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Abstract.

Numerous scholars and practitioners claim that motivational factors can facilitate successful knowledge sharing. However, little empirical research has been conducted examining the different kinds of motivation (extrinsic and intrinsic) used to explain employee knowledge sharing behaviors. By integrating a motivational perspective into the theory of reasoned action (TRA), this study examines the role of both extrinsic (expected organizational rewards and reciprocal benefits) and intrinsic (knowledge self-efficacy and enjoyment in helping others) motivators in explaining employee knowledge sharing intentions. Based on a survey of 172 employees from 50 large organizations in Taiwan, this study applies the structural equation modeling approach to investigate the research model. The results showed that motivational factors such as reciprocal benefits, knowledge self-efficacy, and enjoyment in helping others were significantly associated with employee knowledge sharing attitudes and intentions. However, expected organizational rewards did not significantly influence employee attitudes and behavior intentions regarding knowledge sharing. Implications for organizations are discussed.

Keywords: knowledge sharing; theory of reasoned action; extrinsic motivation; intrinsic motivation

1. Introduction

Knowledge sharing can be considered an important process in organizations, because it is fundamental to generating new ideas and developing new business opportunities through socialization and the learning process of knowledge workers [1]. To increase the ability to manage knowledge sharing within and across the organization is thus one of the major challenges facing contemporary

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organizations [2, 3]. Dyer and Nobeoka [4] indicated that knowledge sharing could be defined as the activities of how to help communities of people work together, facilitating the exchange of their knowledge, enhancing organizational learning capacity, and increasing their ability to achieve individual and organizational goals. Moreover, numerous researchers have indicated that the organizational value of employee knowledge increases when it is shared [5–8]. Only when employees are willing to share knowledge with colleagues can organizations begin to manage knowledge resources effectively. Therefore, determining which factors promote or impede employee tendencies to engage in knowledge sharing behaviors is important.

Researchers have noted that firms can successfully promote a knowledge sharing culture not only by directly incorporating knowledge in their business strategy, but also by changing employee attitudes and behaviors to promote willing and consistent knowledge sharing [9–11]. Smith [12] further admitted that the personal opinions and insights of employees are shaped through their daily activities and human interactions, namely through formal and informal knowledge sharing. These mindsets are difficult to change [13], and many well-designed knowledge management efforts have failed because of non-supportive employee beliefs [14]. Given the impossibility of controlling and enforcing knowledge sharing, organizations must find ways to encourage employees to share knowledge with their colleagues. According to expectancy theory [15], the more positive outcomes are perceived to be associated with a given action, the more inclined people will be to perform that action. From the perspective of work behavior research, extrinsic motivation (rewards) has been shown to significantly affect worker participation [16]. Hence, certain forms of extrinsic motivation, for example monetary incentives or praise and public recognition, may stimulate knowledge sharing. Additionally, previous studies indicate that increased intrinsic motivation has been associated with employee willingness to create a positive mood, resulting in increased learning and inclination to participate in voluntary knowledge sharing [17, 18]. However, although several studies argue that motivation factors are crucial determinants of knowledge sharing behaviors there is no significant body of empirical research that assesses the effect of the difference between extrinsic and intrinsic motivation factors on employee knowledge sharing behaviors.

The theory of reasoned action (TRA) of Fishbein and Ajzen [19] posits that individual beliefs and attitudes explain most human behaviors. TRA has been found useful in predicting a wide range of behaviors, and is widely used to predict and explain behavioral intentions and actual behavior in social psychology [20–22]. However, previous research has revealed the need to include other components to provide a broader view and a better explanation of human behaviors [23]. Specifically, factors related to human and social change processes should be incorporated into TRA. Moreover, despite empirical support for the motivational model of knowledge work behavior [24, 25], little is known about the underlying factors influencing extrinsic and intrinsic motivation, the key determinants of knowledge sharing behaviors. Accordingly, by integrating a motivational perspective into TRA, this study examines the role of both extrinsic (expected organizational rewards and reciprocal benefits) and intrinsic (knowledge self-efficacy and enjoyment in helping others) motivators in explaining employee knowledge sharing intentions. The research model and hypothesized relationship were empirically tested using the structural equation modeling (SEM) approach, supported by LISREL 8.3 software. Furthermore, the findings of this study provide a theoretical basis and empirical evidence of likely directions for predicting and explaining employee knowledge sharing behaviors. From a managerial perspective, given the importance of knowledge sharing in contemporary organizations and also in the future, the findings of this study are designed to enable business managers or policy-makers to formulate policies and target organizations appropriately to ensure the effective creation of a knowledge sharing culture.

2. Literature review

2.1. Knowledge sharing

Knowledge sharing can be defined as a social interaction culture, involving the exchange of employee knowledge, experiences, and skills through the whole department or organization. Examples of

knowledge sharing include employee willingness to communicate actively with colleagues (i.e. donate knowledge), and actively consult with colleagues to learn from them (i.e. collect knowledge). Examples also exist of how knowledge sharing occurs at the individual and organizational levels. For individual employees, knowledge sharing is talking to colleagues to help them get something done better, more quickly, or more efficiently. For an organization, knowledge sharing is capturing, organizing, reusing, and transferring experience-based knowledge that resides within the organization and making that knowledge available to others in the business. Knowledge sharing offers an organization the potential for increased productivity as well as retention of intellectual capital, even after employees leave the organization, which is necessary for business that creates value added.

At least three imperatives are classified as different rationales related to knowledge sharing research. First, organizational culture is considered a key element of effective knowledge sharing activities [11]. According to McDermott and O'Dell [14], in organizations with a knowledge sharing culture, employees share ideas and insights because they see it as natural, rather than as something they are forced to do. Second, knowledge sharing is frequently linked to supporting knowledge exchange through information technology ability. The ability of information technology to increase the knowledge base available to each employee and allow employees to work together enables organizations to increase employee productivity and compatibility with organizational policies in promoting knowledge sharing. Finally, based on the process view, researchers explore knowledge sharing from the perspectives of intention and motivation, behavior during the process, and the results, which are frequently determined by the degree and performance of knowledge sharing [26].

2.2. Extrinsic and intrinsic motivation and knowledge sharing

Motivation has been identified as a key determinant of general behavior [27], information technology acceptance behavior [28–31], and work-related behavior [32, 33], and there is an indication that it is the primary trigger for knowledge transfer [18]. Two broad classes of motivation – extrinsic and intrinsic – have been defined and examined across various contexts and studies [27, 30, 34, 35]. Extrinsic motivation focuses on the goal-driven reasons, e.g. rewards or benefits earned when performing an activity [34], while intrinsic motivation indicates the pleasure and inherent satisfaction derived from a specific activity [36]. Together, extrinsic and intrinsic motivation influence individual intentions regarding an activity as well as their actual behaviors [28, 29, 36].

Employee extrinsic motivation to share knowledge is an outcome belief that is typically based on employee perceptions of the value of association with knowledge exchange [18, 37, 38]. For example, employees engage in knowledge exchange based on a cost–benefit analysis, comparing the rewards (benefits) expected from an exchange with the effort (costs) involved in that exchange. From a socio-economic perspective, if the perceived benefits equal or exceed the costs then the exchange process will continue, otherwise it will stop [39]. In the context of knowledge sharing, the costs include factors relating to effort (e.g. time taken, mental effort, etc.) while the potential gains include receiving organizational rewards or creating obligations for colleagues to reciprocate [2, 40]. Thus, this study applies expected organizational rewards and reciprocal benefits as extrinsic salient determinants of employee knowledge sharing behaviors.

Intrinsic motivation refers to engaging in an activity for its own sake, out of interest, or for the pleasure and satisfaction derived from the experience [36]. For example, through knowledge sharing, employees can be satisfied by enhancing their knowledge self-efficacy or confidence in their ability to provide knowledge that is useful to the organization [41, 42]. Moreover, employees who share knowledge in online communities gain opportunities to help others [43]. Previous research on altruism has demonstrated that people enjoy helping others [44]. Research has recognized the crucial role of intrinsic motivators in explaining human behaviors in several domains [35], including knowledge sharing [18]. Hence, this study proposes knowledge self-efficacy and enjoyment in helping others as employees' intrinsic salient beliefs to explain knowledge sharing behaviors.

Several previous studies have adopted conceptual [45, 46] or qualitative approaches [14, 47, 48] to understand the motivators underlying knowledge sharing behavior. Moreover, existing studies have reported aspects of motivational factors (e.g. extrinsic and intrinsic motivators) as antecedents

of knowledge sharing behaviors [18, 24], while Tyler and Blader [25] have suggested that intrinsic motivators could be important determinants of knowledge worker behaviors. This study contributes to the advancement of theory in two key ways: first, this study simultaneously investigates both extrinsic and intrinsic motivators affecting employee knowledge sharing behaviors. Second, this study proposes a theoretical model that combines a motivational perspective with TRA to illustrate the relationships between different kinds of motivation (extrinsic and intrinsic) and employee knowledge sharing attitudes and intentions.

3. Research model and hypotheses

This study developed a research model by modifying TRA [19]. TRA is a well-established general theory of social psychology that is applied to human behavior research. TRA posits that social behavior is influenced by belief, attitudes, and intention. The research model in this study (see Figure 1) follows the TRA belief–attitude–intention relationship and includes extrinsic and intrinsic motivators as the salient determinants of employee knowledge sharing intentions. Each construct involved in the research model and hypotheses are discussed below.

3.1. Attitude toward knowledge sharing

In TRA, attitude factors have been tested and shown to be significant predictors of organizational behavioral intentions. For example, Chang [20] argued that attitude toward moral behavior significantly influences behavioral intentions. Moreover, in individual professional groups, physicians' attitudes toward knowledge sharing have affected knowledge sharing intentions [49]. More recently, Bock et al. [24] have investigated the positive effect of attitudes toward knowledge sharing on individuals' intentions to share knowledge. In this study, attitudes toward knowledge sharing refer to the positive or negative evaluations of employees regarding knowledge sharing behavior. Based on TRA and the above assertions regarding employee attitudes toward knowledge sharing and behavioral intentions, the following hypothesis was formulated:

H1. Employee attitudes toward knowledge sharing positively affect knowledge sharing intentions.

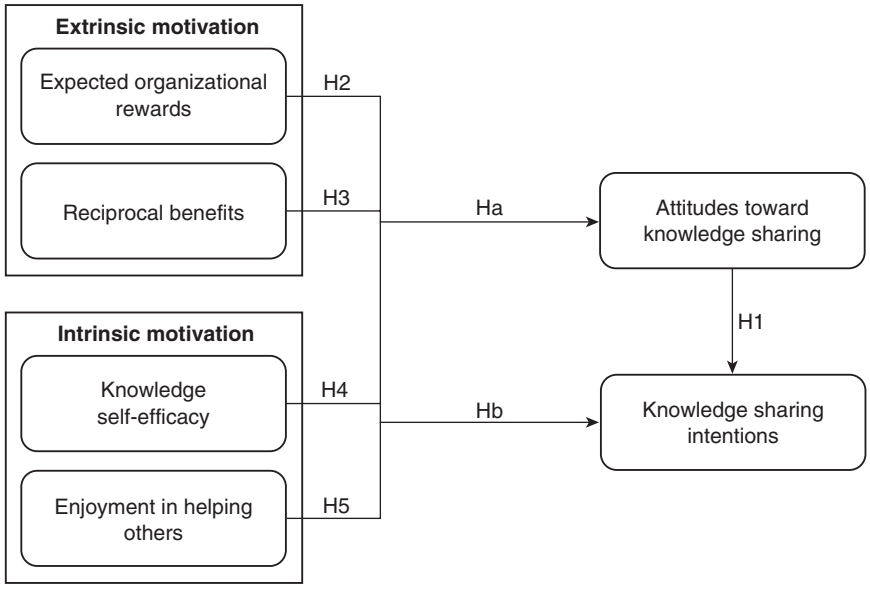

Fig. 1. The research model.

3.2. Extrinsic motivation

From an extrinsic motivational perspective, individual behavior is driven by its perceived values and the benefits of the action. The fundamental goals of extrinsically motivated behaviors are to receive organizational rewards or reciprocal benefits [35, 50]. Organizational rewards are useful for motivating individuals to perform desired behaviors [51]. Organizational rewards can range from monetary incentives such as increased salary and bonuses to non-monetary awards such as promotions and job security [2, 52]. Several organizations have introduced reward systems to encourage employees to share their knowledge. For example, Buckman Laboratories recognizes its 100 top knowledge contributors through an annual conference at a resort. Moreover, Lotus Development, a division of IBM, bases 25% of the total performance evaluation of its customer support workers on the extent of their knowledge sharing activities [45]. Thus, this study expects that if employees believe they can receive organizational rewards by offering their knowledge, they will develop more positive attitudes toward and intentions regarding knowledge sharing. The following hypotheses are proposed.

H2a. Expected organizational rewards will positively affect employee attitudes toward knowledge sharing.

H2b. Expected organizational rewards will positively affect employee knowledge sharing intentions.

Generally, an exchange relationship can involve both economic resources (e.g. money, goods, and services) and socio-emotional resources (e.g. status, devotion, and trust). Reciprocity behavior has been highlighted as a benefit of individuals engaging in social exchange [53]. Reciprocity behavior can provide a sense of mutual indebtedness, leading knowledge contributors to generally expect help from others, ensuring ongoing supportive knowledge sharing [54]. Previous research indicated that knowledge sharing in online communities is facilitated by a strong sense of reciprocity [55]. Furthermore, researchers have observed that reciprocal benefits can provide an effective motivation to facilitate knowledge sharing and thus achieve long-term mutual cooperation [24, 56]. Thus, if employees believe they can obtain reciprocal benefits from other colleagues by sharing their knowledge, they are more likely to view knowledge sharing favorably and thus have higher knowledge sharing intentions. The following hypotheses are proposed.

H3a. Reciprocal benefits will positively affect employee attitudes toward knowledge sharing.

H3b. Reciprocal benefits will positively affect employee knowledge sharing intentions.

3.3. Intrinsic motivation

From an intrinsic motivational perspective, behavior is evoked by the need of employees to feel competence and self-determination in dealing with their environment [36]. Competence or self-efficacy is defined as the judgments of individuals regarding their capabilities to organize and execute courses of action required to achieve specific levels of performance [57]. Competence or self-efficacy can help motivate employees to share knowledge with colleagues [55, 56, 58]. Researchers have also found that employees with high confidence in their ability to provide valuable knowledge are more likely to accomplish specific tasks [41, 58]. Knowledge self-efficacy is typically manifested in people believing that their knowledge can help to solve job-related problems and improve work efficacy [42, 59]. Employees who believe that they can contribute organizational performance by sharing their knowledge will develop more positive attitudes toward and intentions regarding knowledge sharing. Hence, the following hypotheses are proposed.

H4a. Knowledge self-efficacy will positively affect employee attitudes toward knowledge sharing.

H4b. Knowledge self-efficacy will positively affect employee knowledge sharing intentions.

Enjoyment in helping others derives from the concept of altruism. Organ [60] defined altruism as including discretionary behaviors that help specific others with organizationally relevant tasks or problems. Knowledge workers may be motivated by relative altruism owing to their desire to help others [2, 41, 42]. Previous research shows that employees are intrinsically motivated to contribute knowledge

because engaging in intellectual pursuits and solving problems is challenging or pleasurable, and because they enjoy helping others [43, 55]. Knowledge contributors who derive enjoyment from helping others may be more favorably oriented towards knowledge sharing and more inclined to share knowledge. The following hypotheses are thus proposed.

H5a. Enjoyment in helping others will positively affect employee attitudes toward knowledge sharing.

H5b. Enjoyment in helping others will positively affect employee knowledge sharing intentions.

4. Research method

4.1. Sample and data collection

A draft questionnaire was pilot tested by five MIS professors to ensure that the content and wording were free of problems. Thirty respondents from 10 organizations in five industries in Taiwan then examined the revised questionnaire. These respondents were given the questionnaire and asked to examine it for meaningfulness, relevance, and clarity.

Fifty organizations were randomly selected from the top 1000 firms list published by *Common Wealth* magazine in 2004, which listed the 1000 largest firms in Taiwan. Ten survey packets were mailed to each of these 50 organizations in the summer of 2005. A covering letter explaining the study objectives and a stamped return envelope were enclosed. Follow-up letters were also sent about three weeks after the initial mailings. Five hundred questionnaires were distributed, resulting in 172 completed and usable responses, for a 34.4% response rate. Respondents from 50 organizations across 15 industries were used in the data analysis. Additionally, about 67% of sample respondents were executives, filling positions such as director, manager or chief employee. Table 1 lists the respondent company characteristics, including industry type, gender, age, education level, working experience, and position.

4.2. Measures

In this study, items used to operationalize the constructs were mainly adapted from previous studies and modified for use in the knowledge sharing context. All constructs were measured using multiple items. All items were measured using a seven-point Likert-type scale (ranging from 1 = strongly disagree to 7 = strongly agree). Table 2 lists all of the survey items used to measure each construct.

Expected organizational rewards were measured using four items derived from Hargadon [52] and Davenport and Prusak [2], defined as the degree to which employees believe that they will receive extrinsic incentives (such as salary incentives, bonuses, promotion incentives, or job security) through knowledge sharing. Moreover, reciprocal benefits were measured using four items taken from Kankanhalli et al. [56], which focused on employee belief that current knowledge sharing would lead to future requests for knowledge being met. A four-item scale measuring knowledge self-efficacy was adapted from a measure developed by Spreitzer [61]. Knowledge self-efficacy assesses employee judgments of their capability to share knowledge that is valuable to the organization. Additionally, enjoyment in helping others was measured using four items derived from Wasko and Faraj [43], which focused on employee perceptions of pleasure obtained through sharing knowledge. Furthermore, attitude toward knowledge sharing was measured using a four-item scale adapted from Taylor and Todd [62]. Terms such as 'pleasant', 'good', 'valuable', and 'beneficial' were used to assess employees positively evaluate the knowledge sharing behaviors. Finally, a four-item scale measuring behavioral intentions, which assessed the likelihood of employees to share knowledge, was developed based on measures used by prior research [62].

5. Results

The SEM approach was used to validate the research model. This approach was chosen because of its ability to test causal relationships between constructs with multiple measurement items [63].

Table 1
Profile of respondents (n = 172)

Demographic characteristics	Frequency Number of companies	Number of responses	Percentage
Industry type			
Manufacturing	13	51	29.7
Banking/insurance	6	27	15.7
Computers/communication	10	32	18.6
Transportation	4	17	9.9
Retail/wholesale	6	21	12.2
Real estate/construction	5	11	6.4
Health/foods	3	5	2.9
Utility	1	2	1.1
Others	2	6	3.5
Total	50	172	100
Gender			
Male	126		73.3
Female	46		26.7
Age			
21–25	13		7.6
26–30	70		40.7
31–35	41		23.8
36–40	24		13.9
Over 40	21		12.2
Missing	3		1.8
Education level			
High school	11		6.4
Bachelor	102		59.3
Graduate	59		34.3
Working experience			
0–3 years	18		10.5
3–5 years	57		33.1
5–10 years	43		25.0
10–15 years	30		17.4
Over 15 years	21		12.2
Missing	3		1.8
Position			
Director	13		7.6
Manager	31		18.0
Chief employee	72		41.8
Employee	51		29.7
Others	5		2.9

Numerous researchers have proposed a two-stage model-building process for applying SEM [63–65]. Confirmatory factor analysis (CFA) was conducted to examine the reliability and validity of the measurement model, and the structural model was also analyzed to test the associations hypothesized in the research model.

5.1. The measurement model

5.1.1. Convergent validity The measurement model was first assessed by CFA. Table 2 presents the results. Greek symbols are used to denote the research model parameters. Exogenous constructs are denoted by ξ, whereas endogenous constructs are denoted by η. Consequently, ξ_1 denotes expected organizational rewards, ξ_2 denotes reciprocal benefits, ξ_3 denotes knowledge self-efficacy, ξ_4 denotes enjoyment in helping others, η_1 denotes attitudes toward knowledge sharing, and η_2 denotes knowledge sharing intentions.

Table 2
Results of CFA for measurement model

Construct/measure	Factor loading	Composite reliability[a]
Expected organizational rewards (ξ_1)		0.75
OR1: I will receive a higher salary in return for my knowledge sharing.	0.69	
OR2: I will receive a higher bonus in return for my knowledge sharing.	0.80	
OR3: I will receive increased promotion opportunities in return for my knowledge sharing.	0.76	
OR4: I will receive increased job security in return for my knowledge sharing.	0.84	
Reciprocal benefits (ξ_2)		0.81
When I share my knowledge with colleagues, …		
RB1: I strengthen ties between existing members of the organization and myself.	0.86	
RB2: I expand the scope of my association with other organization members.	0.79	
RB3: I expect to receive knowledge in return when necessary.	0.85	
RB4: I believe that my future requests for knowledge will be answered.	0.82	
Knowledge self-efficacy (ξ_3)		0.86
KS1: I am confident in my ability to provide knowledge that others in my organization consider valuable.	0.88	
KS2: I have the expertise required to provide valuable knowledge for my organization.	0.85	
KS3: It does not really make any difference whether I share my knowledge with colleagues. (Reverse coded)	0.81	
KS4: Most other employees can provide more valuable knowledge than I can. (Reverse coded)	0.85	
Enjoyment in helping others (ξ_4)		0.84
EH1: I enjoy sharing my knowledge with colleagues.	0.77	
EH2: I enjoy helping colleagues by sharing my knowledge.	0.87	
EH3: It feels good to help someone by sharing my knowledge.	0.71	
EH4: Sharing my knowledge with colleagues is pleasurable.	0.84	
Attitudes toward knowledge sharing (η_1)		0.87
My knowledge sharing with other colleagues is …		
AT1: very unpleasant … very pleasant.	0.88	
AT2: very bad … very good.	0.90	
AT3: very worthless … very valuable.	0.85	
AT4: very harmful … very beneficial.	0.86	
Knowledge sharing intentions (η_2)		0.85
IN1: I intend to share knowledge with my colleagues more frequently in the future.		
IN2: I will try to share knowledge with my colleagues.	0.81	
IN3: I will always make an effort to share knowledge with my colleagues.	0.78	
IN4: I intend to share knowledge with colleagues who ask.	0.84	

Note: All *t*-values are significant at $p < 0.001$.
[a] Composite reliability: (square of the summation of the factor loadings)/{(square of the summation of the factor loadings) + (summation of error variances)}.

The measurement model was further assessed for construct reliability and validity. Computing composite reliability assessed construct reliability. The composite reliability for each construct of this study is presented in Table 2. The values range from 0.75 (for expected organizational rewards) to 0.87 (for attitudes toward knowledge sharing). The composite reliability of all latent constructs exceeded the benchmark of 0.7 recommended by Nunnally and Bernstein [66]. Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. Table 2 also presents the factor loadings of the measurement items. The factor loading for all items exceeds the recommended level of 0.6 [67].

5.1.2. Discriminant validity Discriminant validity is the degree to which the measures of different concepts are distinct. Discriminant validity can be examined by comparing the squared correlations between constructs and variance extracted from a construct [68]. Table 3 lists means, standard

deviations, and discriminant validity of constructs. The analysis results showed that the square correlation for each construct is less than the variance extracted by the indicators measuring that construct, as shown in Table 3, indicating the measure has adequately discriminant validity.

5.2. The structural model

The results of the structural model analysis are displayed in Figure 2. To assess structural model fit, normed χ^2 (the ratio between χ^2 and the degree of freedom) was 2.05 ($\chi^2 = 342.14$, df = 167), which is smaller than the 3 recommended by Bagozzi and Yi [69]. Other fit indices also show good fit for the structural model. The goodness-of-fit index (GFI) is 0.87, which exceeds the recommended cut-off level of 0.8 [70]. The comparative fit index (CFI) is 0.92 and the normed fit index (NFI) is 0.90, both of which also exceed the recommended cut-off level of 0.9 [63]. In addition, the root mean square error of approximation (RMSEA) is 0.061, which is below the cut-off level of 0.08 recommended by Browne and Cudeck [70]. Hence, the structural model exhibited a fairly good fit with the data collected. Additionally, the model accounts for 32% of the variance in attitudes toward knowledge sharing and 49% of the variance in knowledge sharing intentions.

The structural model links the constructs to one another. Attitude toward knowledge sharing are linked to knowledge sharing intentions (β). Expected organizational rewards, reciprocal benefits, knowledge self-efficacy and enjoyment in helping others are linked to knowledge sharing attitudes and intentions (γ). The finding showed that employee attitudes toward knowledge sharing have a positive influence on behavioral intentions ($\beta_{11} = 0.39$, $t = 5.17$), supporting H1. However, there is insufficient evidence to support H2a and H2b, as expected organizational rewards are not significantly related to employee attitudes ($\gamma_{11} = 0.09$, $t = 1.23$) or to intentions regarding knowledge sharing ($\gamma_{12} = 0.11$, $t = 1.63$). Furthermore, reciprocal benefits ($\gamma_{21} = 0.35$, $t = 4.87$), knowledge self-efficacy ($\gamma_{31} = 0.27$, $t = 4.33$), and enjoyment in helping others ($\gamma_{41} = 0.21$, $t = 3.12$) positively affect employee attitudes toward knowledge sharing, providing support for H2a, H3a, H4a, and H5a. Finally, the results also support H2b, H3b, H4b, and H5b, as reciprocal benefits ($\gamma_{22} = 0.25$, $t = 4.01$), knowledge self-efficacy ($\gamma_{32} = 0.42$, $t = 5.81$), and enjoyment in helping others ($\gamma_{42} = 0.24$, $t = 3.82$) positively influence employee knowledge sharing intentions.

6. Discussion

Consistent with TRA [19], employee attitudes predicted intentions. Employees with the strongest knowledge sharing intentions also had more positive attitudes towards knowledge sharing behavior. This finding agrees with other studies of knowledge sharing using TRA [58, 71].

However, this study found that expected organizational rewards did not significantly influence employee attitudes and intentions towards knowledge sharing. This finding was somewhat surprising, because previous studies indicated that organizational rewards are important in fostering knowledge

Table 3
Descriptive statistics and discriminant validity

Constructs	Mean	SD	Ξ_1	ξ_2	ξ_3	ξ_4	η_1	η_2
Expected organizational rewards (ξ_1)	4.21	1.12	0.58 [a]					
Reciprocal benefits (ξ_2)	5.08	1.15	0.22	0.63				
Knowledge self-efficacy (ξ_3)	5.22	1.04	0.31	0.26	0.67			
Enjoyment in helping others (ξ_4)	4.78	0.96	0.24	0.18	0.21	0.59		
Attitudes toward knowledge sharing (η_1)	5.57	1.03	0.12	0.27	0.23	0.16	0.70	
Knowledge sharing intentions (η_2)	4.92	1.27	0.09	0.22	0.32	0.28	0.35	0.65

Note: Diagonals represent the average variance extracted, while the other matrix entries represent the square correlations.
[a] Variance extracted: (summation of the square of the factor loadings)/{(summation of the square of the factor loadings)} + (summation of error variances)}.

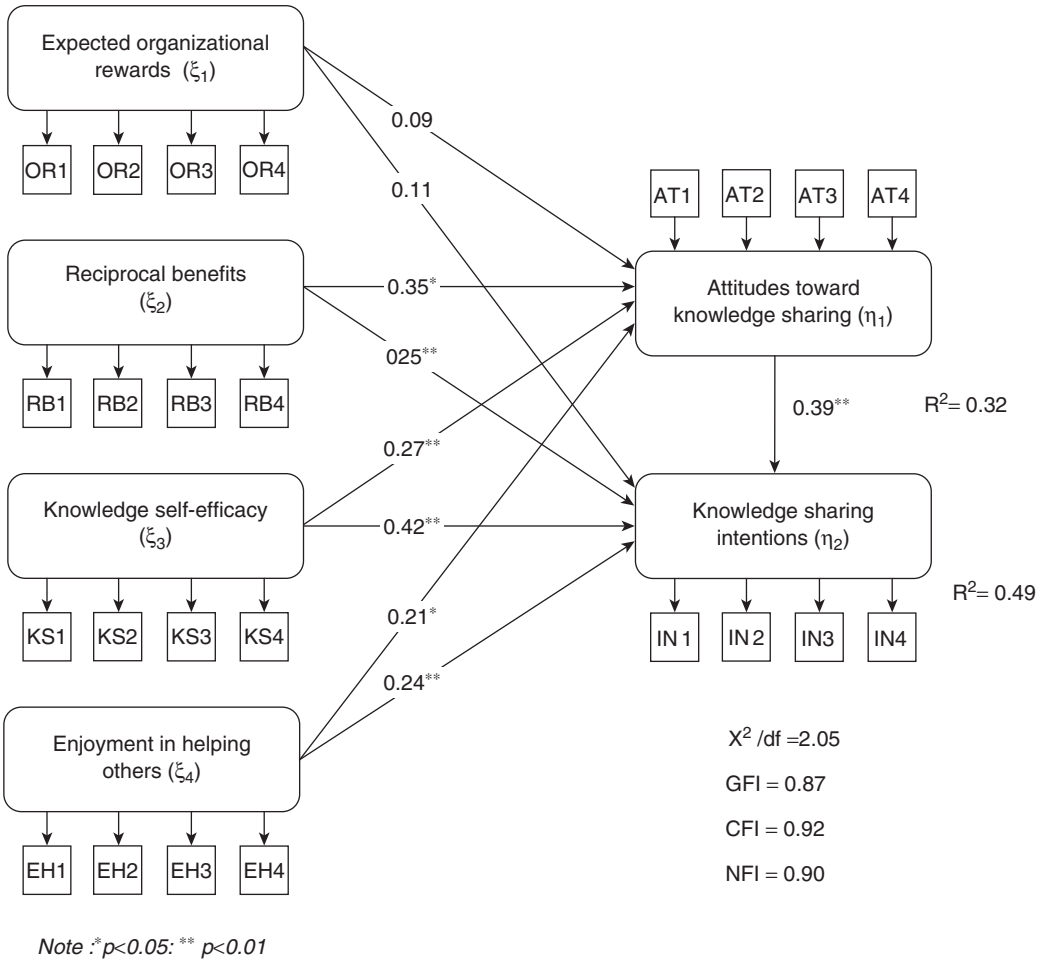

Fig. 2. Results of structural model.

sharing culture [56, 72, 73]. A possible explanation for this finding may be that, in the present study, more than 67% of sample respondents were executives. These respondents may not value organizational rewards, because they are motivated by other objectives, such as the belief that encouraging employees to share knowledge with colleagues was an obligation [71, 74]. The above findings yield plausible explanations for the following observations.

(1) Masterson et al. [75] argue that knowledge sharing occurs mainly in informal interactions, and owing to the difficulty of measuring knowledge sharing behaviors, it is difficult to make organizational rewards contingent on knowledge sharing behaviors.

(2) Kelman [76] suggested that extrinsic rewards succeed only in securing temporary compliance.

(3) Osterloh and Frey [18] acknowledged that with intrinsically motivated employees, the generation and transfer of tacit knowledge is more important than with extrinsically motivated employees (such as those motivated by monetary compensation).

Results from this study also showed that reciprocal benefits significantly influence employee attitudes and intentions towards knowledge sharing. This finding is consistent with that of Scott [77], who argued that collaboration ability depends heavily upon trust as open reciprocity, and that information and knowledge sharing will not occur freely without such reciprocity. Employee attitudes towards and intentions regarding knowledge sharing are formed by expectations regarding reciprocal

benefits from knowledge sharing. This study also found that employee attitudes toward and intentions regarding knowledge sharing were strongly associated with their intrinsic motivation to share knowledge. This result implies that a sense of the competence and confidence of employees may be a requirement for employees to engage in knowledge sharing. That is, employees who believe in their ability to share organizationally useful knowledge tend to have stronger motivation to contribute their knowledge to colleagues. Additionally, employees who feel pleasure in sharing knowledge and thus helping others tend to be more motivated to share knowledge with colleagues.

7. Conclusions

Motivated by a need to understand the underlying drivers of employee knowledge sharing behaviors, this study incorporated a motivational perspective into TRA, and examined extrinsic (expected organizational rewards and reciprocal benefits) and intrinsic (knowledge self-efficacy and enjoyment in helping others) motivators as key influences on employee knowledge sharing attitudes and intentions. The results showed that employee attitudes toward knowledge sharing significantly impacted behavioral intentions. Three motivational factors (reciprocal benefits, knowledge self-efficacy, and enjoyment in helping others) were also significantly associated with employee knowledge sharing attitudes and intentions. However, expected organizational rewards did not significantly influence employee attitudes and behavior intentions regarding knowledge sharing. The implications for practitioners and researchers and the limitations of this study are discussed below.

7.1. Implications for practitioners

This study proposes the following implications for individuals initiating knowledge sharing practices or desiring to encourage knowledge sharing within their organizations. First, do not emphasize organizational rewards (such as salary incentives, bonuses, promotion incentives, or job security) as a primary knowledge sharing mechanism, because extrinsic rewards secure only temporary compliance [78]. This means that organizational rewards may provide temporary incentives for knowledge sharing, but are not a fundamental force forming employee knowledge sharing behaviors. Second, effective and valuable knowledge sharing requires active employee participation [79]. Efforts to foster the targeted reciprocal relationships and interpersonal interactions of employees are necessary for creating and maintaining a positive knowledge sharing culture in organizations. Particularly, managers can improve perceptions of reciprocal benefits among knowledge workers, which are important in knowledge sharing intentions. Third, this study provides evidence that knowledge self-efficacy is an important antecedent to employee knowledge sharing attitudes and intentions. This finding suggests that managers should pay more attention to providing useful feedback to improve employee knowledge self-efficacy. Previous work on role breadth self-efficacy has identified several methods of enhancing the knowledge self-efficacy of employees [80]. A highly self-efficacious staff can be established by recruiting and selecting employees who are proactive, and who have high cognitive aptitude and self-esteem and are intrinsically motivated. Additionally, mangers can enhance the perceptions of knowledge self-efficacy among valued knowledge workers by indicating to them that their knowledge sharing makes a significant contribution to the organization. Finally, since enjoyment in helping others significantly influences employee knowledge sharing attitudes and intentions, managers need to increase the level of enjoyment that employees experience as they help one another through knowledge sharing. Managers interested in developing and sustaining knowledge sharing should focus on enhancing the positive mood state of employees regarding social exchange (i.e. enjoyment in helping others), which precedes knowledge sharing behaviors.

7.2. Limitations and future research

There are several limitations to this study, requiring further examination and additional research. First, the sample was drawn from 172 employees in 50 Taiwan organizations. Hence, the research

model should be tested further using samples from other countries, since cultural differences among organizations influence employee perceptions regarding knowledge sharing, and further testing thus would provide a more robust test of the hypotheses. Second, based on a sample of 172 respondents, several significant results have been obtained. However, a larger sample that brings more statistical power would have allowed more sophisticated statistical analysis. The study findings should thus be verified with a larger sample to increase generalizability. Third, although the scales used for measuring extrinsic and intrinsic motivation are similar to the existing scales, further research might consider developing more elaborate measures to enable a richer convergence of these impact factors of knowledge sharing. Fourth, previous research has suggested a significant relationship between individual differences and employee perceptions of knowledge sharing culture [81]. Future research can examine how personal traits (such as age, level of education, and working experience) and organizational characteristics (such as firm size and industry type) may moderate the relationships between motivation factors and employee knowledge sharing attitudes and intentions. Fifth, because this study considered knowledge sharing to be a very individualistic form of behavior, the research model focused only on the salient beliefs (motivational factors) which influenced attitude and intention toward knowledge sharing. However, according to the theory of planned behavior [82], behavioral intention is determined by subjective norms and perceived behavioral control as well as by attitude. Future research must consider subjective norms and perceived behavioral control to increase the explanatory power of the research model. Finally, an important focus for future research is the long-term effects (i.e. whether the factorable employee reactions were temporary or whether such reactions were sustainable) of motivation on employee knowledge sharing attitudes and intentions. Future studies can gather longitudinal data to examine the causality and interrelationships between variables that are important to knowledge sharing.

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