Duration, frequency, and diversity of knowledge contribution: Differential effects of job characteristics

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ABSTRACT

Although knowledge repositories typically seek to capture the knowledge employees acquire from working on their jobs, little consideration has been given to the influence of job characteristics. This study proposes a job knowledge contribution model that details the influence of different job characteristics on the duration, frequency, and diversity of knowledge contribution through their influences on different knowledge characteristics. The model was assessed with a survey of 255 employees working in knowledge-intensive industries. Identifying the knowledge mechanisms explaining the impact of job characteristics has implications for the theoretical development of knowledge contribution and indicates new directions for research.

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1. Introduction

Since the early days of organizational knowledge management (KM), electronic repositories have been commonly used to collect, organize, and improve accessibility to employees' knowledge. A recent study of KM in knowledge-intensive organizations highlights that building and maintaining a centralized, searchable repository remains a best practice for supporting knowledge-intensive activities such as product development [1]. Appropriate knowledge repository architecture facilitates the accumulation of knowledge stock and resources, which has been shown to improve organizational efficiency [2]. Nevertheless, much of the success of repositories is predicated on employees' willingness to contribute their knowledge. If employees do not actively provide content, dissemination and reuse of knowledge in repositories cannot occur and the benefits attainable would be limited [3,4]. The importance of knowledge contribution has motivated many studies on its antecedents. To date, antecedents identified include those related to cost and benefit considerations, contributor characteristics, social and cultural factors, and system characteristics (e.g., [4–7]). Although knowledge repositories typically seek to capture

employees' knowledge which is largely acquired from working on their jobs [8], much less consideration has been given to the influence of job characteristics.

The few studies that investigated job characteristics have focused on its relationships with intrinsic and extrinsic motivations (e.g., [9,10]). They have offered insights into the motivational mechanisms through which job characteristics influence knowledge contribution. However, the potential effects of job characteristics on employees' knowledge accrual and knowledge contribution (that is, the knowledge mechanisms) have not been explored. To address this gap, this study proposes a model that describes the relationships among job characteristics, knowledge characteristics, and knowledge contribution behavior, while controlling for the influences of intrinsic and extrinsic motivations. The proposed job knowledge contribution model conceptualizes knowledge characteristics in terms of perceived value (of knowledge), knowledge renewal, and knowledge breadth to account for the effects of different job characteristics. Overall, the model seeks to enrich our understanding of the effects of job characteristics on knowledge contribution by detailing the underlying knowledge mechanisms.

Depending on their knowledge characteristics, employees may behave differently in knowledge contribution. For example, employees whose knowledge is updated regularly may contribute new submissions to repositories more frequently, while those with a broader range of knowledge may tend to contribute to more different topics or categories of knowledge. Time spent/duration,

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frequency of contribution, and number of unique contributions/ diversity have been commonly used to measure knowledge contribution behavior in previous studies (e.g., [4,5,7,11–14]). Despite the different measures, the concept of knowledge contribution has mostly been treated as a black box, where different measures are often treated as interchangeable and selected based on practical considerations (e.g., data availability). This poses a challenge to the aggregation of findings across studies for theoretical development, as studies using different conceptualizations cannot be assumed to be comparable [15], and the significance of antecedents may depend on the conceptualization used.

To the extent that an electronic knowledge repository is a type of information system, research on system use lends support to the need to differentiate among conceptualizations. Specifically, the duration and frequency of system use were found to be predicted by different factors, and having a clearer and deeper understanding of system use may facilitate further studies on the different downstream impacts of system use [16]. As knowledge contribution studies accrue and theory development advances, it becomes necessary to open up the black box of knowledge contribution behavior and better understand the different antecedents and theoretical mechanisms underlying the duration, frequency, and diversity of knowledge contribution. To this end, a study that considers all three conceptualizations in the same research setting is warranted, as variance in results across studies may be a consequence of different research settings rather than (or in addition to) different conceptualizations of knowledge contribution. Furthermore, the comparison needs to be grounded on sound theoretical arguments that make clear why the effects are expected to differ across conceptualizations.

For this purpose, this study goes beyond treating duration, frequency, and diversity as interchangeable measures of knowledge contribution behavior to investigating them as theoretical constructs. We not only identify the job characteristics predicting different conceptualizations of knowledge contribution but also identify the knowledge mechanisms by which the effects occurred. In sum, the aims of this paper are to: (1) develop a research model to explain the knowledge mechanisms through which different job characteristics influence the duration, frequency, and diversity of knowledge contribution and (2) statistically assess the proposed research model with empirical data.

2. Conceptual background

In this section, the concept of knowledge contribution is first defined and reviewed. The key characteristics of a job are then described. This is followed by a discussion of the characteristics of employees' knowledge that are likely to be influenced by job characteristics.

2.1. Conceptualizations of knowledge contribution

Employees can contribute to electronic repositories by adding knowledge in the form of new documents or posts [7,12], or shaping and revising one's own or others' previous submissions [17,18]. The focus of this study is on the adding of knowledge, which is critical in enriching a repository to ensure that it captures the new developments in a changing business environment. Our review of studies investigating this type of knowledge contribution (see Table 1) reveals that it is commonly conceptualized in terms of duration [5,14,19], frequency [4,7,12,20], and number of unique contributions [14,21].

Duration of knowledge contribution represents the amount of clock time an employee spends on creating a new submission. Ancona et al. [22] characterize clock time as being a linear continuum that is divisible into quantifiable units. Duration is the accumulation of the quantifiable units. *Frequency* is the number of times an employee creates new submissions within a defined temporal continuum [11]. It represents how often an employee contributes knowledge. An employee who contributes more frequently also tends to have a greater number of unique submissions. In order to minimize the conceptual overlap between frequency and the number of unique contributions, we define unique contributions more precisely in terms of the number of unique topics to which an employee contributes knowledge. This conceptualization of knowledge contribution is referred to as *diversity*. Content on knowledge repositories is typically organized into topics to help knowledge seekers find the knowledge they need [23]. Employees who have a broad range of knowledge are likely to be better able to contribute to multiple topics. Diversity is distinct and not easily discernible from the duration and frequency of contribution, as spending more time on a submission and contributing knowledge more frequently do not necessarily indicate that one contributes to a wider range of topics. Diversity is an important aspect of knowledge contribution because it determines the richness and breadth of knowledge stored in a repository and enhances its usefulness to users. To the extent that knowledge repository is an information technology system, diversity of knowledge contribution is akin to the diversity of information system use, which refers to the extent to which different aspects of a system are used [24,25]. As the focus of this study is *knowledge* contribution rather than system use, it is most appropriate to define diversity in terms of the extent to which employees contribute to different knowledge topics.

Table 1
Conceptualizations of knowledge contribution (i.e., adding) in previous studies.

Study	Conceptualization of Knowledge Contribution	Nature of measure	Sample
Durcikova and Gray [12]	- The extent to which one frequently, often, and regularly uses repositories - Actual contribution frequency	Objective and perceptual	118 senior managers in a large American firm
He and Wei [5]	Usage time spent	Objective	161 employees in an international IT company
Kankanhalli et al. [4]	The extent to which one frequently, often, and regularly uses repositories	Perceptual	150 senior managers in 10 public organizations in Singapore
King and Marks [13]	Frequency measured with a scale anchored by "never," "rarely," "some of the time," "a good bit of the time," "usually," and "always"	Perceptual	169 employees in a large federal agency in the United States
Raman et al. [14]	- Time spent - Number of unique, different submissions	Objective	20 students in an information systems and technology school in the United States
Wasko and Faraj [21]	Volume of contribution	Objective	604 members of a national legal professional association in the United States
Watson and Hewett [7]	Frequency measured with a scale anchored by "almost never" and "always"	Perceptual	430 employees in a global knowledge services firm