Encouraging Knowledge Contribution to Electronic Repositories: The Roles of Rewards and Job Design

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Abstract

The effectiveness of electronic knowledge repositories relies on employees' willingness to contribute their knowledge and rewards have often been used to promote knowledge contribution. To better understand the effectiveness of rewards, this study examines the relative effect of extrinsic and intrinsic rewards. Further, noting that extrinsic rewards have been observed to have inconsistent effects, this study investigates whether the effect of extrinsic rewards is contingent upon job design. Results of a survey of 163 employees show that extrinsic rewards have a weaker effect than intrinsic rewards but its effect can be enhanced by increasing job autonomy, skill variety, and task identity. This study contributes to research by identifying the circumstances in which extrinsic rewards have stronger effect and offers practical suggestions for providing rewards and designing jobs to promote knowledge contribution by employees in organizations.

1. Introduction

As knowledge management (KM) has strong potential to improve operational and organizational performance [5], many organizations have invested in various KM technologies to improve the efficiency and effectiveness of managing employees' knowledge. In particular, electronic knowledge repositories have emerged as a prevalent means for capturing, organizing, and disseminating knowledge in organizations. For knowledge repositories to be effective, it is crucial that employees contribute their knowledge [4] and rewards have often been used as a means for encouraging knowledge contribution [6, 7]. Employees may be rewarded extrinsically and intrinsically for contributing knowledge. Common extrinsic rewards include better chances for promotion and monetary bonus while intrinsic rewards include enjoyment in helping others and increase in one's confidence through knowledge contribution [4, 6-8]. Researchers and practitioners have been especially interested in the effectiveness of extrinsic rewards as they are more tenable to managerial intervention [9]. However, prior research on the effectiveness of extrinsic rewards have been inconclusive. While some studies found that extrinsic rewards effectively motivate employees to contribute knowledge [4], others have found insignificant [8] or even negative effects [7]. Consequently, it has been suggested that intrinsic rewards, which have been found to have more consistent positive effect on knowledge contribution, may have a more salient role in encouraging knowledge contribution. In support, Kankanhalli et al. [4] found that enjoyment in helping others and knowledge self-efficacy (both intrinsic rewards) have larger standardized regression coefficients than organizational rewards (extrinsic reward) and concluded that they have stronger impacts. However, whether the difference in the effects of extrinsic and intrinsic benefits is statistically significant has not been assessed. This study attempts to address this gap.

The lack of consistent findings on the effectiveness of extrinsic rewards also suggests that it may be necessary to consider the context in which the rewards are used. For example, it has been shown that the effect of extrinsic rewards on knowledge contribution is contingent upon the level of employees' identification with their organization [4]. This indicates that it may be important to consider employees' attitudes (e.g., organizational commitment, job satisfaction, job involvement) when understanding the effects of extrinsic rewards. Job design in terms of job autonomy, skill variety, task feedback, task identity, and task significance has been identified as an important aspect shaping employees' attitudes [10]. Therefore, in this study, we investigate whether the effect of extrinsic rewards is contingent upon job design.

In sum, we attempt to address two research questions in this study: 1) What is the relative effect of extrinsic and intrinsic rewards on employees’ knowledge contribution to electronic repositories? 2) How does job design moderate the effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories? As will be detailed later, results of our survey of 163 employees show that...
intrinsic rewards have a stronger effect than extrinsic rewards but the effect of extrinsic rewards can be enhanced by designing jobs to increase job autonomy, skill variety, and task identity. These findings contribute to research and theoretical development by providing statistical evidence for the relative effect of extrinsic and intrinsic rewards and identifying the circumstances in which extrinsic rewards can better entice employees to contribute knowledge. For managers, the findings highlight aspects of job design that can be improved to enhance the effectiveness of extrinsic rewards.

2. Conceptual Background

2.1. The Roles of Rewards

In both research and practice, rewards are widely acknowledged as an important category of factors motivating employees’ knowledge contribution in organizations [4, 6, 7, 11]. Based on the self-determination theory of motivation [12], prior research has studied both extrinsic and intrinsic rewards. Extrinsic rewards refer to organization-controlled rewards such as pay, promotion, status, and job security [13]. In this study, we focus on extrinsic rewards aimed specifically at encouraging employees to contribute knowledge to electronic repositories. The economic exchange theory suggests that individuals’ behaviors are guided by self-interest. Accordingly, individuals are likely to contribute knowledge when they expect that rewards exceed costs [1]. Extending the economic exchange theory to consider longitudinal social relations, the social exchange theory suggests that individuals expect some future return for contributing their knowledge, though the return may not be specified or negotiated [7, 14]. Several studies have provided evidence for the positive effect of extrinsic rewards on knowledge contribution (see Table 1). For example, Kankanhalli et al. [4] found that organizational rewards increase electronic knowledge repository usage by contributors. Wasko and Faraj [15] showed that the chance to improve one’s reputation is a salient determinant of individuals’ volume of contribution to electronic networks of practice. In a meta analysis, Liang et al. [11] observed that extrinsic reward systems increase the degree to which one shares knowledge with others.

Nevertheless, some studies have found that extrinsic rewards do not have a significant effect on employees’ intention to contribute knowledge [e.g., 8, 16]. Contrary to expectations, Bock et al. [7] observed that extrinsic rewards have a negative effect. There are several plausible explanations for these equivocal findings. First, providing extrinsic rewards in exchange for knowledge may promote self-interested behavior among employees and unwittingly encourage knowledge hoarding and competitive behaviors in the long term [15]. In other words, extrinsic rewards may only have a positive effect temporarily [17]. This effect, however, does not have any empirical support yet and remains to be validated in longitudinal studies. Second, extrinsic rewards such as monetary benefits may be viewed by employees as a form of organizational control. The pressure of sanctions may evoke negative sentiments [18]. Instead, it has been suggested that intrinsic rewards may be more effective than extrinsic rewards for promoting knowledge contribution [19]. Third, the effect of extrinsic rewards may be moderated by other factors in an organization [22]. For example, Kankanhalli et al. [4] found that the level of employees’ identification with their organization significantly enhances the effect of extrinsic rewards. This suggests it may be necessary to examine whether the effect of extrinsic rewards is contingent upon other factors in an organization.

<table>
<thead>
<tr>
<th>Table 1. Review of Rewards’ Effect on Knowledge Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extrinsic Rewards</strong></td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>[4]</td>
</tr>
<tr>
<td>N.S.: Insignificant effect on knowledge contribution</td>
</tr>
<tr>
<td>* No known study has found that intrinsic rewards have a negative effect on knowledge contribution</td>
</tr>
</tbody>
</table>

Intrinsic rewards refer to the psychological benefits of having accomplished something worthwhile [13]. They are derived from the activity itself being satisfactory and fulfilling and are especially salient for volitional activities that require creativity and resourcefulness [12], such as contributing knowledge to electronic repositories.

Examples of intrinsic rewards that have been found to motivate employees to contribute knowledge include enjoyment in helping others and increase in one’s knowledge self-efficacy [4, 8]. Research on organization citizenship behavior and altruistic behavior have shown that that employees derive pleasure from helping others [21]. Further, people are driven by the needs to feel competent and self-determining and they seek to engage in activities to satisfy these needs [12].

As mentioned earlier, some researchers have suggested that intrinsic rewards are more effective than extrinsic rewards for promoting knowledge...
contribution in general (i.e., not limited to electronic repositories) [e.g., 19]. Intrinsic rewards have also been found to be more salient in informal settings such as communities of practice [6]. In support, Lin [8] found that extrinsic organizational rewards do not have significant effect on employees’ intention to share knowledge with their colleagues while the intrinsic benefits of enjoyment in helping others and increase in knowledge self-efficacy have significant influences. Nevertheless, other researchers have advocated that extrinsic rewards may be effective for promoting the contribution of explicit knowledge [9] to electronic repositories [6] because employees’ contributions can be recorded and are tenable to measurement. In a study of contribution to electronic knowledge repositories, Kankanhalli et al. [4] found that both extrinsic organizational rewards and the intrinsic benefits of enjoyment in helping others and knowledge self-efficacy have significant effects. This suggests that extrinsic rewards may still have an important role in promoting knowledge contribution to electronic repositories. Therefore, we consider both extrinsic and intrinsic rewards and in this study to understand their relative effect.

2.2. Job Design

Hackman and Oldham [23] identified five important aspects of job design: job autonomy, skill variety, task feedback, task identity, and task significance. Job autonomy refers to the degree to which a job provides substantial freedom, independence, and discretion to an individual in scheduling work and determining the procedures used for carrying out work [23]. In jobs with high autonomy, outcomes depend more on individuals’ efforts, initiatives, and decisions rather than on the adequacy of instructions from supervisors or standard operating procedures.

Skill variety refers to the degree to which a job requires a variety of different activities in carrying out the work, which involves the use of a number of different skills and talents of an individual [23]. Employees working in jobs that draw upon different skills are likely to learn more and be more knowledgeable.

Task feedback refers to the degree to which carrying out the work activities required by a job results in an individual obtaining direct and clear information about the effectiveness of his or her performance [23]. Coworkers, customers, supervisors, and the work activity itself may provide feedback about one’s job. Feedback may also be generated by comparing available performance information with job description and goals. Feedback provides a chance for employees to learn whether they are moving towards goal accomplishment and prompts them to change their behavior if not.

Task identity refers to the degree to which a job requires completion of a “whole” and identifiable piece of work, that is, doing a job from beginning to end with a visible outcome [23]. A job with high task identity allows an employee to follow through the main stages of completing an identifiable element of a product or service, significantly and visibly transforming inputs into recognizable outputs [23]. Employees working on jobs with high task identity are therefore likely to have a better overview of the whole process for generating valuable products and/or services.

Task significance refers to the degree to which a job has a substantial impact on the lives or work of other people, whether within the immediate organization or in the external environment [23]. Task significance enhances employees’ motivation by enabling them to experience their work as more meaningful, as has been shown in a meta-analysis [24].

Although there is yet any published study on the influence of job design on knowledge contribution to electronic repositories, some researchers are beginning to recognize the potential importance of job design on intra-organizational knowledge contribution or knowledge sharing (comprising both knowledge contribution and seeking) [e.g., 25] and provided some evidence for its significance. For example, increasing job autonomy, skill variety, and task feedback has been found to motivate employees to contribute knowledge [26]. Task significance has been shown to increase pro-social behavior, which includes the act of freely giving one’s knowledge for the benefit of other people, groups, or causes [27]. In this paper, we posit that job design enhances the effect of extrinsic rewards related to knowledge contribution. That is, extrinsic rewards are likely to have a stronger effect on knowledge contribution to electronic repositories for employees working in jobs with enriched design. One important reason for this is that employees working on enriched jobs are likely to have more positive attitudes toward their job and organization in terms of organizational commitment, job satisfaction, and job involvement [10]. Such employees are therefore more likely to respond positively to extrinsic KM rewards by contributing their knowledge than employees with negative attitudes. On the other hand, employees with negative attitudes toward their job and organization are likely to display emotional and physical withdrawal behaviors [28] and are more likely to interpret extrinsic rewards negatively as manipulative
techniques that are controlling and pressurizing. Job design may also determine whether employees have the resources (e.g., time, expertise) to contribute knowledge, as will be explained later.

3. Research Model and Hypotheses

Based on prior research, we propose that both intrinsic and extrinsic rewards have significant positive effect on knowledge contribution to electronic repositories. Further, we expect that the effect of extrinsic rewards is stronger when the levels of job autonomy, skill variety, task feedback, task identity, and task significance are high (see Figure 1). These hypotheses are detailed next.

**Figure 1. Proposed Research Model**

**Intrinsic Rewards** include the psychological benefits of enjoyment in helping others and increase in one’s knowledge self-efficacy (i.e., judgment in one’s ability to contribute knowledge) [4, 8]. Intrinsic rewards derived from knowledge contribution are likely to motivate employees to perform the behavior more because they help to satisfy people’s innate needs to feel happy and competent [29]. There has been strong evidence that intrinsic rewards encourage employees to contribute knowledge [4, 8]. Intrinsic rewards also have internal locus of causality, which refers to the belief that an action is one’s own and is freely undertaken rather than being compelled by external forces [30]. In support, Kankanhalli et al. [4] found that intrinsic rewards have a direct effect on knowledge contribution rather than being moderated by external or contextual factors. Accordingly, we expect intrinsic rewards to be directly and positively related to employees’ knowledge contribution to electronic repositories. We consider intrinsic rewards in the proposed model to compare the relative effect of extrinsic and intrinsic rewards.

**Extrinsic rewards** typically provided by organizations to promote knowledge contribution to electronic repositories include increase in pay or monetary benefits, better chances for promotion, improvement in status, and stronger job security [4]. These rewards constitute hygiene factors that satisfy employees’ lower-order needs and it can be de-motivating if they are absent or insufficient [31]. Extrinsic rewards can help to clearly communicate that an organization values employees’ knowledge contribution and serve as a form of feedback about employees’ competence [32]. Vroom and Deci [33] emphasize that for rewards contingent upon the performance of a certain behavior to be effective, performance should be quantifiable and rewards should be administered consistently. This suggests that extrinsic rewards are especially relevant for encouraging knowledge contribution to electronic repositories since contributions can be clearly attributed to specific employees and rewards can therefore be administered fairly [6]. Fairness of rewards can also increase employees’ trust and promote pro-social behavior such as knowledge contribution [6]. In support, Kankanhalli et al. [4] and Wasko and Faraj [15] found that extrinsic organizational rewards increase knowledge contribution to electronic systems such as knowledge repositories and networks of practice. In sum, we expect that both extrinsic and intrinsic rewards are important in the context of electronic knowledge repositories and hypothesize that:

**H1:** Both extrinsic and intrinsic rewards have significant positive effect on employees’ knowledge contribution to electronic repositories.

Unlike intrinsic rewards, the effect of extrinsic rewards on knowledge contribution has been found to be contingent upon other factors in an organization [4]. We expect the effect of extrinsic rewards to be moderated by various aspects of job design, that is, job autonomy, skill variety, task feedback, task identity, and task significance. When employees have high **job autonomy**, they have substantial freedom in scheduling and determining the procedure for carrying out their work [23]. They therefore have greater flexibility in arranging their work and scheduling their time to contribute knowledge to electronic repositories and reap the benefits of extrinsic rewards. In line with this, Davenport and Prusak [3] emphasize that it is unrealistic to expect employees to contribute knowledge in their spare time and work processes must be fine tuned to allow time for it. Therefore, we hypothesize that:

**H2:** The effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories is stronger when their job autonomy is high.

When employees work on jobs requiring high **skill variety**, they have more opportunities to acquire different skills and build rich knowledge [23]. This
helps to increase employees’ ability in contributing knowledge. Such employees are therefore likely to have something valuable to contribute to electronic repositories and are more likely to do so when enticed by extrinsic rewards. In line with this, Bock and Kim [16] found that expected contribution is significantly related to employees’ intention to share knowledge with others. In contrast, when employees feel that their job lacks skill variety, they are likely to find their job meaningless and offer little opportunities for learning and growth [23]. Even when attractive extrinsic rewards exist, they are less likely to be motivated to contribute knowledge as they are hampered by the belief that they have nothing valuable to offer. Hence, we hypothesize that:

**H3: The effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories is stronger when their job’s skill variety is high.**

Jobs with high task feedback provide employees with clear information about their performance [23]. For employees, feedback can promote learning by providing diagnostic information about what to improve and how to develop the competencies needed for goal attainment [35]. This is likely to increase their competence and understanding of their jobs’ requirements and increase their ability in contributing insights to electronic repositories when extrinsic rewards are offered. It has also been shown that employees working in a supportive environment that provides reliable and high-quality feedback are likely to develop more positive attitudes such as commitment [36]. Employees with more positive attitudes are likely to be more willing to respond to organizations’ promotion of knowledge contribution through extrinsic rewards than those with unfavorable attitudes.

**H4: The effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories is stronger when their jobs’ task feedback is high.**

Employees working in jobs with high task identity complete a meaningful and identifiable piece of work [23]. They therefore have a better overview of how their output fits in the process of product/service value creation and the interdependencies between their work and that of others. Understanding task interdependencies may increase employees’ belief that their organizations are the rightful owners of their knowledge [37]. When offered with extrinsic rewards, employees are therefore more likely to be willing to contribute their knowledge. Further, employees working in jobs characterized by high task identity are likely to have unique and in-depth understanding of the process of producing a meaningful component of a finished product/service. This is likely to enable them to contribute knowledge to earn the extrinsic rewards than those working in jobs with low task identity.

**H5: The effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories is stronger when their job’s task identity is high.**

When employees perceive their jobs as being high in task significance, that is, provide opportunities to improve the welfare of others, they experience their work as being more purposeful and valuable [23]. Similarly, research on social information processing suggests that task significance as a subjective judgment that is socially constructed in interpersonal interactions increases employees’ belief that their job is meaningful [38]. This experience of meaningfulness has been proposed to motivate employees to invest additional time and energy in their work [39]. In support, Grant [40] found that employees working in jobs with high task significance are likely to believe that their actions benefit others (social impact) and are valued by others (social worth) and they are therefore more motivated to expend effort. Accordingly, we expect that when organizations promote knowledge contribution with extrinsic rewards, employees working in jobs with high task significance are likely to be more motivated to respond by contributing.

**H6: The effect of extrinsic rewards on employees’ knowledge contribution to electronic repositories is stronger when their job’s task significance is high.**

It is important to note that although skill variety, task feedback, and task identity have the similar effect of increasing employees’ expertise and ability in contributing knowledge, these aspects of job design are conceptually distinct. For example, a job can require high skill variety but provides little task feedback. It is also possible for a job to have high level of task feedback but low task identity. Therefore, it is necessary to consider them separately in this study.

### 4. Research Method

The proposed model was assessed with data collected in a survey. The development of the survey instrument and collection of data are described next.

#### 4.1. Construct Operationalization

In the survey, all constructs were measured with items validated in prior studies. To accurately specify the measurement model, we clearly distinguished between reflective and formative constructs. Reflective constructs have indicators that are affected by an underlying latent construct and dropping an
indicator should not alter the conceptual domain of the construct [41]. On the other hand, formative constructs are composites of multiple indicators and dropping an indicator may alter the conceptual domain of the construct [41]. In this study, the formative constructs are extrinsic rewards and intrinsic rewards because these constructs’ items tap into different themes and the items are not interchangeable. Specifically, extrinsic rewards (ER) were measured in terms of the possibilities of getting better work assignments, promotion, higher salary, more bonus, and stronger job security if one contributes knowledge through electronic knowledge repositories (items adapted from [4]). Intrinsic rewards (IR) were measured as the extent to which one enjoys helping others and the extent to which one’s self-efficacy increases through contributing knowledge (items adapted from [4]). The indicators define the constructs they represent and excluding an indicator is likely to change the conceptual domain of the construct. They are therefore considered to be formative.

Job autonomy (JA), skill variety (SV), task feedback (TF), task identity (TI), and task significance (TS) are reflective constructs measured with items validated by Morris and Venkatesh [42], which was adapted from Hackman and Oldham’s [43] job diagnostic survey. Morris and Venkatesh [42] modified the original version by removing reverse-coded items to improve the scales’ reliability and validity. Knowledge contribution to electronic repositories (KC) is also a reflective construct measured with items adapted from the scale of knowledge sharing behavior validated in Hsu et al. [44] and the scale of electronic knowledge repository usage validated by Kankanhalli et al. [4]. It measures the frequency of and time spent on knowledge contribution as well as the number of topic one is involved in on a knowledge repository.

4.2. Data Collection

The target population of this study is employees working in organizations that have implemented electronic knowledge repositories, especially those involved in knowledge-intensive professional work. To generate a suitable sample, we randomly selected 600 professionals working as doctors, engineers, and lawyers from several directories of certified professionals in Singapore. We contacted them by mail and invited those working in organizations that have implemented electronic knowledge repositories to complete a web-based survey. We received a total of 163 complete responses, representing a response rate of 27.1 percent. The sample has the power to detect effect size of 0.25 at the alpha level of 0.05.

Most of the respondents were employed as engineers (41.1 percent), followed by lawyers (33.7 percent) and doctors (25.2 percent). The sample comprised of 80.4 percent males and 19.6 percent females. Of the respondents, 36.8 percent attained a doctoral degree and the remaining possessed a bachelor or master degree. The median age of the respondents was between 35 to 40 years old with an average organization tenure of 4 years.

5. Data Analysis

We analyzed the data using Partial Least Squares (PLS), a structural equation modeling (SEM) technique that concurrently tests the measurement model and structural model [45]. PLS was chosen because it is able to account for formative and reflective constructs jointly occurring in a single structural model. The SmartPLS program and Bootstrap resampling method were used.

5.1. Tests of Measurement Model

The survey instrument was tested for reliability, convergent validity, and discriminant validity. Reliability of each construct was assessed with Cronbach’s alpha coefficient (see Table 2). All constructs achieved scores above the recommended 0.70 [46]. Convergent validity was assessed by examining composite reliability and average variance extracted (AVE) by each construct (see Table 2). All composite reliabilities and AVEs were above the recommended level of 0.70 [46], indicating that the instrument had satisfactory convergent validity.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach’s Alpha</th>
<th>Composite Reliability</th>
<th>Average Variance Extracted</th>
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<tr>
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<td>5.12</td>
<td>2.13</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>IR</td>
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<td>2.04</td>
<td>–</td>
<td>–</td>
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</tr>
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<td>JA</td>
<td>4.86</td>
<td>2.51</td>
<td>0.94</td>
<td>0.96</td>
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<tr>
<td>SV</td>
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<td>0.86</td>
<td>0.91</td>
<td>0.77</td>
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<tr>
<td>TF</td>
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<tr>
<td>TI</td>
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<td>0.86</td>
</tr>
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<td>TS</td>
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<tr>
<td>KC</td>
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<td>1.91</td>
<td>0.87</td>
<td>0.92</td>
<td>0.80</td>
</tr>
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</table>

*Cronbach’s alpha, composite reliability, and average variance extracted were not calculated for formative constructs.

Discriminant validity was assessed by factor analysis and comparing construct correlations and square root of AVE. Similar to Morris and Venkatesh [42], we conducted a factor analysis with direct oblimin rotation to allow for possibly correlated job design factors. The results indicated that all items
loaded highly on their stipulated constructs (i.e., with value exceeding 0.70) but not highly on other constructs. The correlation matrix (see Table 3) shows that all the non-diagonal entries (i.e., construct correlation) did not exceed the corresponding bold diagonal entries (i.e., square root of AVE), indicating that the items of each construct correlated more highly with their own items than with items measuring other constructs [47]. The correlations ranged from 0.05 to 0.55, and the highest correlations were between an independent and the dependent variable in the proposed model (i.e., intrinsic rewards and knowledge contribution). They therefore did not signify problems of multicollinearity, which exists between independent variables [48]. We further assessed the extent of multicollinearity by calculating variance inflation factor (VIF). The resultant values of VIF ranged from 1.13 to 3.02, which were below the threshold value of 3.33 [49]. This suggests that multicollinearity is unlikely.

### Table 3. Square Root of AVE vs. Correlation

<table>
<thead>
<tr>
<th></th>
<th>ER</th>
<th>IR</th>
<th>JA</th>
<th>SV</th>
<th>TF</th>
<th>TI</th>
<th>TS</th>
<th>KC</th>
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<tbody>
<tr>
<td>ER</td>
<td>N.A.</td>
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<td>JA</td>
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<td>TF</td>
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<td>TI</td>
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<tr>
<td>TS</td>
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<tr>
<td>KC</td>
<td>0.52</td>
<td>0.55</td>
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<td>0.13</td>
<td>0.24</td>
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<td>0.89</td>
</tr>
</tbody>
</table>

* Square root of AVE in bold diagonal; Square root of AVE was not calculated for formative constructs

We also assessed the extent of common method bias with Harman’s one-factor test by entering all constructs into an unrotated principal components factor analysis [50]. The threat of common method bias is high if a single factor accounts for more than 50% of the variance. Our results indicated that none of the factors significantly dominated the variance and common method bias was therefore unlikely.

### 5.2. Tests of Structural Model

The PLS latent variable modeling approach for analyzing interaction effects [45] was used to test the moderating relationships. The procedure involves computing interaction terms by multiplying the predicting and moderating constructs. For interaction terms involving formative constructs, the construct score procedure suggested by Chin et al. [45] was used to create underlying construct scores before creating the interaction terms.

Results of the structural model are shown in Table 4. We found that both extrinsic and intrinsic rewards are significantly related to employees’ knowledge contribution to electronic repositories (H1). By comparing the path coefficients using the parametric approach suggested by Qureshi and Compeau [2], we found that intrinsic rewards have significantly stronger effect than extrinsic rewards (t=1.69, p<0.001). However, the effect of extrinsic rewards is enhanced when the levels of job autonomy (H2), skill variety (H3), and task identity (H5) are high. Contrary to our hypotheses, task feedback (H4) and task significance (H6) do not have significant effects. Among the control variables, only organization tenure has a significant effect. The proposed model explained 32.6% of the variance in employees’ knowledge contribution.

### Table 4. Results of Structural Model

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path Coefficient</th>
<th>T Value</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>H1: ER Æ KC</td>
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<td>IR Æ KC</td>
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</tr>
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</tr>
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<td>H6: TS*ER Æ KC</td>
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**Control Variable**

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<th>T Value</th>
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<td>Education</td>
<td>0.09</td>
<td>1.02</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Gender</td>
<td>0.02</td>
<td>0.52</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Job position</td>
<td>-0.07</td>
<td>0.97</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Organization tenure</td>
<td>0.12*</td>
<td>1.71</td>
<td>Significant</td>
</tr>
</tbody>
</table>

*p<0.05 (T>1.65); **p<0.01 (T>2.35); ***p<0.001 (T>3.14)

### 6. Discussion

Based on prior research on KM and organizational behavior, we posited that both extrinsic and intrinsic rewards are likely to have significant effects on employees’ knowledge contribution to electronic repositories. Further, extrinsic rewards are likely to have a stronger effect for employees working in jobs with enriched design in terms of job autonomy, skill variety, task feedback, task identity, and task significance (i.e. moderating effect). Results of our survey of 163 employees indicated that all hypotheses were supported except for the moderating effects of task feedback (H4) and task significance (H6).

We expected that task feedback could augment employees’ learning and increase their ability in contributing knowledge when extrinsic rewards are offered. However, we found that task feedback did not significantly enhance the effect of extrinsic rewards. A possible reason for this unexpected finding may be that it is necessary to consider the valence of feedback. Recent studies have shown that positive and negative feedback have differential effects.
effects. Positive feedback is likely to generate emotional comfort within employees which motivates them while negative feedback may create discomfort that induces avoidance [51]. While positive feedback may motivate employees to contribute knowledge, negative feedback may daunt them from doing so even if there are extrinsic rewards. The opposing effects of positive and negative task feedback might have canceled each other out in our analysis where they were not distinguished, leading to the finding that task feedback had no significant effect. Therefore, it may be necessary to conceptualize and measure positive and negative task feedback separately in future to understand the true effect of task feedback.

We also found that task significance did not enhance the effect of extrinsic rewards. One plausible explanation is that employees working in jobs with high significance might have felt satisfactorily rewarded through experiencing high meaningfulness in their jobs and they are not further motivated by extrinsic rewards to engage in extra-role activities such as contributing more knowledge to electronic repositories [22]. Another plausible explanation may be that high task significance leads to exhaustion in employees [52] and prevents them from contributing more knowledge even when the extrinsic rewards are attractive.

6.1. Implication for Research

This study contributes to research and theoretical development in several ways. First, we found that both extrinsic and intrinsic rewards have significant effects on employees’ knowledge contribution to electronic repositories. This provides evidence for the significant role of extrinsic rewards in promoting knowledge contribution to electronic repositories in the presence of intrinsic rewards and offers further support to the findings of prior studies [e.g., 4].

Second, through comparing the relative effect of extrinsic and intrinsic rewards using the parametric approach suggested by Qureshi and Compeau [2], we found that intrinsic rewards have a stronger effect than extrinsic rewards and the difference is statistically significant. While prior studies have showed that intrinsic rewards have a stronger effect [4], this is the first study to assess whether the difference is statistically significant.

Third, we found that although the effect of extrinsic rewards is weaker, it is significantly enhanced by the job autonomy, skill variety, and task identity. This is the first study to examine the moderating effects of various aspects of job design. Future studies may extend this study by examining different combinations of various aspects of job design to identify the ideal job design for promoting knowledge contribution. Our findings also indicate that the effect of extrinsic rewards may be contingent upon the context in which the rewards are used. It may be fruitful for future research to consider other contextual factors such as organizational structure, social network, and culture to increase the variance explained.

This study has several limitations that may present opportunities for future research. First, we did not distinguish between positive and negative task feedback and this might have masked the moderating effect of task feedback in our study. It may be useful for future research to consider the valence of feedback to better understand the effect of task feedback. Second, as in the majority of research on job design, we considered job enrichment (i.e., increasing job autonomy, skill variety, task feedback, task identity, and task significance) to have a positive effect on employees’ well-being through increasing experienced meaningfulness, experienced responsibility for work outcomes, and knowledge of the results of work activities [23]. However, there has been growing evidence that over-enriched jobs may have negative effects such as stress [52]. It may therefore be interesting to examine how the positive and negative outcomes of job design influence the effects of extrinsic rewards. Third, we noted that employees working in jobs with high skill variety, task feedback, and task identity are likely to develop stronger expertise and therefore better ability to contribute knowledge but we did not measure employees’ expertise in this study. Future research may consider expertise as a mediator to better understand the effects of these job design aspects on knowledge contribution. Fourth, as our data were collected in a cross-sectional survey in Singapore, longitudinal studies in more countries are needed to ascertain the causal relationships and generalizability of our findings.

6.2. Implication for Practice

Our findings offer insights into ways for promoting employees’ knowledge contribution to electronic repositories that are more tenable to purposeful management. Specifically, we found that extrinsic rewards are effective for promoting employees’ knowledge contribution. Managers may offer extrinsic rewards such as better work assignments, promotion, higher salary, more bonus, and stronger job security. More importantly, we found that the effect of these rewards can be enhanced by designing jobs to increase job autonomy, skill variety, and task identity.
Job autonomy may be increased by using autonomous workgroups, where members are allowed to allocate work among themselves, organize schedules, recruit new members, and address customer requirements [53]. Being responsible for addressing a full set of customer’s requirements also helps to increase task identity. Telecommunicating has also been shown to increase job autonomy as it requires employees to self-regulate their work behavior [54]. Skill variety may be enhanced through the practice of job rotation. It has been found that job rotation supports learning and knowledge acquisition and enhances employees’ administrative, technical, and business knowledge [55]. This also has the additional benefit of improving the breadth and depth of knowledge contributed to electronic repositories.

7. Conclusion

Offering rewards is a common way for organizations to encourage employees to contribute knowledge to electronic repositories. This study has shown that extrinsic rewards, which are easier to administer by organizations than intrinsic rewards, can significantly motivate employees to contribute. Although its effect is weaker than that of intrinsic rewards, its effect can be enhanced by redesigning certain aspects of job. Studies like this help to enhance both our theoretical understanding of the effects of rewards and practical knowledge of the means for promoting knowledge contribution in organizations. We hope that this study will spawn more research on enhancing the effectiveness of rewards, especially extrinsic rewards.

8. References


