0.045 (0.286)	−0.042 (0.479)	0.050 (0.229)
Tangible reward	−0.030 (0.617)	−0.066 (0.115)	0.048 (0.414)	*0.076 (0.067)*

Notes: Pairwise beta coefficients, *p*-values in parentheses; $N = 604$

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