Understanding Knowledge Transfer Dynamics in Information System Support: An Exploratory Study of Procurement System Support

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Abstract

Post-adoptive use of information technology is challenged by various knowledge barriers. Substantial insights can be obtained by examining the knowledge transfer activities between information system (IS) professionals and end-users. Drawing upon studies on knowledge transfer and on IS post-adoptive use, we conducted an exploratory study of knowledge transfer dynamics in procurement system support. Our analysis of 591 support tasks revealed a complex array of knowledge, categorized by two domains (technology vs. business) and three dimensions (process, data, and workflow). Moreover, IS support personnel were found to engage in two knowledge transfer activities (informational and diagnosing) and act three roles (technical expert, business analyst, and boundary spanner). By focusing on the interplays between knowledge characteristics and knowledge transfer activities, our study developed a contingency view on managing knowledge in IS post-adoptive support. Findings of this study offer organizations useful guidelines for adapting IS support services to enhance technology use.

1. Introduction

Organizations deploy work systems --- consisting of employees, tasks, activities, and contexts ---- to perform work tasks. These work system are considered “IT-enabled” because information technologies (IT), such as enterprise software applications, are utilized to support the work tasks [13]. During the IT post-adoptive use, various knowledge barriers have arisen, preventing organizations from realizing the promised benefits of the installed technologies [3, 22]. To achieve effective use of information technology, end-users need to understand not only how the technology enables the work tasks at their units but also how their employment of the technology will affect tasks of other business units. Lack of such knowledge may lead to technology use problems across work units, impairing the successful completion of a work task, as reflected in the procurement scenario below:

“Lisa from the Surgical Operation unit created a purchase order for medical equipment by using the SRM application in an ERP system, SAP/R3. Upon the delivery of the order, John at the Accounts Payable unit logged in the SAP/R3 system, he found the discrepancy in price between the invoice from vendor and the original purchase order by Lisa. Then John rejected to pay the Invoice in the system, which triggered an error message to Lisa’s inbox in SAP/R3 system. Frustrated, Lisa called the SAP Support Center, and complained about why “clearing the incorrect price message” did not resolve the payment issue. With the help of an analyst at the Support Center, Lisa realized that only if she “completed the workflow item that she received and accepted the price difference from the vendor” in her R3 system inbox would allow John at the Accounts Payable to pay the invoice.”

As shown above, the successful completion of the vendor payment task was impeded not only by the data error (price discrepancy between the purchase order and the vendor invoice) but also by Lisa’s lack of understanding of the 3-way price-matching rule enforced in the Shopping Cart function. The SAP Support Center in the organization facilitated the technology use of end-users such as Lisa. An IS support operation is a knowledge-intensive setting where IS support personnel engage in frequent knowledge sharing activities with organizational end-users and provide them with information and solutions to facilitate their system use. Thus, it serves as an important channel to facilitate end-users’ learning of new technologies, enabling users to achieve substantive use of installed technologies.

Knowledge transfer activities between IS professionals and end-users have been evidenced in the support services by software vendors [7] and by IT departments [25]. Studies on IS post-adoptive use have highlighted the importance of knowledge transfer in organizational use of technology [22] and provided useful insights into the types of knowledge being transferred in the support context [25]. Enterprise technologies, such as enterprise resource planning (ERP), are the technologies developed to integrate business processes and data across business...
functions across an enterprise [8]. The complexity and dynamics arising in the post-adoptive use of enterprise technologies make knowledge transfer more challenging for both IS professionals and end-users. We argue that we can gain substantial and valuable insights into the knowledge transfer challenges if we take into account both the characteristics of knowledge and the knowledge transfer activities by IS professionals. In this study, we intend to examine the variety of knowledge requested by end-users regarding a newly-implemented procurement system, and how the knowledge requests are adequately addressed by IS support personnel. In particular, the paper will address two questions: 1) What types of knowledge requests emerge in IS support service? 2) How do IS professionals respond to those knowledge requests?

Drawing upon extant literature on knowledge transfer and on IS post-adoptive use, we conduct an exploratory study of knowledge transfer dynamics in the post-adoptive support for a Supplier Relationship Management (SRM) system. Similar to enterprise resource planning (ERP) systems, SRM systems embed a process-oriented structure that streamlines the procurement processes between a focal company and its external vendors. Our data analysis revealed that knowledge requests with such an integrated technology use can be characterized by two domains (technology vs. business) and three dimensions (process, data, workflow). Moreover, IS support personnel were found to play three different roles (technical expert, business analyst, and boundary spanner) as they responded to end-users’ support requests. Our study contributes to the knowledge transfer literature by focusing on the interplays between characteristics of knowledge requested and knowledge transfer activities, developing a contingency view of effective knowledge transfer. Results of the study suggest that organizations consider both variety of knowledge and adaptive roles by IS professionals to better manage their IS post-adoptive support.

The remainder of the paper is organized as follows. Section 2 describes the context of investigation, followed by literature review in section 3. We explain the research method in section 4 and present the results in section 5. Finally, section 6 presents the discussion of the paper, and section 7 concludes the paper with limitations and directions for future research.

2. Investigative context

The investigative context of this study is a SAP/R3 system for procurement, SRM system. Like CRM (customer relationship management) system investigated in a recent study of IT post-adoptive use [12], SRM system is an extended module of enterprise resource planning (ERP) system. The SRM system integrates the procurement process between a focal enterprise and its suppliers (vendors) such that a purchased order created in the system is automatically routed to the authorized vendors pre-configured in the system. As organizations increasingly adopt and depend on inter-organizational systems (e.g., SRM) to coordinate their supply chain transactions, end-users’ learning and utilization of SRM system thus become an important topic to both academia and industry practitioners.

One important function in SRM is the Shopping Cart functionality, which enables an employee to obtain goods and services from the eMarketplace, an Internet-enabled electronic portal embedded in the SRM system. When accessing a SRM system, employees have different authorization roles (e.g., requisitioner and approver), determined by their respective positions in an organization. The requisitioner role allows an employee to initiate a purchase order (PO), which is required to purchase most goods and services at this enterprise, while the approver role allows an employee to approve a PO (e.g., amount greater than $5000). One important business rule in managing Shopping Carts is the rule of 3-way match: a vendor’s invoice will be automatically paid by the Accounts Payable (AP) unit only when the invoice matches the initiating PO and the confirmation receipts of the order delivery.

Moreover, the completion of the Shopping Cart function involves two main stages of procurement---Create Shopping Cart and Approve/Confirm Purchase Order -- which impose different work tasks and knowledge requirements on end-users. For example, initiating a purchase order just requires the role of requisitioner and knowledge about the vendor’s product offering. Once a shopping cart is generated, with an assigned SC (shopping cart) number, it is added to the shopping cart workflow to be approved and processed. Users’ confusions with the Shopping Cart function arise as a shopping cart order progresses along the approval path to the final receipt of goods and payment at the “Approve/Confirm” stage. This latter stage often involves multiple stakeholders, including the person(s) with “Approver” roles, the central purchasing department, and external vendors. It also involves different business rules, such as the “First One Gets It” rule in approval and the “3-way matching” rule in determining payment. Due to different work tasks and knowledge requirements, the two procurement stages may witness different patterns of knowledge transfer activities.
Two knowledge barriers arise in supporting organizational use of procurement system. First, the completion of SRM-enabled procurement tasks is complicated by the tight integration of data and process across business units within an organization and between the organization and external vendors. In this regard, the scope of knowledge requests may encompass multiple areas, including technical features, system-generated information, inter-dependence of data and processes. Second, the technology use is dynamic, as the elements in the system are changing over time, e.g., the pre-configured vendor list gets updated or new business rule enforced. Because of the complexities inherent in the post-adoptive use of a procurement system, the SRM system becomes a suitable context for us to examine the dynamics of knowledge transfer in information system support.

3. Theoretical development

3.1 Knowledge barriers in using integrated technology

Prior studies on technology use have provided some descriptions of the knowledge barriers and problems that end-users experience with new information technologies. When individuals begin to actively learn about and use the technology applications during the post-implementation stage, they may encounter problems which, if unresolved, prohibit their successful use of the technology applications. End-users’ problems with new information technologies ranged from routine inquiries to complex data and network issues [15, 28]. According to a study of personal workstations in an educational institution, the commonly encountered system use problems involved confusing error messages, dropped network connections, and hard-to-find system features [6]. These problems not only caused user frustration, but also led to an average of 33% individual productivity loss. When users lack knowledge about a new technology, they may refuse to use the new system for a period of time (“inertia” phase) [3], or they may develop some workarounds, which become undesired organization routines [21], hurting the organization’s performance in the long run.

To promote technology use, researchers have called for more attention on individual use behavior [12, 13]. Among the factors influencing post-adoptive individual use, knowledge barriers and users’ reflection upon their prior technology experience become critical factors [3, 13]. In this regard, gaining an in-depth understanding of knowledge demands by users and knowledge transfer activities by IS support personnel will provide IS academia and practitioners valuable insights into promoting post-adoptive IT use in the short term, and achieving organizational benefits of technology investment in the long term.

3.2 Knowledge transfer by IS professionals

Knowledge transfer refers to “the process by which one unit of an organization, such as a group or department, is affected by the experience of another” [2, p.151]. This suggests that individuals engaging in this process learn and apply the knowledge in performing their respective tasks. In the IS support context, collective learning and problem-solving among IS professionals and users underlies a crucial knowledge transfer process. On the one hand, employees need to learn newly-installed system functionalities and to understand how to apply the technical features to performing work tasks. On the other hand, IS support personnel benefit from learning about users’ business domains and how a work task can be facilitated by a technical system. Effective knowledge transfer between IS support personnel and end-users has a positive impact on users’ learning, enhancing IS usage [25].

Many factors influence the outcome of knowledge transfer. According to the generic framework of knowledge transfer [1, 26], the set of influencing factors include the source and recipient of knowledge, the characteristics of knowledge being transferred and the mechanisms employed to transfer knowledge at organizational and firm levels. By focusing on the support service of an integrated technology, we seek to develop an adaptive framework of the knowledge transfer strategies during IS post-adoptive support.

4. Method

4.1 Research site and data collection

The research site is a large U.S. enterprise located in the eastern region of the United States. It is a 40,000-employee enterprise consisting of four different institutions (two hospitals and two educational institutions) under the enterprise umbrella. In January 2007, it successfully completed the implementation of enterprise resource planning (ERP) system, SAP/R3, including four applications --- human resource/payroll management, supplier relationship management (SRM), finance management and special project management. To provide a centralized support to the 11,000 users across the different sites, the organization set up a SAP Support Center staffed with IS professionals. During the first 3 months post the implementation, the organization offered training sessions to end-users, providing an overview of the new system and
training on users’ access roles. The study reported here focuses on the support services of the SRM system by IS professionals at the Support Center during the first 5 weeks (April - May 2007) when end-users formally started to use the SRM system.

Employees at the organization had two channels to report their system use problems and to request knowledge and assistance: phone calls or emails. Both emailed and phoned problems were logged in the tracking system with description of the problem and contact information of the reporting employees. There were three levels of support professionals at the support center: front-liner, specialist, and developer. Level 1 analyst received calls and logged them with a unique ticket number, then assigned the tickets to specialists who supported that SAP modules. When level 2 specialists could not resolve a problem, they passed it to the development team at level 3 for system modification and enhancement. Among all three levels of support, specialists at level 2 were the main knowledge source to directly address to end-users’ SRM use problems and information requests. Thus, they became the focal IS support professionals in this study. As the support center manager informed us, the first month of the formal use of the system was chaotic, as a variety of problems were reported across the four institutions.

For our study, we extracted a total of 691 ticket records closed from the organization’s ticket-tracking database for the period of five weeks: from week 1 (the 1st week of April 2007) to week 5 (the 1st week of May 2007). We chose this timeframe for our data samples, as the period was considered by our site informants (manager and specialists) as the critical learning period for the end-users, mostly departmental administrators in the organization. This secondary data set contains data on the sequence of activities in solving an enterprise system problem, from the problems’ origin, to its categorization and assignment, and to the final resolution of the problem. Additionally, we also conducted three interviews with the support center manager and specialists in December 2007 for additional insights about the post-implementation support context. We conducted semi-structured interviews with the support center manager and two support specialists and asked them open-ended questions about their experience with post-implementation support, including the types of problems encountered by organizational end-users, support staff’s resolution strategies, and knowledge transfer challenges with regard to the new enterprise system. Each interview lasted forty-five to seventy-five minutes. Insights from the interviews are used to supplement our data analysis.

4.2 Data coding and analysis

We manually coded the texts on problem description and resolution strategies to extract information on knowledge types and transfer activities. To code the tickets, both authors determined the coding schemes together, performed a trial coding on 100 records, and discussed the coding results. Based on the coding scheme, both authors coded independently the remaining 591 problem records for our data analysis. We first used 30 records to do the coder training and after the training, the inter-rater reliability measured by Cohen’s Kappa index [18] has increased to 0.88 and reached the agreement at 93% of the 100 records. This suggests an acceptable level of agreement between the two coders [23]. When a coding discrepancy exists, the two coders discussed the coding and resolved the discrepancies together.

As reflected in Table 1, the types of knowledge transfer activities significantly differ between works tasks of the two procurement stages: informational activities slightly dominated the Create stage while diagnosing activities significantly dominated the Approve/Confirm stage. We present our findings by the two types of knowledge transfer activities in the following section.

<table>
<thead>
<tr>
<th>Knowledge Transfer Activity</th>
<th>Procurement Stage</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Freq. (n=591)</td>
</tr>
<tr>
<td>Informational</td>
<td>243 (41%)</td>
</tr>
<tr>
<td>Diagnosing</td>
<td>348 (59%)</td>
</tr>
<tr>
<td>Total</td>
<td>591 (100%)</td>
</tr>
</tbody>
</table>

Note: χ² test for difference has a p-value<0.001

5. Results

IS support professionals were found to engage in two major types of knowledge transfer activities---informational and diagnosing services---which were performed to meet different types of knowledge requests by the SRM users. An informational service was performed when IS support personnel simply provided the information and knowledge requested by end-users. By contrast, diagnosing services entailed the process of identifying the cause(s) to a user-reported system use problem and advising that user on how to resolve the problem.
The requested knowledge can be categorized into three dimensions (process, data and workflow) and in two domains (technology vs. business). Process knowledge refers to knowledge on procedures to achieve task goals and addressing questions like “How do I...?” [7]. This category of knowledge is similar to procedural knowledge, “Know-How” about a technical function or a business process. An example of process knowledge is knowledge on how to “fill out the New Vendor form and submit it to Accounts Payable (AP).” Data knowledge refers to specific factual information about input and output of the SRM system, such as the quantity entered for a purchase order or a vendor code. It is similar to information to address questions about “where/when/what is...” [7]. Lastly, the workflow knowledge refers to knowledge about the integration of data and processes, such as the causes of data discrepancy between two system outputs (purchase order vs. invoice). In performing diagnosing service, the workflow knowledge is similar to “knowledge of problem details” specific to the actual problem encountered [24].

Finally, our data analysis revealed three different roles played by IS support personnel, including “technical expert,” “business analyst,” and “boundary spanner.” Support personnel played the role of “technical expert” when providing knowledge about process and data embedded in the technology, and played the role of “business analyst” when offering insights into the business process and data in the organization. Meanwhile, when requested knowledge involved workflows enforced in either technology or in the organizational context, IS professionals were more likely to play a “boundary spanner” role, relating users from one unit to another, or passing good practices of a business unit to end-users of other units. These main themes on the complexity and dynamics of knowledge transfer in the procurement system support context are illustrated with supporting evidence.

5.1 Informational service: The Create stage and technical application knowledge

During the post-adoptive use of the installed SRM system, employees sought help from IS support personnel at the Support Center. Each service encounter between those end-users and IS professionals thus represents an episode of knowledge transfer activity in the IS support context. One common activity is informational service provided by the support personnel. During the early stage of a procurement process (e.g., create a Shopping Cart), users’ knowledge requests were informational and were on the SRM technical functions. The knowledge requests were dominated by “What is” or “How to” questions, such as “What is the purchase order (PO) number?” or “how to change the shipping addresses on a shopping cart?” When the Support Center received those information requests, they usually sent users some guidelines or walked users through the steps on the phone.

In the knowledge transfer episode below, the user was requesting knowledge about system-generated information (e.g., PO number for a shopping cart). The IS support person not only located the correct PO number as requested, but also detailed the procedure (how to locate a PO number) for the user’s future reference.

Request: “Customer needs the PO# for shopping cart. Shopping# 1xxxxx”.
Response: "Researched and responded by email: The PO number for shopping cart number 1xxxx is 2xxxxx. You find this by: 1. Go to Check Status. 2. click on magnifying glass next to the item to open up the details. 3. ......” [Episode Stage1_N01]

However, there were occasions that, even after users had acquired the knowledge about technical functionalities (e.g., “How-to” knowledge), they still needed assistance with their navigations in the system. One such occasion was about ordering free software, but the SRM system required a price greater than 0.

Request: “Customer has a Question about Shopping Cart.”
Response: "She needs to order free software. She should set up a shopping cart for 1 penny with a note saying the item is actually free. I talked her through the initial setup." [Episode Stage1_N02]

Sometimes, end-users’ knowledge requests cannot be satisfied by the explanations of data or functionality in the technical system. In the context of integrated technology of SRM, users usually got confused about the shopping cart approval path, and had no knowledge about the status of their actions in the system, as shown in the following episode:

Request: “Customer wants to know if she deletes a PO, will that be deleted throughout the whole system.”
Response: "Educated or trained the customer as to the correct procedure. Told her to cancel her goods receipt and ask purchasing to change the PO." [Episode Stage1_N03]

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In this episode above, the support person provided the knowledge on the PO deletion workflow embedded in the SRM, including the steps to cancel goods of receipt and to contact Purchasing unit to change the PO. This PO deletion path may be different from what the user expected. The information and knowledge provided by the IS personnel confirmed the workflow embedded in SRM. Moreover, the IS personnel directed the user to another business unit to track and complete the workflow. In the latter circumstance, the support person played a “boundary spanner” role, connecting the user who initiated the shopping cart with the Purchasing unit. This boundary spanning role is evidenced below:

Request: “Customer has a Question about Store Room/Supplies.”
Response: “Educated or trained the customer as to the correct procedure, She needs to have the vendor added. Neither one of us can find the vendor in the (SRM) system. I asked her to complete a new vendor form and send to Shared Services (at Purchasing Unit).” [Episode Stage1_N04]

In another episode, the IS personnel diagnosed the problem and directed the user to the external vendor. Hence, the boundary spanner guided the user to contact vendor, crossing the organizational boundary.

Request: “Customer is placed an order and is receiving double order.”
Response: "Advised her that for LVPOs, a PO is faxed in. She should contact vendor." [Episode Stage1_N05]

In summary, during the initial stage of procurement, end-users’ knowledge requests focused on the new features offered in the implemented technology. In this regard, those IS support professionals were considered as the “Expert” of the SRM application, and their knowledge of the technical system, including know-what (e.g., what is the vendor ID?), know-how (e.g., how to modify a shopping cart?), and know-why (e.g., how to remove double orders?). Further, when a support person walked users step-by-step on the phone to complete a work task, such as to modify a shopping cart, the support person trained individual end-users “on-the-job” to enhance their technology usage. All of the informational services represented the knowledge transfer activities performed by IS support personnel.

5.2 Diagnosing service: The Approve/Confirm stage and business domain knowledge

Knowledge requested by users included not only knowledge about the technical application but also about the business domain in the organization. During the Approve/Confirm stage of the procurement process, IS professionals increasingly performed problem diagnosing activities and spanning practices. For example, after diagnosing problems, IS support personnel not only provided users with problem solutions but also took extra step to coordinate with other parties involved in the SRM-enabled purchasing process. In this case, IS personnel spanned both departmental and organizational boundaries (e.g., AP and vendor) on the users’ behalf, as shown in the following.

Request: “There is a PO that didn't make to the vendor.”
Response: "Researched, I couldn't find what would keep the PO from reaching vendor, contacted AP, PO had been sent to vendor. AP is sending copy of PO to customer so that customer can forward to vendor. Done." [Episode Stage2_N01]

In the SRM, one or many approvers may be assigned to approve for a particular cost center. The PO approval path is complicated by the approver rules associated with multiple authorized approvers. If many approvers, then all of them will see the shopping cart awaiting approval in their SRM inbox, but only approval is needed to process a transaction. Without knowledge of the approval rules, the user questioned why her boss did not receive a shopping cart to approve, as shown in the following:

Request: “Customer has a Question about Shopping Cart. Can't find internal order number on PO that is being brought up”
Response: "Educated or trained the customer as to the correct procedure. [I] talked a long time with Andy about doc # 19xxxxxx. Why was it approved by Cathy and not her boss Nikky? Both ladies are approvers for the shopping cart, and are connected to the order #s used in this document, but only Cathy is getting the doc to approve." [Episode Stage2_N02]

The approver “mystery” above can be explained by the approver rule of “First One Gets It”; when an approver goes in first and approves the shopping cart, the approval procedure is completed and the work item will disappear from the SRM inboxes of the other approvers. The work item will also be removed from other approvers’ inboxes, as soon as the first approver opens the shopping cart item in their SAP
inbox. That explained why one supervisor never received “the doc to approve” in the case above.

Another type of common requests during the Approval process was about returned shopping carts. One exception in the approval path is when a submitted shopping cart was modified by the approver and returned to the requisitioner.

Request: “Customer has a Shopping Cart Question about returned shopping cart.”
Response: "Walked customer through the process of going back onto the SRM shopping cart area and finding the cart. Changes had been made by the approver and were sent back to the customer to accept the changes. Customer was successful in accepting the changes, and cart processed through to creation of a Purchase Order." [Episode Stage2_N03]

As demonstrated in the episode above, knowledge of workflow embedded in both the system and in the organization was in high demand during the Approve/Confirm stage. Given the variety of ways a workflow proceeds from one process to another, IS support persons found themselves explaining different options associated with a workflow, i.e., the integration of data and processes across work units. For example, how to change vendor name on a PO was complicated because the “Undo” action was closely tied with data integration across multiple parties. The following interaction reflects the dynamics.

Request: “Customer wants to change the company name on the PO. Customer has already finished the transaction and she already has the product. PO# 2xxxxxx.”
Response: “Emailed response: Hello xxx, There is no way for you to directly change the vendor on a PO once it has been processed and delivered. Before it has been completed, an approver can change information, but not after. If the need to change the vendor is based on getting the payment to the right company, (then) contact AP to ask how to update information to have the payment paid to the right vendor. If what you need is for a vendor name or address to be updated, (then) go to (URL) http://xxx/forms.html, and click 'New Vendor' form, and check the Change box, and submit that for change. *In the meantime, you will still* want to contact AP to make sure that the payment goes to the right name and address. Please call us back if this does not give you what you need. [Episode Stage2_N04]

Because of the urgency of a user request (e.g., system use problem), e.g., a specific shopping cart being held as a result of no-vendor assignment, the support personnel researched and resolved the problem within 2 hours of receiving the problem report.

Request: “# 1xxxxxx was just created, and it's being held because of no vendor assigned.”
Response: "Shopping Cart # 1xxxxxx has been submitted. Because you requested an item that is not associated with a specific vendor, it will be researched and purchased by a purchaser at the Supply Chain Shared Services. As the cart was entered yesterday, you might want to allow a few more days before following up with the purchaser. You can always check the status of this shopping cart in the Check Status link in Go Shopping. [Episode Stage2_N05]"

In the detailed response above, the support personnel also offered additional information about whom/when to follow up next and where to check the status of the submitted shopping cart. When responding to knowledge requests on workflows, IS personnel not only provided detailed information about the procedures, but also provided a pointer of contact in other business units (e.g. Purchasing Unit). Under both cases above, the IS professionals played two roles: technical expert and boundary spanner.

When IS support persons provided knowledge about the business processes in the organization, they played the role of “business analyst” as shown in the following.

Request: “Customer has a Question about Shopping Cart. Placed an order on 4/5”
Response: "The solution was as follows for this incident: Provided customer with the telephone number to Shared Services Purchasing and advised her to have the buyer who is responsible for Office Supplies either provide her with the contact information for Office Depot or have the Buyer call Office Depot to see why several items on her order have not been shipped." [Episode Stage2_N06]

When users provided the specific information (e.g., shopping cart #) and precise error (e.g., no vendor assigned) in their requests, the specific information enabled the support personnel to speed up his researching and problem-resolving process. However, when no detailed information was provided by users, IS support personnel had to make
assumptions, negatively affecting their responsiveness to the users’ requests. Therefore, IS support persons suggested users to “leave the following (specific) information, shopping cart number, specific problem encountering, with the tier one (frontline) help desk person who answers the phone so that we can troubleshoot and give you an answer even if we don’t catch you at your phone.”

During this later stage of procurement, users’ attentions shifted to the workflows and rules about transaction approval and confirmation. The Approve/Confirm stage involved multiple sources (information, goods, money) and multiple parties (user, purchasing, and vendor). As a result, the knowledge transfer between IS professionals and end-users became complex and dynamic. IS professionals diagnosed user-reported problems with their shopping carts, and provided users with knowledge about both technical system and the business domains. IS professionals played more diagnosing and boundary spanning activities, providing “know-why” and “know-who” knowledge respectively. In this regard, those IS support professionals were considered as both “Technical Expert” and “Boundary Spanner” in the organizational post-adoptive use of the technology.

6. Discussion

In this study we sought to understand the knowledge transfer dynamics in the support service of integrated technologies. Using the post-adoptive support of SRM system, we aimed to identify the type of knowledge required in facilitating individual post-adoptive use of procurement system, and to examine how IS professionals performed knowledge transfer activities as they were addressing end-users’ knowledge requests. We analyzed more than 591 information requests by users of a large enterprise during the first 5 weeks post the system implementation. Our data analysis suggests that knowledge transfer in IS support is a multi-facet and dynamic phenomenon, reflecting the nature and stage of a work task in the procurement process. Moreover, IS professionals were playing multiple roles in this dynamic and challenging knowledge work context.

First, a variety of knowledge was flowing from IS professionals to end-users. The knowledge requested by end-users can be categorized by two domains (business and technology) and three dimensions (process, data and workflow). The variety of knowledge was applied when employees perform IT-enabled work tasks such as procurement. In the case of an informational service, IS support personnel provided users with knowledge about the technology domain, e.g., about data and process. These findings are consistent with the technical “know-what” and “know-how” knowledge proposed in prior study of IS support [25]. However, in the case of diagnosing service, knowledge of the technical system was necessary but not sufficient to meet users’ knowledge requests as those diagnosing often required IS support personnel to be familiar with workflows embedded in the SRM system, such as the workflows linking users’ business units with other entities (e.g., the Purchasing and Vendor).

Knowledge barriers in post-implementation of integrated technology such as ERP have been documented in prior studies [3, 22]. By revealing requested knowledge at different procurement stage, our study suggests that managing the knowledge barriers in technology use should consider the levels of workflows and features rather than the level of whole system.

Third, our data analysis revealed the multiple roles that IS professionals played in supporting organizational use of the implemented technologies. When they informed and educated users on a technical feature, they wore the hat of “technical experts.” This supported the notion of technical knowledge flowing from IS professionals to end users [25]. Further, our finding provided evidence to demonstrate the boundary spanning practice by IS professionals when they related users to the purchasing unit and to external vendors. This boundary-spanning practice is consistent with Levinia and Vaast’s [16] definition of “relating practices in one field to practices in another by negotiating the meaning and terms of the relationship” [16, p. 339]. In addition, the spanner role also supports Wenger’s [27] notion that a third-party is situated between two communities and engaged in coordination activities; such a third-party (referred to as a broker) “provide connections between communities of practice” [27, p. 109]. In our study, the IS professionals, who supported and maintained the implemented enterprise technology, shared one group’s use practices with other groups in performing their work tasks. As demonstrated in the illustrative scenario of the PO processing by Lisa and John at the Introduction, the support person was able to relate John’s task and use of the SRM system to Lisa so that both of them were able to complete their tasks.

7. Contribution, limitation and future research

Our study examined the IT-enabled procurement work system and revealed the dynamic and complex knowledge requirements in accomplishing procurement tasks using supplier relationship
management (SRM) technology. In such an IT-enabled procurement system, performing efficient and effective work tasks requires not only employees’ proficiency in using SRM technology but also their knowledge about the integrative structures (e.g., workflows) enforced in SRM and embedded in the Organization. Knowledge transfer activities performed by IS professionals in the support context proved to be one valuable mechanism to help employees (end-users) achieve the learning goal [20, 25].

The study contributes to knowledge transfer literature by developing a contingency view of effective interpersonal knowledge transfer and by focusing on the interplay of two important aspects of knowledge transfer: the characteristics of knowledge (process, data, and workflow) and the corresponding knowledge transfer activities (informational vs. diagnosing). Informational activities require knowledge about the data and processes in both business domain and technical application, while diagnosing activities rely more on one’s familiarity with the integration of data and processes.

This study also makes theoretical contribution to IS post-adoptive use and support studies. As Fichman and Kemerer [9] noted, assimilation gaps exist in IS post-adoptive use, indicating knowledge barriers experienced by end-users. Nelson and colleagues [19] identify the key dimensions of the expertise required in support environment, based on the belief that supporting and maintaining a system will require different skills of an IT professional than from developing a system. Das [7] attempts to link problems with problem-solving approaches and determined which approach (move) is the most effective. Those studies focus on technical support provided by software vendors and the problem scenarios are mainly related to hardware and software malfunctions. Extending this line of research, our study suggest the knowledge competency of IS professionals in the support context is multi-facet, encompassing both business domain and technical applications. A prior study on help desk knowledge management suggests that the recipient of knowledge (end-users) are influenced by the credibility of the knowledge source (IS support personnel) in making knowledge application decision [5]. Our study further suggests that the interplay between transfer activities and the underlying dimensions of knowledge also matters in ensuring effective knowledge application. Moreover, to effectively meet knowledge requests, IS support professionals were found to adapt their roles, from technical expert to boundary spanner.

Findings of this study offer useful implications for organizations and their managers in improving their information system use and support. For example, to achieve the optimal outcome of their IT-enabled work systems, organizations should provide customized mechanisms for different stages of a work task to promote knowledge transfer. Further, to promote the learning and use of integrated technology, organizations should consider incorporating effective boundary-spanning strategies and developing IS professionals’ boundary-spanning competence, in addition to their IT skills and business domain knowledge.

We acknowledge that the organizational context in this study may limit the extent to generalize the findings. Nevertheless, our study revealed the contingency interplay between knowledge transfer activities and knowledge characteristics in IS post-adoptive support such that three adaptive roles --- technical expert, business analyst and boundary spanner --- were enacted by the knowledge source (IS support personnel) in supporting organizational use of an integrated technology. These analytically generic patterns can be applied to the post-adoptive use and support of other integrated information technologies such as CRM and ERP. Prior IS studies have highlighted the importance of interpersonal relationship [4] and business domain knowledge [10, 25] in improving IS support service. Meanwhile, service research has suggested that customers make decisions to choose a service provider, based on service response time [14] and on the adaptive behavior of service providers [11]. To this end, findings of our study suggest useful approaches for IS professionals to achieve quality customer service by responding to customers’ information needs and by adapting their roles in IS support. Future research on the performance effects of the knowledge transfer strategies will provide us further insights in promoting organizational learning [17] of integrated technologies.

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9. References


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