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Who Should I Approach?
Knowledge Sourcing in Enterprise System Implementation

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Abstract

During enterprise system implementation, organizations transfer system-related knowledge to end users through training sessions and by having them involved in the system design and implementation processes. However, during actual use of the system, end users acquire informal knowledge from co-workers through their social networks. Existing research has focused on the structural features of social networks and their impact on regulating knowledge flow between end users and across the network. The personal attributes and preferences of end users that could impact their knowledge acquisition and processing capabilities have not been considered. This paper examines the expertise level of end users, their gender, and the complexity of their job tasks in influencing system-related knowledge acquisition and its impact on performance outcomes. Data for this study was collected from active users of a new Enterprise Resource Planning (ERP) system that had been implemented across multiple business units of diversified business conglomerate in the United States.

Keywords: Social Networks, Enterprise Resource Planning, Advice Networks, Expertise Networks, Gender.

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1. Introduction

Enterprise systems integrate data across business units within organizations for the purpose of enhancing efficiency and effectiveness (Ranjan et al., 2016). They usually are replacing legacy systems which typically manage data and business processes of a single department. Transitioning from a legacy environment to an integrated environment requires end-users to be more collaborative and have a cross-organizational perspective. As a result, end-users need to master the tools and procedures of the new system, understand how upstream and downstream processes are affected by their actions, understand how the newly restructured data flows across multiple processes, and how the resulting information will be used (Garg & Agarwal, 2014; Kini & Basaviah, 2013; Tarhini et al., 2015). Researchers and practitioners have emphasized the need to disseminate system-related knowledge during and after enterprise system implementation. The vehicles to deliver knowledge can be in the form of training, end-user involvement during implementation, and the use of experts and technology champions within organizational departments (Arasanmi, 2019; Bano & Zowghi, 2015; Bhattacharya et al., 2019; Ma'arif & Satar, 2018).

Despite these measures, end users often reach out to their social networks to learn about system use in the context of a specific role, share best practices, address on-the-job technical issues, and to address business challenges (Freeze et al., 2012; Sasidharan et al., 2012; Sasidharan et al., 2017; Sykes et al., 2009; Sykes et al., 2014).

2. Social Learning Theory and Social Networks

The social learning theory argues that learning is a social activity facilitated primarily through observation. Their environment impacts how people learn new things and acquire new behaviors (Bandura, 1977). This concept of environment-driven learning forms the basis of social networks: the study of how and why people or groups interact with one another (Hanneman & Riddle, 2005). In a work environment, employees may acquire knowledge from co-workers to solve job-related problems. A co-worker who might not an answer to a question may in turn reach out to another co-worker for help, leading to the development of an informal knowledge acquisition network. Social network techniques help codify these knowledge networking patterns to identify network players and network structures that can influence knowledge flows across the organization (Borgatti & Cross, 2003; Brass, 1984, 1985, 2011; Hanneman & Riddle, 2005).

3. Social Advice Networks and Enterprise System Implementation

Workplace social networks are composed of informal, context-relevant employee interactions, formed in real-time based on shared beliefs, preferences, goals, and objectives (Borgatti & Cross, 2003; Brass, 1984, 1985, 2011; Hanneman & Riddle, 2005). Research on social networks in the context of enterprise systems has found that system-related knowledge gained through such informal network structures facilitates an improved understanding of the system, in addition to improving job performance. Such knowledge transfer social networks are referred to as advice networks. As opposed to the more formalized "text-book" knowledge acquired during training sessions, advice networks have been found capable of providing direct fixes to unanticipated and context-dependent problems. In addition, it

reduces the amount of time required for problem resolution (Freeze et al., 2012; Sasidharan et al., 2012; Sasidharan et al., 2017; Sykes et al, 2009; Sykes et al., 2014).

Network researchers have primarily focused on the structural features of advice networks that calibrate the amount of knowledge flowing through the network. The unit of analysis could be the network or the individual user (Hanneman & Riddle, 2005). Network level measures include knowledge tie density which can be indicative of the speed of knowledge transmission across the network. Other approaches include identifying closely connected sub-networks or cliques within the overall network based on commonalities such as demographics. At the level of the individual user, the primary focus has been on the immediate network surrounding the user – the user is called the "ego", and the network of those users that ego approaches to acquire knowledge is called the ego network. The ego network often forms the most immediate and primary knowledge acquisition source for a user (Hanneman & Riddle, 2005).

The effective use of enterprise systems requires end users to constantly acquire knowledge and integrate its features into their work, so a large ego network provides individuals with increased access to others' knowledge (Brass 1984, 1985; Brass & Burkhardt, 1993; Ibarra & Andrews, 1993). The centrality measure reflects the positioning of a user within an advice network in relation to his or her knowledge acquisition and knowledge transmission potential. This could be in terms of closeness (the number of direct knowledge ties of a user with other users) or betweenness (the extent a user is between otherwise unconnected users, such users transmit knowledge between unconnected users gaining knowledge and institutional power in the process). Increasing centrality provides exposure to a variety of experiences, information, challenges, and solutions which would not have occurred in isolation (Hanneman & Riddle, 2005). Central users possess influence, power, and control within the network (Borgatti & Cross, 2003; Brass, 1984; Ibarra & Andrews, 1993).

While this body of research has provided a better understanding of how users access and process informal knowledge in the workplace, the focus essentially has been on a numerical count of the knowledge ties between end users, and not on the end users themselves. The implicit assumption has been that the higher the number of knowledge ties, greater the amount of knowledge acquisition, leading to improved performance outcomes. We argue that while the number of knowledge ties do matter, for a more holistic appreciation of the knowledge dynamics at play within the network, the end user too must be taken into account, as his or her personal attributes, preferences, and perspectives can impact the quantity and quality of knowledge flows and their subsequent utilization (Aubert et al., 2013; Shih, 2006; Sun et al., 2009).

4. Research Framework
We now examine the expertise level of end users, their gender, and the nature of their job tasks in influencing knowledge flows and subsequent performance outcomes.

4.1 Expertise Level of Knowledge Sources
The expertise level of knowledge sources can impact the quality of knowledge flows across the advice network. While all end users would likely have undergone formal organizationally mandated training, the extent to which this knowledge would have been internalized by recipients can depend on a variety of factors, including prior experience with similar technologies, technical self-efficacy, and learning capabilities. Some end users would have participated in the system design and implementation processes, and would arguably possess

more procedural or know-how expertise than others who did not have that experience. Knowledge flows emanating from those with authentic system related expertise would have a greater positive impact on recipients than that sourced from those lacking such expertise.

Hoffman's expertise model (Hoffman, 1998) conceptualizes expertise as a continuum, ranging from those with little or no domain knowledge (the naïve and the novice) to those with foundational and higher than foundational domain knowledge (the apprentice, the initiate, and the journeyman), and finally to those with competence and experience in both domain and related subdomains (the expert and the master). In the context of this study, the expert and the master are viewed as possessing system-related knowledge to the extent that they can function as reliable sources of high quality knowledge flows. The subnetwork within the overall advice network connecting these system-related experts is referred to as the expertise network.

The quality of knowledge accessible to an end user can have an impact on performance outcomes, hence greater the overlap between the end user ego network and the expertise network, higher would be the performance outcomes.

P1: The extent of overlap between the end user ego network and the expertise network would be positively related to end user performance outcomes.

4.2 Gender
Social networks capture human interactions and gender can play a role in the manner in which relationships are initiated, nurtured, and expanded. Prior research on workplace social networks have concluded that they have by and large been disadvantageous to women (Forret & Dougherty, 2004; McGuire, 2002; Ibarra, 1995, 1997; Loscocco et al., 2009; McPherson et al., 2001). Women view workplace interpersonal relationships as a means of gaining reciprocal trust, developing intimacy, and fostering closeness. On the other hand, men are more goal-oriented with their workplace relationships being a tool for achieving job success, acquiring power, and establishing dominance (Basow & Rubenfield, 2003; Mason, 1995; Mulac et al., 2001; Tannen, 1990). A new enterprise system would be replacing an existing system which would have an associated advice network. Women would be more likely than men to call upon their existing advice network to acquire knowledge regarding the new system as it would further nurture and cement their existing relationships. However, use of the newly implemented system may require access to knowledge flows different from what is available from within their current advice network. Men being goal-oriented would be more likely to deliberately venture outside of their existing advice network and acquire knowledge from those perceived as system-related experts. Hence, men are expected to have higher performance outcomes than women.

P2: The extent of overlap between the end user ego network and the expertise network would be higher for men than women.

P3: Men will have higher performance outcomes than women.

4.3 Job Tasks
The nature of the job task performed by end users can vary in and structure and complexity. At one extreme, tasks may be well-defined and structured. The steps involved for executing structured tasks are usually documented and require minimal cognitive input (e.g., generating routine expense reports). At the other extreme job tasks may be unstructured and may require

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creative thinking and analytical reasoning (e.g., modeling a supply chain). The execution of such tasks through an enterprise system may demand higher levels of cognitive input on the part of the end user and familiarity with more complex system functionalities (Chang et al., 2014; Giachetti, 2016). End users executing such unstructured tasks would benefit more from high-quality knowledge flows than those end users involved in more routine structured tasks. A greater overlap between the end user ego network and the expertise network would provide the end user with the high-quality knowledge flows required for such tasks. Hence, we propose an interaction effect between the nature of the job task (unstructured versus structured) and accessibility to high quality knowledge flows.

P4: The joint effects of end user task structure and the extent of overlap between the end user ego network and the expertise network will be positively related to end user performance outcomes.

5. Research Methodology

Our study context was an agribusiness company located in midwestern United States having interests in grain storage and distribution, commodity trading, and plant nutrients. They implemented an Enterprise Resource Planning (ERP) system with the intent of improving efficiency and maximizing productivity through streamlining operations across their various business units.

An online questionnaire was used to collect data from heavy users of the ERP system belonging to the three business units that were most impacted by the implementation. These users were shortlisted based on transaction logs that included both the frequency and complexity of system-related interactions. Networking data was collected using the "roster" method – each end user was provided with a roster of other users within their business unit and asked to identify those that they had approached for acquiring system-related knowledge. Those identified in this manner constituted the ego network for that user. This data was used for generating the advice networks for end users. End users also self-reported their level of expertise with the system. This was used in conjunction with data provided by the company regarding expertise levels of end users to create the expertise network.

In addition to networking data, demographic details of participants such as age, gender, experience, and educational qualifications was also collected. Data regarding the extent of structuredness and complexity of job tasks was also collected. Performance outcomes of end users was measured using the individual impact component of the DeLone and McLean Information Systems Success (DMISS) model (DeLone & McLean, 1992). The individual impact component spans performance indicators such as time savings, innovative idea generation, client satisfaction, and productivity improvements.

5. Current Status

We have completed data collection and the data is being tabularized for analysis. Two of the three operational groups had 27 end users each (representing an 80% response rate), and the third unit had 25 end users (representing an 75% response rate). The UCINET and NetDraw (Borgatti et al., 2002) is being used for mapping the ego networks and generating networking parameters. We expect to present our preliminary findings at the conference.

6. Concluding Remarks

Current research on knowledge sourcing through advice networks has focused on structural influences impacting the amount of knowledge acquired by end users. We expand on this

narrowly defined research paradigm to encompass attributes and characteristics pertaining to the end user and their impact on knowledge acquisition. The expertise level of end users, their gender, and the complexity of their job tasks in influencing system-related knowledge acquisition and its impact on performance outcomes is considered.

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