

**Intrinsically Motivating Employees' Online Knowledge Sharing:
Understanding the Effects of Job Design**

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Abstract

The knowledge management literature emphasizes intrinsic motivation in promoting employees' knowledge sharing due to its consistently positive and lasting effect. Yet, how intrinsic motivation to share knowledge can be nurtured remains elusive and it is often left to random development. This study examines how job design, which determines the conditions in which employees develop and function, influences their intrinsic motivation to share knowledge. A model that specifies the effect of different job design characteristics and clarifies the underlying mechanism through which job design affects intrinsic motivation is developed. Data collected in a survey of 255 employees supported the model. Implications of the findings for research and practice are discussed.

Keywords: Online knowledge sharing, intrinsic motivation, job design characteristics, affective commitment

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1. Introduction

Knowledge is the basis of many business processes and activities in organizations (Grant 1996). Knowledge sharing among employees creates opportunities for learning, application, and creation of new knowledge, which in turn reduce costs of production, improve organizational performance, and enhance innovation capability (Wang and Noe 2010; Wang and Wang 2012). There is therefore a strong managerial interest in promoting knowledge sharing.

Many organizations encourage *online* knowledge sharing because it facilitates the efficient flow and wide distribution of knowledge among employees, thereby amplifying the benefits of knowledge sharing. However, promoting online knowledge sharing is also more challenging. The oft-cited reasons for not sharing knowledge, such as costs of codifying knowledge (i.e., time and effort), perceived lack of personal benefit, lack of trust, and fear of losing knowledge power (Kankanhalli et al. 2005; Wang and Noe 2010), are exacerbated in online knowledge sharing. With regard to costs, online knowledge sharing typically requires employees to codify their knowledge in the form of composed texts. With regard to perceived benefit and trust, it is difficult to control how knowledge shared online is applied as it resembles a public good that could be exploited by any other employee regardless of whether the employee contributed to its provision (Cabrera and Cabrera 2002); The lack of reciprocation by beneficiaries is more difficult to detect online; The knowledge shared may be accessible to people whom the knowledge source do not trust. Employees may also

perceive a greater loss of knowledge power as knowledge shared online is stored electronically and remains accessible long after it is posted.

Among various antecedents of online knowledge sharing, motivation has been studied extensively (Bartol and Srivastava 2002; Bock and Kim 2002; Bock et al. 2005; Gagné 2009; Hau et al. 2013; Hsu 2006; Lin 2007; Osterloh and Frey 2000). Extrinsic motivation focuses on the goal-driven outcomes of sharing knowledge (e.g., rewards, career advancement), while intrinsic motivation emphasizes inherent enjoyment (Lin 2007). Although both extrinsic and intrinsic motivations have been found to be significant, it is widely agreed that intrinsic motivation has a stronger, more stable, and more sustainable effect. In contrast, extrinsic motivation has shown positive (e.g., Kankanhalli et al. 2005), insignificant (e.g., Lin 2007; Seba et al. 2012), and even negative effects (e.g., Bock et al. 2005). The inconsistent findings indicate that extrinsic motivation may secure only temporary compliance, has an indirect effect, and needs to fit with employees' expectations to work (Bock et al. 2005; Wasko and Faraj 2000; Wei et al. 2010). Mandating knowledge sharing through the promise of a reward or threat of punishment often results in satisficing in which employees only provide knowledge meeting the minimum necessary quantity and quality (Gagné 2009). In comparison, intrinsic motivation has a well-established positive effect which has been shown to be stronger than that of extrinsic motivation (e.g., Foss et al. 2009; Hau et al. 2013; Hung et al. 2011; Lin 2007; Natalia et al. 2009). Intrinsic motivation provides enjoyment and satisfaction in the activity of knowledge sharing itself, leading to a more enduring behavior (Osterloh and Frey 2000). It can also overcome the multiple-task problem, in which employees who hold back their knowledge cannot always be objectively identified and sanctioned and sharing therefore cannot be fully assured contractually (Osterloh and Frey 2000).

Although many studies conclude that employees should be intrinsically motivated to

share knowledge, how intrinsic motivation can be nurtured remains elusive. This is partly because prior KM studies have focused more on the effects of intrinsic motivation than its sources. The gap may also be due to the traditional view that intrinsic motivation is a natural inclination or inherent disposition. Similarly, KM researchers have noted that intrinsic motivation may be more difficult to change compared to extrinsic motivation (e.g., Osterloh and Frey 2000). However, more contemporary psychology research has begun to recognize that intrinsic motivation may be affected by the conditions in which individuals develop and function and its maintenance and enhancement require supportive conditions (Ryan and Deci 2000). This study examines job design as one potential condition affecting employees' intrinsic motivation to share knowledge.

We focus on job design in view of its relevance, motivational potential, managerial focus, and prior evidence. First, job design determines how employees carry out their work and it is constantly being experienced by employees in daily work. It leaves a deep imprint on the psychological states of employees (Hackman and Oldham 1976) and is therefore likely to have a pervasive impact on intrinsic motivation by shaping the conditions in which employees develop and function (Ryan and Deci 2000). Second, job design has been shown to motivate *job* performance (Garg and Rastogi 2006; Hackman and Oldham 1976; Humphrey et al. 2007). This indicates its potential in influencing employees' intrinsic motivation to share knowledge. Nevertheless, we note that online knowledge sharing is largely an extra-role, pro-social, organizational citizenship behavior rather than an obligatory job responsibility. The findings of job performance studies therefore cannot be assumed to be directly applicable and a more direct examination in the context of knowledge sharing is necessary. Third, job design is amenable to active management, through varying skill variety, task identity, job autonomy, task feedback, and task significance (Hackman and Oldham 1976). It is therefore practically relevant to determine the extent to which it is effective in

promoting the intrinsic motivation to share knowledge online. Fourth, some of the job design characteristics have been shown to influence intrinsic motivation to share knowledge. Notably, Foss et al. (2009) found that job autonomy had a significant effect. It is worthwhile to extend this line of inquiry by examining the other job characteristics, as well as understanding *how* job design influences intrinsic motivation by explaining the underlying mechanism.

Based on our review of the literature on intrinsic motivation, job design, and knowledge management, we propose that affective commitment mediates the impact of job design on employees' intrinsic motivation to share knowledge online. Affective commitment has been shown to drive employees to go beyond their call of duty to engage in extra-role, organizational citizenship behavior (Meyer et al. 2002). As discussed earlier, online knowledge sharing involves significant costs and is voluntary rather than obligatory. Further, job design research suggests that job design affects affective commitment (Warr 1987) while motivation researchers posit that affective commitment is an energizing force for intrinsically motivated behavior (Meyer et al. 2004). These indicate that affective commitment could be an important and relevant factor explaining the underlying mechanism through which job design influences employees' intrinsic motivation to share knowledge.

In sum, the research objectives of this study are 1) extend prior research (e.g., Foss et al. 2009) by examining the impact of all five job design characteristics simultaneously and 2) better understand *how* job design influences employees' intrinsic motivation to share knowledge online by proposing and assessing a model that accounts for the mediating effect of affective commitment. As summarized in Table 1, this study also advances research and practice by considering intrinsic motivation to share knowledge as being amenable to purposeful management rather than something that can only be left to random development.

Table 1. Preview of Study Contributions

State of the Literature	This Study	Relevance	
		Theory/Empirics	Practice
Intrinsic motivation is more difficult to change compared to extrinsic motivation (e.g., Osterloh and Frey 2000).	Intrinsic motivation to share knowledge online is influenced by job design, which is amenable to purposeful management.	✓	✓
Job autonomy (a job design characteristic) influences intrinsic motivation to share knowledge (Foss et al. 2009).	<ul style="list-style-type: none"> - Job autonomy as well as other job characteristics have significant effects - The effects of job characteristics on intrinsic motivation to share knowledge online are mediated by affective commitment 	✓	✓
Job autonomy has a positive linear effect (Foss et al. 2009).	Different job design characteristics have different effects, which can be linear or curvilinear.	✓	✓

2. Conceptual Background

2.1 Review of Literature on Intrinsic Motivation to Share Knowledge

Employees who are intrinsically motivated to share knowledge find the activity itself interesting, enjoying, and stimulating (Foss et al. 2009) and engage in sharing for its own sake (Lin 2007). Intrinsic motivation can be directed to the activity's flow, a self-defined goal, or obligations of personal and social identities (Ryan and Deci 2000). For example, through knowledge sharing, employees may derive pleasure from demonstrating altruism by helping others. They may also gain satisfaction from recognizing their ability to provide valuable knowledge that is useful to the organization (Kankanhalli et al. 2005).

Table 2. Studies on Employees' Intrinsic Motivation (IM) to Share Knowledge

Study	Findings Related to IM	Factors Studied alongside IM	Sample
Cabrera et al. (2006)	- IM (intrinsic reward) → knowledge sharing	- Big five personality - Extrinsic rewards - Job autonomy - Perceived availability of KM systems - Perceived support from colleagues - Quality of the contents in KM systems - Role breadth self-efficacy - Value-based commitment	372 employees in a multinational IT company
Foss et al. (2009)	- Autonomy → IM - IM → receiving of knowledge - IM → sending of K	- External motivation - Introjected motivation	263 employees in a company in Germany
Hau et al. (2013)	- IM (enjoyment) → tacit knowledge sharing intention - IM (enjoyment) → explicit knowledge sharing intention	- Reciprocity - Social capital	2010 employees in seven Korean firms
He and Wei (2009)	- IM (enjoyment in helping) → contribution belief → contribution intention	- Reciprocity - Social relationship	201 employees in an IT company
Hung et al. (2011)	- IM → Intention to share knowledge using electronic repositories - IM → perceived ease of use	- Reciprocity - Reputation	225 employees of 20 organizations in Taiwan
Kankanhalli et al. (2005)	- IM (enjoyment in helping) → electronic repository usage by knowledge contributors	- Codification effort - Generalized trust - Organizational reward - Identification - Reciprocity - Pro-sharing norms - Knowledge self-efficacy	150 employees in public organizations in Singapore
Lin (2007)	IM (enjoyment in helping) → knowledge sharing intention	- Expected organizational rewards - Knowledge self-efficacy - Reciprocal benefit	172 employees in 1000 largest firms in Taiwan
Reinholt et al. (2011)	- IM → knowledge provision - IM * knowledge-sharing ability → knowledge provision - IM * knowledge-sharing ability * network centrality → knowledge provision	- Knowledge-sharing ability - Network centrality	705 employees in an consulting firm in Denmark
Yan and Davison (2013)	- IM (enjoyment in helping) → Web 2.0 usage for knowledge contributing - Web 2.0 usage for knowledge seeking → IM (enjoyment in helping)	- Flow - Sense of self-worth	232 employees in 14 organizations in China

Intrinsic motivation, which is experienced as self-endorsed rather than due to external pressure or regulation (Reinholt et al. 2011), is especially relevant in the sharing of high-

quality knowledge because it is a discretionary behavior that can only be encouraged and facilitated rather than forced (e.g., Bock et al. 2005). Indeed, the salience of intrinsic motivation on knowledge sharing is well established and supported by consistent and strong empirical evidence (see Table 2). Despite its significance, most studies have modeled intrinsic motivation as an exogenous factor. Much less attention has been given to factors influencing its development. An exception is a study that sought to explore the behavioral transfer from knowledge seeking to knowledge sharing (Yan and Davison 2013). The study found that knowledge seeking can provide information about other employees' enjoyment, thereby influencing one's intrinsic motivation to share knowledge. Another study has identified job autonomy as an antecedent of intrinsic motivation (Foss et al. 2009). These studies indicate that intrinsic motivation to share knowledge could be influenced by the conditions in which employees develop and function. This study examines job design as one such condition.

2.2 Job Design Characteristics

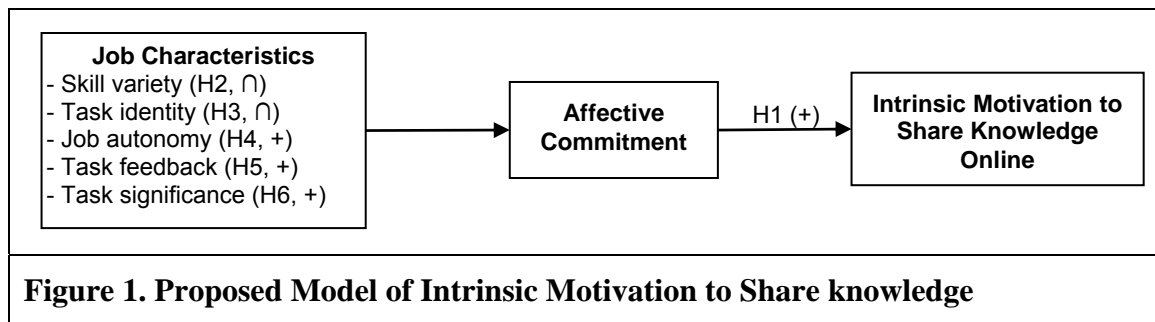
The job design model suggests that job characteristics can influence various work outcomes such as work quality, job satisfaction, absence from work, and turnover (Hackman and Oldham 1976). The five core job characteristics are skill variety, task identity, job autonomy, task feedback, and task significance (Hackman and Oldham 1976). *Skill variety* refers to the degree to which the job requires a range of different activities in carrying out the work, involving the use of different skills and talents of the employee (Hackman and Oldham 1976). *Task identity* refers to the degree to which the job requires doing a whole and identifiable piece of work from beginning to end. A job with high task identity requires the employee to follow through the main stages to "provide a complete unit of product or service" (Hackman and Oldham 1976, p. 257) instead of just an indistinguishable part. *Job autonomy* refers to the degree to which the job provides substantial freedom, independence, and discretion to the

individual in scheduling the work and in determining the procedures to be used in carrying it out. In high-autonomy jobs, job outcomes depend more on the employee's efforts, initiatives, and decisions rather than on the adequacy of instructions from supervisors or adherence to standard operating procedures. *Task feedback* refers to the degree to which carrying out the work activities required by the job provides the individual with direct and clear information about the effectiveness of his or her performance. Receiving feedback on one's performance is a critical element of feeling competent. *Task significance* refers to the degree to which the job has a substantial impact on the lives of other people, whether those people are in the immediate organization or the world at large. Task significance thus allows the employee to experience the job as being more meaningful.

3. Theoretical Development

In this study, we develop a model to explain the effects of job design characteristics on intrinsic motivation to share knowledge online (see Figure 1). Specifically, we propose that 1) job characteristics influence intrinsic motivation to share knowledge online through affective commitment, and 2) different job characteristics have different effects, which can be linear or curvilinear. We develop the overarching job characteristics → affective commitment → intrinsic motivation relationship by integrating several theories. A theory that identifies affective commitment to be a key antecedent of intrinsic motivation is the Integrative Model of Employee Commitment and Motivation (Meyer et al. 2004); The job characteristics → affective commitment relationship is suggested by the Job Demands-Resources Model (Bakker and Demerouti 2007) and Warr's Vitamin Model (Warr 1987); They also provide the bases for hypothesizing the different effects of different job characteristics. Overall, these theories pinpoint the mediating role of affective commitment. This study is the first to integrate these theories to clarify the mechanism through which job design influences employees' intrinsic motivation to share knowledge. The rest of this section details the

development of these relationships and the underpinning theories.



3.1 Affective Commitment – Intrinsic Motivation Relationship

Intrinsic motivation is theorized as being influenced by affective commitment in the Integrative Model of Employee Commitment and Motivation (Meyer et al. 2004). The model posits that employees' goal regulation, which is a motivational mindset that can be intrinsic or extrinsic, is influenced by their commitment (Meyer et al. 2004). Intrinsic goals are more autonomous, and the resultant behavior is undertaken purely for its own sake (i.e., the activity itself is enjoyable). Employees who have a strong affective commitment are likely to share the organization's values and experience greater intrinsic motivation to pursue goals relevant to the organization.

Affective commitment refers to an employee's emotional attachment to, identification with, and involvement in the organization (Meyer and Allen 1991). Affectively committed employees feel psychologically bonded to their organization and experience volitional dedication and responsibility for the wellbeing of the organization (Klein et al. 2012). The commitment results in a willingness to make trade-offs in favor of the organization when allocating resources such as time and attention and provides a general direction to behavior.

In the context of online knowledge sharing, affective commitment can help to overcome the knowledge sharing dilemma as employees become more concerned with the overall performance of the organization and the collective welfare of all organizational members rather than focusing solely on individual costs and benefits (Cabrera and Cabrera 2002; Hislop 2003). Although there is still a lack of empirical evidence, the potential

influence of affective commitment on intrinsic motivation has been pointed out in KM research. For instance, Hislop (2003) developed a psychological contract model of knowledge sharing which proposes that employees' motivation to share knowledge is shaped by their level of organizational commitment. Storey and Quintas (2001) suggest that knowledge workers with high levels of organizational commitment are less likely to leave, more likely to be highly motivated, and will probably be more willing to provide extra discretionary effort such as sharing their knowledge within the organization. In line with this, Jarvenpaa and Staples (2001) advocate that greater commitment engenders the belief that the organization has rights to the knowledge that one has created or acquired and could drive the use of electronic media for sharing. This study tests the hypothesis empirically:

H1: Affective commitment towards organization increases employees' intrinsic motivation to share knowledge.

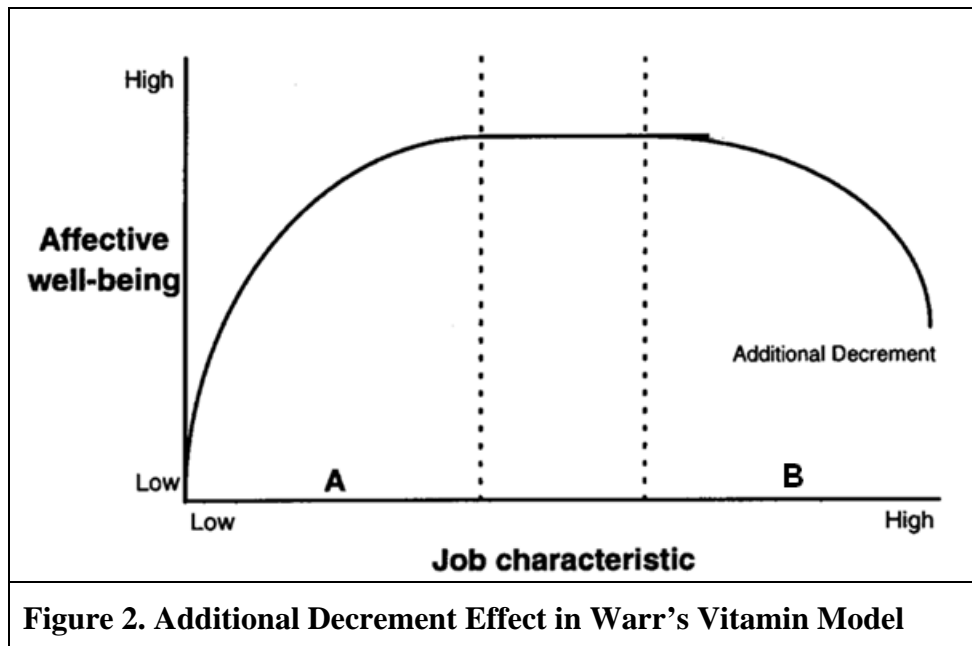
3.2 Effects of Job Characteristics

The effects of job characteristics are proposed based on the Job Demands-Resources Model and Warr's Vitamin Model. These theories suggest that 1) job characteristics influence affective commitment, and 2) different job characteristics have different effects.

The job demands-resources model categorizes job characteristics into two types. Job demands are aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs. High job demands exhaust employees' mental and physical resources and therefore lead to the depletion of energy and health problems. In contrast, job resources refer to aspects of the job that are functional in achieving work goals, deal with job demands, and stimulate personal growth and development. They foster engagement, organizational commitment, and extra-role performance (Bakker and Demerouti 2007). Bakker and Demerouti (2007) suggests that job autonomy, task feedback, and task significance are job resources that fulfill the basic human

need for autonomy, feeling of competence, and social relatedness. Decision latitude satisfies the need for autonomy; Constructive task feedback fosters learning and thus increases job competence; Task significance increases the perceptions of social impact and social worth and thereby fulfills the need for relatedness (Grant 2008). In contrast, skill variety and task identity demonstrate features of job demands. A job that requires diverse skills and talents calls for greater mental effort and can become taxing (Chen and Chiu 2009; Xie and Johns 1995); Jobs with high task identity demands employees to complete a whole and identifiable output and the increased accountability can create stress when it exceeds employees' limit (Hochwarter et al. 2005; Lin and Hsieh 2002).

The Warr's Vitamin Model (Warr 1987) proposes that job demands have negative effects on employees' affective wellbeing, including affective commitment, in a way that is analogous to the effects that some vitamins have on physical health. In general, deficiency in vitamins is detrimental and vitamin intake can initially improve health. However, an overdose of vitamins may lead to toxic concentration which causes a decline in health. Likewise, the absence of job demands impairs employees' affective wellbeing and their presence has a beneficial effect initially (segment A of Figure 2). Beyond a certain required level, further increase in job demands (segment B) is harmful and impairs affective wellbeing. This n-shaped curvilinear effect of job characteristics is named the additional decrement effect. The additional decrement effect of job demands can be explained by the activation theory, which states that mental arousal is necessary for effective functioning and a certain level of activation is needed to motivate work behavior and performance (Scott 1966). Employees seek activation through different types of stimulation, including variation, complexity, and novelty. When there is an absence of activation, they may experience boredom, a lack of alertness, and dulling of the senses. However, too much stimulation that goes beyond the upper limit of activation can generate emotional stress.



3.2.1 Effects of Job Demands

Warr's Vitamin model suggests that the job demands of skill variety and task identity have a curvilinear effect on affective commitment. With regard to skill variety, Fullagar and Kelloway (2009) observed that employees are likely to feel bored with activities that do not challenge their skills. Wiesner et al. (2005) found that employees working on jobs with low skill variety tend to feel depressed. Such employees are unlikely to develop strong affective commitment for their organization. It has been shown that enhancing skill variety through practices such as job rotation improves employees' affective commitment (Humphrey et al. 2007). However, researchers note that very high skill variety may deplete employees' mental resources and lead to mental overload and increase job pressure (Chen and Chiu 2009; Xie and Johns 1995). The mental strain is likely to decrease affective commitment. This study assesses the full spectrum of skill variety's impact by hypothesizing an n-shaped effect:

H2: When the level of skill variety is very low or very high, employees' affective commitment is lower than that when skill variety is moderate.

Pedrini et al. (2009) found that employees working in jobs with low task identity feel that they lack personal accomplishment. It has been observed that feelings of boredom and

meaninglessness are prevalent among employees with low task identity (Gemmill and Oakley 1992). These imply that the level of affective commitment will be low when task identity is low. Increasing task identity has been found to improve organizational commitment (Dunham et al. 1994). However, when task identity is very high, employees may feel solely accountable for the outcome of their work, resulting in stress. In support of the curvilinear effect, Lin and Hsieh (2002) found that task identity has an n-shaped relationship with organizational commitment:

H3: When the level of task identity is very low or very high, employees' affective commitment is lower than that when task identity is moderate.

3.2.2 Effects of Job Resources

The job resources of job autonomy, task feedback, and task significance are expected to have a positive linear effect on affective commitment. Jobs with low autonomy require employees to follow rigid rules and procedures and provide little flexibility for employees to structure work according to their circumstances and preferences. These employees often feel that their use of judgment at work and personal initiative are suppressed, which may evoke opposition and resistance and lead to the development of negative attitudes (Naus et al. 2007). Increasing job autonomy should enhance perceived personal control, which is the amount of control that individuals believe they have over their environment to make it less threatening or more rewarding. Personal control is a basic human need that has been shown to have strong effect on wellbeing (Sels et al. 2004). This implies that increasing job autonomy facilitates the development of affective commitment:

H4: Job autonomy is positively related to affective commitment towards organization.

Task feedback may be provided by coworkers, customers, supervisors, and the work activity itself. Effectiveness of performance may also be gleaned by comparing available information about performance with job description and goals. Feedback helps to alleviate

uncertainty and has been found to reduce employee perceptions that organizational decisions are politically driven, potentially uncontrollable, threatening, or unfair (Rosen et al. 2006). Perceptions of politics influence employees' morale, as reflected in low job satisfaction and organizational commitment. Employees with low morale are likely to reduce the time and effort put into meeting organizational objectives, thus resulting in lower levels of organizational citizenship behavior. Task feedback also provides information for employees to learn about their proximity to goal accomplishment and enhances the experienced meaningfulness of their job (Humphrey et al. 2007). Pursuing meaning is an important goal in one's life and experiencing meaning can promote wellbeing (King and Napa 1998).

H5: Task feedback is positively related to affective commitment towards organization.

Grant (2012) links task significance to pro-social behavior, which refers to the act of freely giving one's time, knowledge, or skills for the benefit of others. When employees perceive their jobs as high in task significance, they experience their work as more meaningful (i.e., more purposeful and valuable). This experience of meaningfulness can motivate employees to invest additional time and energy at work. Further, employees working in jobs with high task significance tend to believe that their actions benefit others (social impact) and are valued by others (social worth) (Grant 2008). Such employees are likely to develop positive affective commitment towards their organization that has provided them with the legitimacy to do so.

H6: Task significance is positively related to affective commitment towards organization.

3.3 Mediating Effect of Affective Commitment

Taken together, the Integrative Model of Employee Commitment and Motivation, Job Demands-Resources Model, and Warr's Vitamin Model suggest that affective commitment mediates the effect of job characteristics on employees' intrinsic motivation to share knowledge online. The Integrative Model of Employee Commitment and Motivation suggests

affective commitment → intrinsic motivation, and the other two models suggest job characteristics → affective commitment. Affective commitment is also strongly relevant in online knowledge sharing as it shifts employees' attention away from individual costs and benefits and towards the welfare of their organizations (Cabrera and Cabrera 2002; Hislop 2003). Accordingly, we hypothesize that affective commitment is an important underlying mechanism through which job characteristics influence intrinsic motivation. This study is the first to hypothesize and test the mediation:

H7: The effects of job characteristics on employees' intrinsic motivation to share knowledge online are mediated by affective commitment.

3.4 Control Effects and Variables

Since the effect of intrinsic motivation on knowledge sharing behavior is an important premise of this study and it is already well established, the relationship was controlled for in our analysis. Other control variables are age, education, gender, job level, and job tenure.

4. Research Method

Data for assessing the proposed model were collected in a survey. This section describes the development of survey instrument and data collection.

4.1 Construct Operationalization

The survey instrument was developed in two steps: First, scales that could potentially measure the constructs were identified from prior studies. Next, a pilot survey involving 211 full-time employees was conducted to identify possible improvement to the measures as well as procedure. Based on the results of the pilot survey, we revised the measure of task feedback to clarify that the focus is on constructive feedback. This is in line with the job demands-resources model which specified constructive feedback to be a job resource (Bakker and Demerouti 2007) and removes any ambiguity in the valence of feedback in the measure.

Table 3. Construct Operationalization

Skill Variety (adapted from Morris and Venkatesh 2010)

To what extent...

SV1: ...does your job have variety? Having variety means you are required to do many different things at work, using a variety of your skills and talents.

SV2: ...does your job require you to use a number of complex or high-level skills?

SV3: ...is your job complex and non-repetitive?

Task Identity (adapted from Morris and Venkatesh 2010)

To what extent...

TI1: ...does your job involve doing a whole and identifiable piece of work? A whole and identifiable piece of work means a complete piece of work that has an obvious beginning and end rather than only a small part of the overall piece of work

TI2: ...does your job provide you the chance to completely finish the pieces of work you begin?

TI3: ...is your job arranged so that you can do an entire piece of work from beginning to end?

Job Autonomy (adapted from Morris and Venkatesh 2010)

To what extent does your job ...

JA1: ...have autonomy? Having autonomy means that you are allowed to decide on your own how to go about doing the work.

JA2: ... give you opportunity for independence and freedom in how you do the work?

JA3: ... give you chances to use your personal initiative and judgment in carrying out the work?

Task Feedback (adapted from Morris and Venkatesh 2010)

To what extent does your job provides...

TF1: clues about how well you are doing – aside from any constructive feedback that coworkers or supervisors may provide?

TF2: chances for you to figure out how well you are doing your job?

TF3: constructive feedback of how you have performed?

Task Significance (adapted from Morris and Venkatesh 2010)

To what extent...

TS1: ...is your job significant in general? A significant job means that the results of your work are likely to significantly affect the lives or wellbeing of other people.

TS2: ...is your job one where a lot of other people can be affected by how well the work gets done?

TS3: ...is your job significant and important in the broader scheme of things?

Affective Commitment (adapted from Rhoades et al. 2001)

To what extent...

AF1: ...would you be happy to work at your organization until you retire?

AF2: ...do you feel that the problems faced by your organization are also your problems?

AF3: ...do you feel a sense of belonging to your organization?

AF4: ...do you feel personally attached to your organization?

AF5: ...does working at your organization have a great deal of personal meaning to you?

AF6: ...are you proud to tell others that you work at your organization?

Intrinsic Motivation (adapted from Wasko and Faraj 2005)

To what extent do you...

IM1: ... enjoy sharing knowledge with others through your organization's electronic knowledge repositories?

IM2: ... enjoy helping others by contributing to your organization's electronic knowledge repositories?

IM3: ... feel good to help someone else by contributing to your organization's electronic knowledge repositories?

IM4: ... experience pleasure by contributing to your organization's electronic knowledge repositories?

Knowledge Sharing (adapted from Hsu et al. 2007)

KC1: On average, how much time do you spend on creating each submission to your organization's electronic knowledge repositories?

KC2: On average, how often do you create new submissions (rather than update existing ones) to your organization's electronic knowledge repositories?

KC3: To what extent do you contribute knowledge to many different topics rather than specific topics on your organization's electronic knowledge repositories?

* All items were measured with seven-point Likert scale

The operationalization of constructs is shown in Table 3. To capture low and high levels of job characteristics, we followed Janssen (2001) and worded all the measurement items in the question form (e.g., “to what extent does your job have variety?”), along with a scale anchored by “not at all” – “moderate” – “to a very great extent”.

4.2 Data Collection

The target population of this study is employees working in organizations that facilitate online knowledge sharing. We focus on employees occupying professional and managerial positions because their work is likely to be knowledge-intensive and they are typically the anticipated participants of online knowledge sharing in organizations. The sampling and survey were conducted through a research company, which had a panel of 88,856 employees. The company randomly selected 553 employees occupying professional and managerial positions and invited them to complete the online survey. The survey included two filter questions: the first question requested respondents to indicate the types of information system available for their use in their organizations; the second question asked respondents to indicate their job position. Only those employees working in organizations with online knowledge sharing systems and those occupying professional or managerial positions at the time of the survey were invited to complete the rest of the survey. Those who completed the survey could opt to receive reward points which could be accumulated and exchanged for items of their choice from the research company.

We received 255 completed responses from qualified respondents, yielding a response rate of 46.1%. We examined the data to assess potential issues related to nonresponse bias and common method bias. To assess non-response bias, the demographic characteristics of respondents and non-respondents were compared. We did not find statistically significant differences in age ($t=0.23$, $p=0.82$), level of education ($t=0.81$, $p=0.42$), organization size ($t=-0.27$, $p=0.79$), and job tenure ($t=0.25$, $p=0.80$), suggesting that non-response bias is not an

issue. To assess common method bias, the widely used Harman’s one-factor test was conducted. The largest factor extracted did not explain more than 50 percent of the variance, indicating that common method bias is unlikely.

4.3 Sample Demographics

The characteristics of the survey respondents are summarized in Table 4. The majority of the respondents are male (64.7%) between 30 to 49 years old (62.7%) and attained a Bachelor degree (72.5%). About half of them were working in professional positions (60.8%) in organizations with more than 1000 employees (45.9%). Most of them had been with their organizations for more than five years (63.1%).

Table 4. Demographic Analysis (n=255)				
Characteristic	Value	Frequency	Percent*	Cumulative%
Gender	Female	90	35.3	100.0
	Male	165	64.7	64.7
Age (years)	20-29	56	22.0	22.0
	30-39	83	32.5	54.5
	40-49	77	30.2	84.7
	50-59	30	11.8	96.5
	>60	9	3.5	100.0
Education	Professional Certificate	44	17.3	17.3
	Bachelor	185	72.5	89.8
	Master	4	1.6	91.4
	PhD	22	8.6	100.0
Job Position	Chief Executive Officer/ President	4	1.6	1.6
	Senior Manager (COO, CFO)	53	20.8	22.4
	Division/ Department Manager	34	13.3	35.7
	Middle Manager	9	3.5	39.2
	Professional	155	60.8	100.0
Organization Size (person)	51-100	26	10.2	10.2
	101-200	24	9.4	19.6
	201-300	17	6.7	26.3
	301-400	16	6.3	32.5
	401-500	11	4.3	36.9
	501-1000	44	17.3	54.1
	>1001	117	45.9	100.0
Job Tenure (year)	< 1	22	8.6	8.6
	1-2	19	7.5	16.1
	3-5	53	20.8	36.9
	6-9	60	23.5	60.4
	10-15	39	15.3	75.7
	>15	62	24.3	100.0

*Percentages for a characteristic may not sum to 100 due to rounding.

5. Data Analysis

The relationship between affective commitment, intrinsic motivation to share knowledge, and knowledge sharing behavior were analyzed with Partial Least Square (PLS) regression, a structural equation modeling approach that allows the simultaneous assessment of the measurement and structural relationships. PLS is chosen because it is able to analyze formative constructs. In this study, knowledge sharing was measured formatively, in terms of frequency, time spent, and variety of topics contributed. Unlike reflective measures, they tap into different themes and are neither expected to covary nor interchangeable.

The linear and curvilinear effects of job characteristics were estimated using a three-step hierarchical polynomial regression. Control variables were entered in the first step, followed by the job characteristics. Quadratic terms were entered in the final step to estimate curvilinear effects, while controlling for the lower-order effects as required in polynomial regression. All variables were standardized before creating the quadratic terms to reduce multicollinearity between linear and quadratic terms (Aiken and West 1991).

The mediating effect of affective commitment was assessed by Sobel test to see whether the reduction in variance in intrinsic motivation explained by job characteristics before and after controlling for affective commitment is significant. Detailed results of these tests are presented next.

5.1 Measurement Reliability and Validity

The survey instrument was tested for indicator reliability, construct reliability, convergent validity, and discriminant validity (Götz et al. 2010). Indicator reliability was assessed by examining item loadings. We observed that all loadings were above the recommended value of 0.70. Construct reliability was estimated using Cronbach's alpha coefficient and composite reliability measure. All constructs had scores above the threshold of 0.70 (see Table 5).

Convergent validity was assessed by examining average variance extracted (AVE) by each construct (see Table 6). All AVEs were above 0.50 and therefore satisfactory. The discriminant validity of a construct was assessed by examining whether its AVE is larger than the squared correlations with other constructs. We found that all constructs had adequate discriminant validity. Overall, all measures had adequate reliability and validity.

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted	Mean	Standard Deviation
Skill variety (SV)	0.84	0.91	0.76	3.50	1.32
Task identity (TI)	0.82	0.89	0.72	2.99	1.09
Job autonomy (JA)	0.89	0.93	0.82	3.63	1.46
Task feedback (TF)	0.84	0.90	0.76	3.24	1.09
Task significance (TS)	0.91	0.94	0.84	3.19	1.31
Affective commitment (AC)	0.91	0.93	0.70	3.63	1.26
Intrinsic motivation (IM)	0.97	0.97	0.91	3.79	1.32
Knowledge sharing (KS)	N.A.	N.A.	N.A.	4.39	1.44

	SV	TI	JA	TF	TS	AC	IM
Skill variety (SV)	0.87*						
Task identity (TI)	0.47	0.85					
Job autonomy (JA)	0.44	0.45	0.91				
Task feedback (TF)	0.48	0.46	0.52	0.87			
Task significance (TS)	0.44	0.43	0.51	0.49	0.92		
Affective commitment (AC)	0.43	0.42	0.49	0.61	0.54	0.83	
Intrinsic motivation (IM)	0.35	0.31	0.42	0.38	0.42	0.58	0.95
Knowledge sharing (KS)	0.54	0.36	0.50	0.43	0.49	0.50	0.58

* Bold values are square root of AVEs

5.2 Tests of Hypotheses

Results of hypotheses testing are summarized in Table 7. Affective commitment had a significant effect on intrinsic motivation to share knowledge online (i.e., H1 was supported). Skill variety had an n-shaped curvilinear effect on affective commitment (i.e., H2 was supported). However, contrary to hypothesis H3, task identity did not have a significant effect on affective commitment. Job autonomy, task feedback, and task significance were found to

be positively related to affective commitment (i.e., H4, H5, and H6 were supported) . The job characteristics explained 50% of the variance in affective commitment. Affective commitment, in turn, explained 34% of the variance in intrinsic motivation to share knowledge. Together, affective commitment and intrinsic motivation explained 39% of the variance in knowledge sharing behavior.

Table 7. Results of Hypothesis Testing							
Partial least squares regression							
Effect	Path		P-Value		R ²		Result
AF → IM	0.58**		0.003		0.34		H1 is supported
IM → KS	0.45**		0.004		0.39		Control relationships are significant
AF → KS	0.24**		0.003				
Polynomial regression (dependent variable: affective commitment)							
Effect	Step 1 R ² =0.003		Step 2 R ² =0.45		Step 3 R ² =0.50		Result
	Beta	P-value	Beta	P-value	Beta	P-value	
Age	-0.04	0.668	-0.09	0.217	-0.06	0.472	Control variables are not significant
Education	-0.03	0.753	-0.07	0.256	-0.05	0.446	
Gender	-0.07	0.465	-0.04	0.534	-0.04	0.538	
Job position	0.00	0.970	-0.13	0.074	-0.12	0.088	
Organization tenure	-0.03	0.758	-0.05	0.498	-0.06	0.450	
Skill variety (SV)			-0.19	0.056	-0.10	0.372	Control linear effects are not significant
Task identity (TI)			-0.06	0.462	-0.10	0.296	
Job autonomy (JA)			0.31***	<0.001	0.30**	0.002	H4 is supported
Task feedback (TF)			0.57***	<0.001	0.49***	<0.001	H5 is supported
Task significance (TS)			0.33***	<0.001	0.38***	<0.001	H6 is supported
SV ²					-0.28**	0.003	H2 is supported
TI ²					0.09	0.263	H3 is not supported
JA ²					0.09	0.322	Control curvilinear effects are not significant
TF ²					0.15	0.055	
TS ²					-0.10	0.274	
SV * TI					0.04	0.709	
SV * JA					0.13	0.283	
SV * TF					0.16	0.214	
SV * TS					0.03	0.852	
TI * JA					-0.14	0.146	
TI * TF					-0.15	0.190	
TI * TS					0.05	0.624	
JA * TF					-0.06	0.492	
JA * TS					0.01	0.912	
TF * TS					-0.11	0.340	
Sobel test for assessing mediation							
Job Characteristic	Sobel	P-value					Result
Skill Variety ²	3.99*	<0.05					H7 is supported
Job autonomy	4.42*	<0.05					
Task feedback	3.33*	<0.05					
Task significance	2.55*	<0.05					
Significant at **p<0.01, ***p<0.001							

In the Sobel test, there is significant reduction in variance in intrinsic motivation explained by the job characteristics of skill variety, job autonomy, task feedback, and task significance (see Table 7), supporting the hypothesis that the effect of job characteristics are mediated by affective commitment (i.e., H7 was supported).

The curvilinear effect of skill variety is plotted in Figure 3. It can be seen that as skill variety increases towards the sample mean, affective commitment increases. However, as skill variety increases beyond the mean, affective commitment begins to decrease. Given the positive relationship between affective commitment and intrinsic motivation, knowledge sharing will begin to decrease as well.

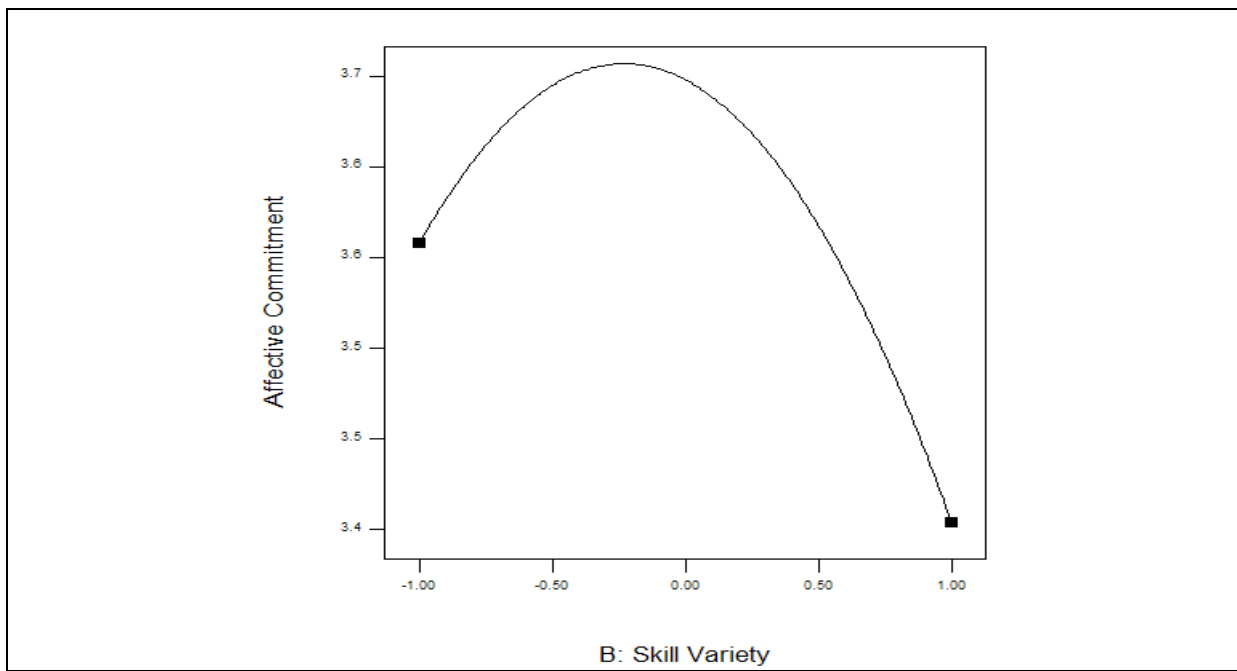


Figure 3. Curvilinear Effect of Skill Variety

6. Discussion

This study sought to examine how all five job design characteristics influence employees' intrinsic motivation to share knowledge online. Supporting the proposed model, we found that job characteristics influence intrinsic motivation through impacting affective commitment. The job demand of skill variety has an n-shaped curvilinear effect while the job resources of job autonomy, task feedback, and task significance have a positive linear effect.

The implications of the proposed model and findings are discussed in the following subsections.

Unexpectedly, the curvilinear effect of task identity was not significant. To a certain extent, this contradicts the finding of a prior study that task identity has a significant n-shaped curvilinear effect on organizational (rather than affective) commitment (Lin and Hsieh 2002). Rather than concluding that task identity does not have a significant effect, we believe that it is necessary to ascertain the effect in further studies. One explanation for the different findings might be that it is necessary to consider moderators. For instance, personal characteristics such as growth need strength (Oldham and Hackman 2010) may moderate the effect of task identity such that employees with little inherent need to grow would not pursue or respond to the internal “kick” that comes from succeeding on high-identity tasks. Organizational characteristics such as effort-reward fairness has also been shown to moderate the curvilinear effect of job demands such that those who perceive reward unfairness feel less satisfied to intermediate levels of job demands because the unfairness distracts them from the positive qualities of job demands (Janssen 2001). Accounting for these moderating effects in further studies may provide a better understanding of the effect of task identity.

6.1 Implications for Theoretical Development and Research

The theoretical contribution of this study is four-fold. First, the proposed model advances KM research by looking beyond the effects of intrinsic motivation to understand how job characteristics influence intrinsic motivation. Prior studies have not investigated this, even though a) intrinsic motivation is an important factor in online knowledge sharing, b) several theories and researchers suggest that job characteristics potentially have significant effects, and c) job characteristics are amenable to purposeful management in practice.

Second, this study clarifies that job characteristics influence intrinsic motivation through affective commitment. This provides a theoretical explanation for the mechanism

underlying the effects of job characteristics on online knowledge sharing, which is not an obligatory job behavior. Establishing the mediating role of affective commitment links the two disparate streams of research on job design and KM and elucidates how job design is relevant to employees' knowledge sharing.

Third, the proposed model also identifies the different effects of job demands and job resources, which can be linear or curvilinear. This provides a nuanced understanding of the effects of job characteristics, which have been conceptualized and tested predominantly in linear terms in KM studies. The curvilinear effect of skill variety reveals its paradoxical negative impact and refines our understanding of the impact of job characteristics on intrinsic motivation to share knowledge. This study demonstrates that curvilinear effects may be relevant in understanding knowledge sharing in particular and KM behaviors in general. Extending this study, future research may investigate whether the mixed results related to extrinsic motivation can be clarified by considering curvilinear effects.

Fourth, this study is one of the earliest to draw on the theories of Integrative Model of Employee Commitment and Motivation, Job Demands-Resources Model, and Warr's Vitamin Model in KM research. We have demonstrated the relevance of these theories in explaining online knowledge sharing behavior in organizations, which involves employees and seeks to promote the flow of job-related knowledge. The explanatory power of the proposed model demonstrates the theories' value in enhancing our understanding of knowledge sharing. The findings also suggest the potential of applying other theories of organizational behavior. For instance, leadership theories have strong relevance. Ilies et al. (2005) propose that the transformational leadership style facilitates higher levels of knowledge sharing. Transformational leaders are seen as considerate, intellectually stimulating, charismatic, and inspirational by followers. Leaders may be regarded as role models and motivate employees through social learning (Ilies et al. 2005). In most

organizations, they also control the allocation of resources and are in a particularly legitimate position to foster employees' sense of self-determination and subsequently intrinsic motivation.

More studies that explore other antecedents can further improve our conceptual understanding of the sources of employees' intrinsic motivation to share knowledge. A theoretical framework that could serve as a basis for this endeavor is the theory of human motivation developed by Maslow (1943). The theory states that employees have five levels of needs that have to be satisfied for them to feel motivated: physiological, safety, social, ego, and self-actualizing. Job characteristics examined in this study contribute to fulfilling social, ego, and self-actualizing needs but less to physiological and safety needs. Future research can investigate these two types of need in terms of factors related to KM. With regard to physiological needs, it has been observed that open-plan office design and water cooler areas facilitate the flow of knowledge in organizations (e.g., Waring and Bishop 2010). Maslow's theory suggests that their effects on KM may be partly explained by their influence on employees' intrinsic motivation. As for the safety need, job security may be a salient antecedent of intrinsic motivation. Sharing knowledge online entails risks to one's knowledge power and having job security may motivate employees by addressing the risks directly.

6.2 Implications for Practice

This study shows that, contrary to the prevailing belief, employees' intrinsic motivation to share knowledge can be more actively managed in organizations and its development need not be left to chance. Among the job characteristics, job autonomy, task feedback, and task significance have positive linear effect and they should therefore be increased to promote knowledge sharing. Job autonomy may manifest as work scheduling autonomy, work methods autonomy, and decision-making autonomy (Morgeson and Humphrey 2006). In practice, one way of increasing job autonomy is through the use of autonomous workgroups,

where members are allowed to allocate work among themselves, organize schedules, address customer requirements, and recruit new members. Not only does working in such workgroups enhance employees' job autonomy, they have also been found to lead to better coordination, more expertise, and increased innovation (Cohen et al. 1996). Constructive task feedback should be clear and understandable, specific to the targeted behavior, and emphasize the performance of the employee. Feedback should focus on providing information necessary for improving or maintaining desired performance and avoid references to personal characteristics of the employee. Feedback could be enhanced by supportive statements, social praise, constructive criticism, and modeling (London 2003). Task significance may be increased by clarifying employees' individual contribution to moral ideals and higher-order goals such as department or organizational objectives. Managers may also provide more opportunities for employees to have direct contact with the (internal or external) beneficiaries of their work to better understand the impact of their work on others (Grant 2008) through organizing focus groups, public presentations, and other socializing events.

Skill variety has a curvilinear effect such that very low and very high levels of skill variety have detrimental effects. This has important implications for practice, as employees working in jobs with high skill variety have the greatest potential to accrue valuable know-how and experience. They therefore constitute the critical mass of knowledge sharing participants that would attract other users (Peddibhotla and Subramani 2007). Ironically, the curvilinear effect suggests that this group may not share as much as the organization would have hoped. The marginal benefit of skill variety in motivating knowledge sharing decreases at high levels and disappears at extreme levels. A useful approach for keeping skill variety optimal is empowering employees to craft their jobs by changing cognitive, task, and relational boundaries to cope with the demands (Wrzesniewski and Dutton 2001).

6.3 Limitations and Suggestions for Improvement

A limitation of this study is that the survey was cross-sectional. Conducting a longitudinal study that measures the independent and dependent variables at different times can provide stronger evidence for the causal relationships in the proposed model. A longitudinal study also offers opportunities to advance our research model by incorporating temporal mechanisms. For example, it will be interesting to examine whether employees' perception about job characteristics changes over time and how the change influences their affective commitment and intrinsic motivation.

It has been suggested that the distribution of a variable may influence the statistical power of detecting its curvilinear effect (McClelland and Judd 1993). The distribution with higher statistical power is one where one fourth of the observations are at either extreme of the variable and the remaining half of the observations is exactly halfway between those two extremes. In this study, data were collected in a survey and it was therefore not feasible to manipulate the distribution of job demands. As a result, weak curvilinear effects might have gone undetected. Future studies may explore the feasibility of conducting experiments to assess the proposed model in a more controlled setting. If so, it must be noted that over-sampling extreme observations may produce an inflated estimate of the variance explained.

7. Conclusion

With strong evidence for its prominence in KM, the time is ripe to trace farther back along the causal chain of intrinsic motivation to share knowledge to examine its antecedents. Our findings indicate that intrinsic motivation is influenced by job characteristics through affective commitment and is at least as tenable to management as extrinsic motivation. This study also highlights the need to be mindful about the diminishing return of increasing skill variety. Identifying other factors influencing intrinsic motivation can unravel more

approaches for effectively addressing the daunting challenge of motivating employees to share knowledge online.

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