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More than providing 'solutions': towards an understanding of customer-oriented citizenship behaviours of IS professionals

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Abstract. *Information systems (IS) support in organizations has undergone dramatic changes over the years. IS professionals in the support function have become an important knowledge source to colleagues who seek assistance with their IS usage. Our understanding of IS professionals' customer-oriented behaviours is limited, however. Focusing on IS post-implementation support and drawing upon organizational citizenship behaviour (OCB) theory, this paper seeks to understand IS professionals' citizenship behaviours in supporting colleagues. Our analysis of 630 support tasks performed by IS professionals with regard to two systems at three periods reveals five types of customer-oriented OCB: anticipation, education, justification, personalization-technology and personalization-business. Our results also show different associations between four contextual factors of IS support (i.e. system, user, task and problem) and the OCBs. In instances of user deficiency, more personalization-business and anticipation OCBs were observed across all the four problem domains (functionality, data, workflow and role). By contrast, in instances of system deficiency, more personalization-technology OCBs were observed among the two problem domains of data and functionality. Moreover, the occurrence of OCBs revealed a temporal pattern such that personalization-business OCBs are more pronounced in early post-implementation periods whereas anticipation OCBs and personalization-technology OCBs become more dominant later. The categorization scheme of the customer-oriented OCB, the OCB dynamics and the patterns between OCB types and the contextual factors advance our understanding of the evolving and challenging work of organizational IS support. Our findings extend the OCB literature on customer orientation and enrich the limited studies on knowledge-intensive IS support work. Practical implications of the findings on IS management and policies are discussed.*

Keywords: information systems support, organizational citizenship behaviour, customer orientation, mixed-methods research

INTRODUCTION

The role of information systems (IS) professionals who implement and support IS in organizations has undergone dramatic changes over the years. IS professionals were highly valued for their technical skills in managing computer operations, programming and processing data in the 1960s and 1970s (Benbasat *et al*., 1980; Bartol & Martin, 1982). As organizations increasingly adopted complex IS to enable and facilitate a variety of business activities, their demands for IS professionals' knowledge and skills increased. For instance, Lee *et al*. (1995) found that IS personnel would be expected to acquire not just technical knowledge and skills but also skills in business operations, management and interpersonal communication to facilitate the organizational integration of IS. In addition, with the decrease in in-house IS development and the increase in off-the-shelf software adoption (Shin & Lee, 1996) and outsourcing (Lacity *et al*., 2009), IS personnel have found themselves increasingly involved in direct interactions with business functions and business users. In consequence, greater knowledge about the business domain and understanding of business users' needs are required to better integrate technical functionalities into business processes. For example, Bassellier & Benbasat (2004) found that organization-specific, interpersonal and management knowledge significantly influences the development of partnerships between IS professionals and their business clients. This shift in skill and competence requirements of IS professionals calls for new practices in managing IS professionals (Agarwal & Ferratt, 2002) and necessitates further research on the increasing interactions between IS departments and their business user units (Ward & Peppard, 1996; Peppard & Ward, 1999, 2004; Carr, 2006; Daniel *et al*., 2014).

A particular IS function that has experienced increasing IS–user interactions relates to post-implementation support of organizational IS. Much of the prior research on IS post-implementation has viewed the interactions between IS personnel and business users from a knowledge management perspective. For example, Santhanam *et al*. (2007) examined the operation of post-implementation support as a process of knowledge transfer during which IS personnel transfer their knowledge about the installed technical systems to their business colleagues. Pawlowski & Robey (2004) viewed IS personnel as knowledge brokers who bridge different business units that use the same shared technical systems by passing good IS usage practices from one business unit to another. More recently, Wagner *et al*. (2010) shifted the focus of IS implementation research by considering 'the processes of mutual adaptation of the technical and social during system implementation and maintenance of [a] large scale [enterprise system by focusing] on the turnaround process by which a troubled project at go-live becomes a working information system' (p. 276).

Research has also examined the competence and skill development of IS professionals in the support function. For example, Gray & Durcikova (2005) focused on the problem-solving aspect of IS post-implementation support and examined how technical analysts sought knowledge from knowledge repositories and found means to solve users' problems. Das (2003)

conceptualized IS support work as problem-solving tasks and established the linkage between problem-solving activities and individual productivity. Both studies implicitly suggest the 'customer side' of post-implementation support: IS personnel's problem-solving activities are affected by end-users' problem formulation (Das, 2003) or are oriented towards finding means to deal with end-users' problems (Gray & Durcikova, 2005). Notwithstanding the importance of the customer service perspective in IS support, the interactions between IS personnel and users were not investigated specifically in either of these studies.

In this paper, we view IS end-users as *business users* and IS professionals in the support function as *support personnel*. Our goal is to explore in-depth the interactions between support personnel and business users in the organizational context of post-implementation support and to examine IS personnel's behaviours towards users when performing support work. As noted earlier, IS post-implementation support often entails knowledge transfer between support personnel and business users. As such, an investigation into IS personnel's customer-oriented behaviour may be expected to offer new insights into the challenges in, and coping strategies for, dynamic knowledge transfer activities in IS post-implementation support. To achieve our goal, we draw on the literature on organizational citizenship behaviour (OCB), defined as a discretionary behaviour that promotes the effective functioning of an organization but not part of the formal job description (Organ, 1988). An example of OCB would be that one team member offers to help a newcomer learn how to perform a specific team task. Rather than considering OCBs for colleagues on the same team, we focus on IS personnel's OCBs directed to business users (customers), which we refer to as *customer-oriented OCBs*. Specifically, our research objectives are twofold: (1) to identify customer-oriented OCBs in IS post-implementation support and (2) to examine the contextual factors that are associated with customer-oriented OCBs.

We address these questions by studying the IS support department of a large healthcare enterprise that implemented two integrated systems – a human resources/payroll (HR/payroll) management system and a supplier relationship management (SRM) system – across its two major institutions: a healthcare provider and a university. Based on the analysis of a sample of 630 support service interactions (i.e. support 'tickets') extracted from the enterprise's archival ticketing database, we identified five major types of customer-oriented extra-role behaviours by IS personnel, revealing interesting patterns between the types of customer-oriented OCBs and the characteristics of IS support context (system, user, task and problem). Moreover, these patterns were found to be evolving across three periods during the first 13 months following implementation.

Theoretically, this research extends existing studies on IS professionals and IS support activities and contributes to the OCB theory, by extending citizenship behaviours to the customer service arena. By developing a categorization scheme of customer-oriented OCB types and by revealing association patterns between OCB types and contextual factors, we present a contingent and temporal view of customer-oriented OCBs. Practically, we aim to demonstrate the value of customer-oriented citizenship behaviours in the knowledge-intensive environment of IS support.

The remainder of the paper is organized as follows. We begin the theoretical foundation section that follows with a review of studies on IS post-implementation support and of the OCB literature. In the Research Methodology section, we describe our research methodology

that combines qualitative and quantitative approaches. In the sections on Citizenship Behaviours of the Information Systems Support Personnel: Findings and Organizational Citizenship Behaviours and Information Systems Support Characteristics: Quantitative Analysis and Results, we present the qualitative and quantitative analyses, respectively. The resultant findings are discussed in the Discussion section, and we conclude, in the Contributions, Implications, and Future Research Agenda section, with a discussion of our contributions, the study's limitations and directions for future research.

THEORETICAL FOUNDATIONS

Information systems professionals and support activities

Much prior research on IS professionals and their interactions with users has focused on the process of IS development in general and on user involvement in systems requirements elicitation in particular. Users were considered as important information providers, facilitating the requirements analysis and design of IS. According to prior studies on user involvement, such as those by Ives & Olson (1984) and Barki & Hartwick (1994), users could influence the IS development outcome through facilitating developers' elicitation of systems requirements and enhancing developers' knowledge about users' business domains and information needs. In this regard, it is concluded that the success of system development depends, in large part, on how well developers and users communicate and work together in IS projects. The quality of their communication becomes crucial for allowing developers to meet complete and thorough requirements (Coughlan & Macredie, 2002), especially for large complex systems (Curtis *et al*., 1988). In contrast, ineffective communications can result in inadequate requirement elicitation, leading to costly or failed system development projects (Slaughter *et al*., 1998).

Information systems personnel and users continue to interact post-implementation, however. For the new system to bring benefit to the organization, employees should continue to use the system effectively and extensively. The interactions between IS personnel and users become critical in achieving effective system use. IS *users* seek information concerning the installed technical systems from IS personnel (Pawlowski & Robey, 2004; Santhanam *et al*., 2007), especially when the IS has become an integral part of organizational work (Jasperson *et al*., 2005). IS *personnel* communicate with users to acquire business domain knowledge and collect detailed information on system usage problems. As the IS become more complex and integrated, users encounter many problems when integrating the new technology into their work routines (Boudreau & Robey, 2005; Deng & Chi, 2012). Unresolved system problems can cause user frustration and potentially limit the continued and extended use of the system (Ceaparu *et al*., 2004). When IS personnel understand and solve those IS usage problems in a timely manner, they help users to employ system features more effectively (Hsieh *et al*., 2011). However, lack of a timely response may negatively affect task performance at both the individual and organizational levels (Ceaparu *et al*., 2004; Rice & Cooper, 2010).

Compared with studies on IS–user interactions during system development, the interactions between IS personnel and users *post*-implementation are largely under-explored, with two exceptions. First, Wagner & Newell (2007) argued that user participation plays an equally

important role, if not more so, in the post-implementation period as in the earlier periods of IS development. Second, Wagner *et al*. (2010) examined the process of negotiation through which a negative release of packaged software was turned around to become a working system. These two studies examine the post-implementation stage with a focus on user experiences and perspectives. Other studies on IS post-implementation support often focus on users' frustrations with their installed IS and portray IS support personnel as sources of technical knowledge for these frustrated users. For example, Santhanam *et al*. (2007) found knowledge of technical systems flowed from IS personnel to business users. Pawlowski & Robey (2004) viewed IS personnel as the channel to facilitate the flow of good IS use practices between various business units using a shared enterprise system. Research has also highlighted IS personnel's problem-solving ability and productivity. For example, Das (2003) examined the technical support provided by software vendors and suggested that matching problem resolution strategies with the types of system usage problems resulted in timely responses to users' requests, thereby improving the productivity of support operations. Similarly, Gray & Durcikova (2005) focused on the solution-seeking behaviours of IS personnel and examined how they found remedies to users' problems. In the post-implementation stage, IS personnel's communication skills remain important, but their customer orientation behaviours become increasingly so (Carr, 2006).

Although implicitly suggesting customer-oriented behaviour in IS support, prior studies have not explicitly investigated IS–user interactions from a customer-oriented perspective. Neither have they examined the potential associations between the characteristics of IS support activities and IS personnel's customer services behaviour. Rather, research on IS post-adoptive use has tended to emphasize the consequence of IS–user interactions on overcoming users' knowledge barriers with installed IS. For example, Ceaparu *et al*. (2004) concluded that users' system usage problems, if unresolved, could result in individual productivity loss. Unresolved system usage problems may also negatively affect organizational performance (Rice & Cooper, 2010). We argue, therefore, that an in-depth study on IS–user interactions in post-implementation support may provide useful insights into this important but under-explored topic. Hence, we draw upon the literature on OCB for further insights.

Organizational citizenship behaviour and customer orientation

The notion of OCB was first introduced by Organ and colleagues (Organ, 1977; Bateman & Organ, 1983) and has been defined as 'employees' behaviors that are discretionary and not directly or explicitly recognized by the organization's reward system' (Organ, 1988). Examples of OCB include helping a new co-worker with work-related problems and being a team player. OCB has been studied extensively by management and organization scholars who link OCB with measures of organizational effectiveness, as reflected in more than 650 articles published on the topic (Podsakoff *et al*., 2009). OCBs enhance organizational and team performance when employees engage in such 'extra-role' behaviours that go beyond the job requirements specified in their employment contract (Podsakoff & Mackenzie, 1997; Nielsen *et al*., 2009). When the extra-role behaviours are extended to new co-workers, the OCBs are likely to lead to improved productivity for the work unit.

Our understanding of those behaviours that constitute citizenship behaviour has evolved over time. Early research on OCB in the 1980s used qualitative methods to identify the specific types of activities that comprised OCB. For example, Smith *et al*. (1983) identified OCB instances by asking supervisors at a manufacturing company to describe those 'helpful, but not absolutely required, job behaviors' performed by their employees. At that time, behaviours such as not taking extra breaks (Smith *et al*., 1983) or exhibiting punctuality in arriving at work (Bateman & Organ, 1983) were considered as OCBs in manufacturing contexts, characterized by fixed time and work shift schedules. Organ (1988) identified such OCB categories as altruism, courtesy, civic virtue, conscientiousness and sportsmanship. Both altruism and courtesy refer to helping behaviours directed to co-workers, whereas civic virtue refers to the recognition of one's wider responsibilities. These were subsequently empirically tested by Podsakoff *et al*. (1990) and were the most commonly adopted categorization scheme of OCB for a number of years. Later, Podsakoff *et al*. (2000) combined two OCBs – altruism and courtesy – as a helping behaviour. They also identified behaviours at the individual level, such as taking individual initiatives when engaging in a task-related behaviour. These amendments are now commonly adopted in the management and organizational studies (Podsakoff *et al*., 2009; Dekas *et al*., 2013).

However, as organizational work becomes more knowledge intensive (Newell *et al*., 2009) and employees work under flexible schedules, some citizenship behaviours that were originally identified (e.g. punctuality and not taking breaks) apply less well to the changing context of knowledge work. According to Dekas *et al*. (2013), the changing nature of knowledge work has caused changes in the nature of citizenship behaviours. Their study identified eight categories of OCB from their investigation of citizenship behaviours by knowledge workers at Google Inc. Some forms of OCB (e.g. helping behaviour, civic virtue and individual initiative) identified in the original classification were confirmed while new forms (e.g. employee sustainability, social participation and knowledge sharing) also emerged. One such new OCB in the knowledge work context is employee sustainability, which refers to 'participating in activities to maintain or improve ones' own health and well-being, or to support others' efforts to maintain their health and well-being for both self and coworkers' (Dekas *et al*., 2013, p. 228). An example would be to get co-workers up from their desks to stretch with a view to keeping fit and healthy at work.

The table in APPENDIX A summarizes the major categorization schemes of OCB drawn from the extant literature that have implications for customer-oriented OCB in an IS support environment. We propose two main categories of citizenship behaviours in relation to IS support post-implementation: helping behaviour and individual initiative. Both focus on task-related or work-related issues. First, extra-role helping behaviours, such as coming to the office on a weekend to help co-workers, improve the process of solving work-related problems encountered by users. This type of extra help would be appreciated by IS users in the post-implementation phase when users' work would otherwise be hindered by problems associated with the installed systems (Boudreau & Robey, 2005; Deng & Chi, 2012). Second, employees' individual initiative of taking on extra responsibilities will not necessarily be recognized and rewarded (e.g. acting as the point of contact for a group or in relation to a product). In post-implementation support, such additional roles include acting as a bridge between users from different work units by sharing good practices associated with technology use (Pawlowski & Robey, 2004; Santhanam *et al*., 2007).

As the types of activities that constitute OCB are updated to reflect the changing nature of work, it is important to understand the activities that constitute OCB in terms of customer service – in this instance, in post-implementation support for organizational IS. Podsakoff & Mackenzie (1997) considered customer-focused OCBs as employee extra-role behaviours (i.e. those beyond their job specification) in serving customers' interests and needs. Similarly, marketing researchers, for example, Brown *et al*. (2002, p. 111), have emphasized customer orientation, defining the concept as 'an employee's tendency or predisposition to meet customer needs in an on-the-job context'. The two concepts share a common focus on customer service orientation. We adopt the term *customer-oriented OCB* and define it as 'employees' discretionary behaviors in serving customer interests and needs not explicitly requested'. Yet, there is a lack of OCB categorization for such knowledge-intensive customer service contexts as IS support. This may be due to the difficulty that employees and managers encounter in distinguishing in-role (expected) from extra-role (discretionary) behaviours in the service sector, given the expectation on service employees to meet customers' needs. This difficulty, as Podsakoff *et al*. (2000) have acknowledged, necessitates further theoretical development of the OCB construct in customer orientation.

In summary, we argue that the conceptualization of OCBs provides insights into understanding the extra-role helping behaviours of IS professionals as customer service providers. A citizenship behaviour perspective facilitates our understanding of IS support activities by allowing us to unpack customer service provided to users in greater detail. Given that the conceptualization of the construct needs further development, we view IS support personnel as customer service providers and seek to identify the dimensions of customer-oriented OCBs in the IS support service context.

RESEARCH METHODOLOGY

Mixed methods

Research that aims to improve understanding of organizational problems and their causes (e.g. critical realism) often requires a variety of methods (Mingers *et al*., 2013). Following Mingers (2001) and Mingers *et al*. (2013), we adopt a mixed-methods approach in our attempt to better understand issues confronting IS support personnel in the post-implementation context. Specifically, we combine qualitative and quantitative analyses. The qualitative and quantitative methods complement each other and potentially provide a richer exploration of the linkages across variables (Mingers, 2001). The qualitative analysis allows us to develop a classification of the customer-oriented OCB construct, and the quantitative analysis offers insights into the evolution of OCB occurrences over time and demonstrates the linkages between the revealed types of OCBs and the factors influencing each OCB type. Although such a mixed-method study may be desirable in this regard, Mingers (2001) notes that such work is relatively scarce in the IS field. Nevertheless, there are exceptions, such as work by Bhattacherjee & Premkumar (2004) on changes in users' beliefs about usefulness and attitudes towards IS use and by Piccoli & Ives (2003) on the role of behavioural control on trust decline in virtual teams. Similarly, Newell & Edelman (2008) used both quantitative (survey) and qualitative (interview)

methods when investigating effective mechanisms in cross-project learning. Incorporating two methods into a single study increases the robustness of the results and allows researchers to obtain a wider range of participant perspectives.

In conducting this mixed-methods research, we followed the four general guidelines proposed by Venkatesh *et al*. (2013, p. 21) in considering and discussing (1) the appropriateness of mixed-methods research, (2) strategy for mixed-methods research design, (3) strategy for analysing mixed-methods data, and (4) meta-inferences from mixed-methods results. We summarize how the guidelines were followed and how the evaluation criteria were met in our study in Table 1.

Research context

The study was conducted in the IS support organization of a large healthcare enterprise located in a metropolitan area in the north-east of the USA. The enterprise and its affiliates are the largest employers and major purchasers of goods and services in this particular metropolitan area. In the 2010 fiscal year, the number of full-time employees reached 37 510, and total revenue reached $7.62bn, of which patient care and clinical services accounted for $3.63bn (49%) of total revenue, grants and contracts accounted for $2.39bn (31%), and tuition and fees accounted for $411m (5%). The enterprise comprises a health service institution (hospital) and an academic institution (university). The hospital is a major academic medical centre in the USA. Founded in 1889, the hospital has been ranked as one of 'America's Best Hospitals' for 15 consecutive years since 1990 by the *US News & World Report*. Meanwhile, the university is a leading research institution, receiving more than $1.2bn federal research grants each year.

In January 2007, the healthcare enterprise implemented two modules of the packaged enterprise system (SAP/R3) – an HR/payroll management system and an SRM system –across the hospital and the university to replace the existing stand-alone HR/payroll processing and purchasing systems. The two new systems were fully integrated with other technical applications, such as the business warehousing (BW), a business intelligence application and the grants management system. The enterprise expected their physicians, faculty members and staff to use the SRM system for all purchasing requests, which were frequently charged to their research grant accounts, in a paperless internal approval and verification process. However, faculty and staff did not fully embrace the new systems following the implementation. According to a user satisfaction survey conducted in June 2007, the faculty and staff found the system challenging and difficult to use. Their dissatisfaction arose in part from inadequate training and system 'glitches'. Echoing their anxiety and unhappiness, the director of the implementation project indicated that the most important challenge facing the IS support organization was to stabilize the end-user experience and to make users feel that they had returned to 'business as usual'. The support organization provided centralized technical support services to 11 000 employees who actively used the two new systems. For the operation of the support organization, the big challenge in April 2007 became, 'how we prioritize the literally hundreds of requests that we get from the user community. It's a monumental task to prioritize and then deliver on all the requests'.

Employees of the healthcare enterprise began utilizing the new systems in April 2007, after an initial period of training from January to March 2007. Our study focused on this initial training

Table 1. Application of the mixed-methods research guidelines proposed by Venkatesh *et al*. (2013)

Guideline	Evaluation criteria	Considerations for and application in this study
1. Decide on the appropriateness of a mixed-methods approach	Understand the core objective of a research inquiry to assess whether mixed-methods research is appropriate for an inquiry	A mixed-methods approach is appropriate for our research into customer-oriented citizenship behaviour in the IS support context in two aspects: (1) there is no conclusive evidence regarding the presence of customer-oriented OCB and on its positive impact on employee performance in a customer service setting; (2) the context for our research inquiry – the customer service context of IS post-implementation support – is significantly different from the team and group work contexts in which the theoretical perspective of OCB was initially developed. As such, our study satisfies two of the purposes for undertaking mixed-methods research: completeness and expansion. Specifically, the study aims to provide a more complete picture of the customer-oriented OCB in the context of Enterprise Resource Planning (ERP) post-implementation support.
2. Develop a strategy for mixed-methods research design	Evaluate the appropriateness of a mixed-methods research design from two perspectives: research objective and theoretical contributions	We adopted a concurrent design to undertake the research, collecting qualitative and quantitative data simultaneously. Data collection over the same period allowed us to uncover those influencing factors in the context when a certain type of behaviour was enacted. Qualitative data analysis allowed us to develop a classification of customer-oriented OCB, and quantitative data analysis enabled us to gain additional insights into the contextual factors that are associated with the enactment of the behaviours.
3. Develop a strategy for analysing mixed-methods data	Apply the same standards for rigour as would typically be applied in evaluating the quality of analysis in quantitative and qualitative studies singularly	We followed generally accepted qualitative and quantitative validation principles. In terms of qualitative data analysis, we provided rich and immersive descriptions of our data collection and analysis and detailed our steps in data coding by providing coding examples, defining coding schemes, reporting the inter-coder reliability score and illustrating how any disagreements between two coders were resolved (Research Methodology section). In terms of the data analysis, we analysed the quantitative data by using multivariate analysis of covariance and reported the relevant statistics in the section on Organizational Citizenship Behaviours and Information Systems Support Characteristics: Quantitative Analysis and Results.
4. Draw meta-inferences from the results arising from the mixed-methods analysis	Evaluation of meta-inferences should be carried out from the perspective of the research objective and theoretical contributions to ensure that the authors draw and report on appropriate meta-inferences	The results section (Discussion section) provides a substantial discussion of meta-inferences by triangulating quantitative and qualitative results. In particular, in the section on The Interplay between Customer-oriented Organizational Citizenship Behaviours and Characteristics of Information Systems Support, we discuss the revealed patterns between types of OCB and IS use contexts (user, data, problem and task), thereby enhancing our understanding of the

(Continues)

Table 1. (Continued)

Guideline	Evaluation criteria	Considerations for and application in this study
		dynamic phenomenon of customer-oriented citizenship behaviour in the IS post-implementation support context.

process and the first 13-month usage period (April 2007–April 2008), following the implementation. Employees (users) contacted the support centre for assistance to request system-related information and/or when they experienced problems with the systems. The majority of user requests were called in, whereas about 25–30% of the requests were submitted via email. Both email and phone requests were logged in the support centre's ticket tracking database with details of the user contact information, support request details, the assignment of IS personnel, and the support services provided.

The support centre management emphasized IS personnel's efficiency and monitored their performance in addressing user requests. Similar to the common measures used by call centres and help desks (Czegel, 1988; Rafaeli *et al*., 2002; Kumar & Telang, 2012), the support operation manager routinely calculated the total number of tickets 'closed' by a support person in a week, and the ratio between closed and open tickets. The manager also emphasized the quality of services provided. For instance, she explained (in December 2007), 'When users call about SAP, they like to talk to someone with some knowledge about business applications. They look for answers from the respondents when they call'. However, given the support centre's heavy workload and the lack of readily available data, she admitted that it was difficult, if not impossible, to measure the quality of each IS person–user service interaction.

Despite this viewpoint, descriptive texts of the IS–user interactions were available in the ticketing database records, which provided us with a means to investigate the IS personnel's customer-oriented behaviours in a reasonable depth. The concurrent implementation of the two systems – HR/payroll and SRM – allowed us to compare and contrast the support provided by the IS personnel in relation to each system. The two systems differed in the extent to which they involved complex business rules and engaged multiple parties in completing a business task. Whereas the HR/payroll system was internally focused and more data driven, the SRM system involved external vendors and the delivery of physical goods.

As may be inferred from the earlier discussion, it seemed likely that the different systems and different users might require different levels and types of assistance, making it a suitable context for us to compare and contrast the customer-oriented citizenship behaviours by the IS support staff in relation to each.

Data collection

We examined the IS support activities during the 13 months after the implementation. This 1-year period offered learning opportunities for organizational users to adapt to the installed IS (Tyre & Orlikowski, 1994). In particular, we studied the interactions between business users and IS

personnel in three post-implementation periods – April 2007 (at implementation), October 2007 (6 months later), and April 2008 (1 year later) – by randomly sampling 630 ticket records (about 20% of all the 3150 tickets) regarding the two systems from the support centre's ticketing database. The tickets from these three periods allowed us to examine whether the customer-oriented OCBs varied over time during the first post-implementation year. According to the support centre manager, this random sample was representative of typical problems and causes in post-implementation. Each ticket record provided data on a customer's request(s), including its domain (i.e. the system and its sub-modules) and service provider (i.e. the IS support person assigned to work on the problem), and detailed response(s)/resolution(s).

In addition, we conducted a total of five interviews with the support centre manager and support personnel in December 2007 and March 2008. Our main objective in conducting the interviews was to understand the IS support environment in the post-implementation phase and IS support persons' perceptions of customer orientation towards their business colleagues. This enabled comparisons with our interpretations of customer-oriented OCBs, as identified from the archival ticket records. The interview with the support centre manager facilitated our understanding of the support centre operation, including the common types of user requests and the evolution of system use problems. It also enabled the identification of those support personnel who specialized in supporting each of the systems and who interacted with users on the daily basis. Because of work pressures of support centre staff in December 2007, the support centre manager recommended a support lead from each team (SRM and HR/payroll) for our on-site interviews. Both support specialists had expertise in supporting one of the systems (SRM or HR/payroll) and serving as the main contact person for each user group (the hospital and the university), which was important and sufficient for our research objective. Three interviews were conducted in December 2007, with each interview lasting 60–75 min. The first author conducted the interviews and asked the support staff open-ended questions about their support experience, including the types of problems reported by users, the resolution strategies adopted by IS personnel, and challenges arising in helping users learn about the new systems. The interviewees' responses were transcribed verbatim on the same day after the interviews. Interviewees reviewed these transcriptions for accuracy. On the second site visit in March 2008, two 40-min interviews were conducted with a different support specialist from each team (SRM and HR/payroll) for additional insights. The table in APPENDIX B summarizes the five interviews. Although limited in number, these interviews provided context and further insight.

Data coding

Before identifying OCBs, it is necessary to understand expected in-role behaviours in the customer support context. Prior research in relation to call centres is instructive. The main job responsibilities in call centres include responding to customer inquiries, providing customers with product and service information, handling and resolving customer complaints, and researching required information using available resources (Czegel, 1988; Das, 2003). Call centre employees are evaluated by a number of generic measures, including overall volume of calls handled, percentage of calls abandoned and average call duration time (CallCenterHelper,

2012). All of these performance measures focus on the efficiency of customer interactions (e.g. the total count of calls and response times).

For extra-role behaviours in this context, we focused on the effectiveness of customer service interactions. In line with Rafaeli *et al*. (2002), we defined instances of customer-oriented OCBs as 'instances of services during which support persons offered customers assistance that was not explicitly requested by them, but that could promote effective customer service'. To identify instances of OCBs, we carefully reviewed the 630 ticket records by focusing on support persons' written descriptions of their activities in solving user-reported problems. Given that the primary task of the IS support function was to assist users with their system usage, we did not consider responding to users' explicit requests and resolving user-reported problems as customer-oriented OCBs. By contrast, an OCB instance was evidenced if an IS person's helping behaviour exceeded the specific request made by a user. To identify the OCB instances, we followed the definition by Podsakoff *et al*. (2000) that an OCB behaviour is (1) *not* an explicit part of job description, (2) *not* something the IS workers were trained by the organization to do, and (3) *not* a behaviour that was formally and explicitly rewarded when exhibited or punished when not. From those identified OCB instances, we then classified the types of customer-oriented OCBs. We first adopted the categorization scheme proposed by Rafaeli *et al*. (2002): anticipation, explanation, education, emotional support and personalized information. Moreover, we developed three new categories – justification, personalization-business and personalization-technology – from the insights gained from our interviews.

We adopted the coding strategy proposed by Miles & Huberman (1994). Two researchers determined the coding scheme together and performed a pilot coding on 40 support tickets (20 on the HR/payroll system and 20 on the SRM system). The two then discussed the pilot coding results and refined the coding scheme. The coding scheme for the OCB categories is provided in APPENDIX C, together with examples. On the basis of the refined coding scheme, the authors independently coded the remaining 590 records. After coding a total of 630 records (40 in the pilot coding and 590 remaining records), we found 593 ticket records with complete information for our data analysis.[1] We identified 181 instances of OCBs from the 593 support tickets. The inter-rater reliabilities of coding the presence/absence of OCB and different categories of OCB are high, with Cohen's kappa indexes of 1.00 and 0.96, respectively. This suggests an acceptable level of agreement between the two coders (Ryan & Bernard, 2000). When a coding discrepancy became evident, the two researchers discussed their coding and resolved the discrepancies. When the two coders were uncertain about a coded type of OCB, they consulted with the support centre manager for insights. APPENDIX D provides examples of where discrepancies occurred and how the discrepancies were resolved.

In addition to the OCB types, we reviewed studies on system usage problems and compiled a list of user request categories, including types of support requests (denoted as *TASK*) and

[1]Thirty-seven records missed information in one of the coded variables and thus were excluded from further data analysis. As a result, 593 records (out of 630) provided sufficient information for coding purposes and were reported in our data analysis.

problem domain (denoted as *PROBLEM*). In IS support, there are three kinds of support requests, including 'know-what', 'know-how' and 'know-why' (Carud, 1997). Accordingly, we coded IS support tasks in two categories: informational task (*TASK* = 1) associated with support requests of know-what and diagnostic task (*TASK* = 0) associated with know-how and know-why requests. Similarly, we adopted the four categories of Enterprise Resource Planning (ERP)–organization misalignment in ERP implementation (Strong & Volkoff, 2010) and coded the IS usage problems in the four problem domains: control related (*PROBLEM* = 1), data related (*PROBLEM* = 2), function related (*PROBLEM* = 3), and role related (*PROBLEM* = 4). For example, 'Error in Document xxx Period 007 Not Open for Posting' was categorized as a functionality issue and was coded as 3 for the problem domain. However, when a user made the inquiry, 'What happens to the paid hours when the retroactive reassignment is processed? The business owner xxx needs to follow procedures for retro processing…', we classified it as a control-related problem (*PROBLEM* = 1) as the user request is related to the processing of work hours. We also considered the causes of the problems and categorized the causes as user deficiency (*CAUSE* = 1), system deficiency (*CAUSE* = 2), or system imposition (*CAUSE* = 3). User deficiency refers to users' lack of knowledge or human errors in utilizing the systems. System deficiency refers to system malfunction, configuration errors or missing functionalities. System imposition refers to new functionalities and business rules introduced by the new systems and imposed on the organization's business processes and data management. For example, when problem cause was 'the interface with another existing system (e.g. HRSS [Human Resource Shared Service]) which would run normally if not integrated with the SAP', the problem was due to system imposition. Last, we recorded information about systems and users. That is, *SYSTEM* equals 1 for the HR/payroll system and 0 for the SRM system. *USER* equals 1 for the university and 0 for the hospital. Cohen's kappa indexes for the coding of problems and tasks were 0.78 and 0.94 respectively, denoting acceptable inter-rater reliability.

CITIZENSHIP BEHAVIOURS OF THE INFORMATION SYSTEMS SUPPORT PERSONNEL: FINDINGS

The changing context of IS post-implementation support and the tighter integration between technical systems and business processes require an in-depth investigation into the work practices[2] of IS professionals in the support function. In this study, we attempted to understand the customer service aspect of IS professionals' work practices in supporting organizational use of installed new systems. In the following sections, we examine in detail what constituted extra-role behaviours in the IS support context and how the behaviours varied. Our analysis of the qualitative data revealed five different types of OCBs, namely *education*, *anticipation*, *justification*, *personalization-business* and *personalization-technology*. We organized and integrated our findings around the five types of customer-oriented OCBs, as outlined in Table 2.

[2]An increased interest into actual IS practices is demonstrated by the March 2014 special issue of *The Journal of Strategic Information Systems* (Peppard *et al*., 2014).

Table 2. Customer-oriented citizenship behaviours in IS support environment

Customer-oriented OCB	Activities that constitute the OCB	Domain of IS support	Reason for IS support	Consequence of OCB on the users
(1) Education OCB	IS personnel provide a user with hands-on training of technical features associated with the reported problems. IS personnel take initiatives to ensure that users correctly employed the technical features.	Technical function (e.g. 'how to process a purchase order?')	Users' lack of knowledge (user deficiency)	Users achieved learning about technical features and related workflow.
(2) Anticipation OCB	IS personnel offer additional information on the consequence of an action in the system, which could be anticipated as being helpful to the user during a later time.	Workflow (e.g. 'how payment rate update triggers retro-processing in payroll?')	Users' lack of knowledge (user deficiency)	Users overcame the 'legacy thinking' and understood the process-oriented structure of the integrative system.
(3) Justification OCB	IS personnel offer explanations and additional information on the cause of the problem or on the status of the problem resolution.	Technical function (e.g. 'why do I receive the recurring error message?') Workflow (e.g. 'why was the overstatement of an employee's vacation leave and sick leave balance not corrected?')	Technical malfunctions (system deficiency)	IS personnel communicated the process of how the user request is being addressed 'behind the scene' with users.
(4) Personalization-business OCB	IS personnel provide personalized information and solutions tailored to users' business processes and data	Data (e.g. 'what specific G/L account number is appropriate for the billing?') Workflow (e.g. 'why is there a data discrepancy between the SAP/R3 system and the BW reporting?')	Users' lack of knowledge (user deficiency)	Users acquired knowledge about the process and data specific to users' work tasks.
(5) Personalization-technology OCB	IS personnel develop workaround solutions tailored to the technical features that users employed.	Technical function (e.g. 'How to generate two different checks as a result of two different deductions on the same truncation?')	Technical malfunctions (system deficiency)	Users applied temporary fixes to the reported problems to complete users' work tasks.

Education organizational citizenship behaviour

During the early stage of post-implementation use of the integrated system, users encountered knowledge barriers in their employment of new technical features. System use was restricted by users' limited knowledge of the new systems and processes (Boudreau & Robey, 2005; Deng & Chi, 2012). Often, a support person would walk a user through each step in completing a business task enabled by the system and would take the initiative to ensure that the user could perform the task without error. Here, we see the IS support person demonstrating an education-focused, extra-role behaviour by providing hands-on training in relation to the system's technical features and extra attention to the user, as illustrated by the following:

> User Request Customer has a question about Online Payment Request [that was] Not in list of charts.
> Support Response (Customer) got message that G/L [general ledger] account not good. We [the support person and the user] checked G/L and it was good. *Then* we checked the vendor number, and it was a 4xxx number. We found a 2xxx number. That did it. I [then] walked her through saving as complete. Her system lost the doc, so we did it a *second* time. Workflow didn't display properly. She didn't know her approvers. We located her approvers and fixed the workflow display. [It] was a 1 hour phone call.
> [SRM, April 2007]

In the preceding example, the service request, which would normally take 15 min to complete, lasted for 1 h. Informing and educating users with regard to their technology use were listed in the formal job responsibilities of IS support personnel. However, when they not only trained users about the correct procedure in employing the SRM system but also took extra time and effort to ensure that users correctly employed the technical features to perform a business task (e.g. a payment request) without error, an education OCB became manifest.

It is not surprising that an education OCB often occurred when the system use problem was due to users' lack of knowledge about technical functionalities. For example, when checking the purchase order (PO) approval in the SRM, users reported one common problem with handling returned shopping carts. The following episode reflects an education OCB:

> User Request Customer has a Shopping Cart Question about returned shopping cart
> Support Response [I] Walked customer through the process of going back onto the SRM shopping cart area and finding the cart. [Then we found that] Changes had been made by the approver and were sent back to the customer to accept the changes. [I also made sure that] Customer was successful in accepting the changes, and cart processed through to creation of a Purchase Order.
> [SRM, April 2007]

In the preceding instance, the support person identified the cause to the problem (i.e. the submitted shopping cart was modified by the approver and returned to the original requester) and explained to the user what to do. He further ensured that the user was able to accept the

change successfully. This extra-role behaviour enabled the user to learn about the workflows enforced in, and the actions required by, the technical system.

The ability to effectively extend the educational, extra-role behaviours depended on the IS support personnel's ability to understand users' problems at the time and on the user's understanding of the workings of the systems. Sometimes the technical functionality associated with a problem was clear, as in the case of the returned shopping cart, so that the IS person was able to provide the user with additional knowledge related to that functionality. In other cases, problem causes were ambiguous, such as the error message on the G/L account. In that case, the IS person walked the user through all the related technical functions, from verifying vendor number, to locating approvers and fixing the workflow display. The IS person's comprehensive knowledge about the system and his ability to decompose the problem step by step allowed him to perform the education OCB effectively.

Anticipation organizational citizenship behaviour

During the early stages of post-implementation use, it is equally difficult, if not more so, for users to see beyond their current business practices and to anticipate the consequences of their IT-enabled actions. When an IS person offers additional information to a user with regard to the next step of the user's current action in the system, an anticipation OCB is demonstrated. This category of OCB – anticipating customer requests – involves providing customers with information not explicitly request but directly related to the reported problems. The following interaction reflects the anticipation OCB:

> User Request To update FWS [Federal Work Study] table with corrected percentages.
> Support Response FWS percentage changes [have been] moved to production. List of 32 personnel numbers [for 32 employees] affected [have been] sent to payroll for retro processing.
> [HR/payroll, April 2007]

In the earlier case, the user did not enquire about the number of employees being impacted as a result of a payment rate update. However, the support person provided the user with the information as a consequence of the 'update' in the system and assured the user that the retroactive processing of those employees' payroll had been performed. Both pieces of additional information could be anticipated as being helpful to the user later. The occurrence of the anticipation OCB instance was associated with problems related to the workflow, with which users may not be familiar.

Sometimes, instead of informing the users what to do next in the system, a support person would take the initiative to perform the anticipated action in the system on the user's behalf, as shown in the following record:

> User Request A question concerning the processing of a travel request.
> Support Response The user [xxx xxx] had not submitted the trip into workflow – I arranged for it to be launched (I launched it myself!).
> [SRM, April 2007]

In an organization where IS has become an integral part of employees' work, employees rely on the installed system to complete their work tasks. Challenges arise when employees are pre-occupied with 'legacy thinking', as Wagner & Newell (2007) put it, expecting technical functions similar to those in their previous system and focusing on specific activities within their business units. Yet, employees' effective use of such integrative systems as enterprise systems depends on their understanding of the inter-relations between data and processes in the technical systems as well as across business units. In this case, the anticipation OCB not only enables users to overcome hurdles when completing their IT-enabled work but also provides them with knowledge about the system and business processes in a proactive way.

Justification organizational citizenship behaviour

A justification OCB refers to the offering of additional information regarding the causes of a reported problem and the status of the related problem resolution. This category of OCB was demonstrated especially when a user's request(s) could not be fulfilled immediately, but when the user was demanding an explanation. For example, when a user of the SRM system made the complaint, 'Error message keeping me from getting through the system', the support person offered a justification on the problem resolution status, as follows:

> Support Response [I] Reviewed the user's screen shot. [I] Told her this was only a warning message. She complained about getting this message whenever she does anything, and that it is a 'Production killer'. I told her that a fix is in the works, but she just needed to click her 'Enter' key to go past the message.
> [SRM, April 2007]

In addition to the cases of a recurring technical error message, justification OCBs were also observed when the system use problem was related to the workflows enforced in the new system. For example, a payroll employee questioned why the overstatement of vacation hours and sick leave balance for a union employee had not been resolved in the HR/payroll system. The extra-role behaviour of justification was evidenced in the following record:

> User Request Vacation hours and sick [leave] balances are incorrect on Union employee 4xxxx.
> Support Response For personnel # 4xxxx, the record of vacation was locked by me and when TE runs it will fix her overstated balance. The [vacation] maximum issue is global for the xxx group and not individual. I am in the process of working this issue.
> [HR/payroll, April 2007]

In response to the user's request, the support person could simply indicate that he or she was working on the issue and could provide an estimated time frame as to the completion of the update; he or she was not required to offer details of problem causes and/or the resolution process. Yet, the support person offered a justification as to how the overstatement issue could affect the entire business group. This was performed by illustrating the interdependence of data (e.g. vacation hours) and processes (updating the data on vacation hours) embedded in the system and by suggesting that correcting an individual data item (e.g. overstatement of

vacation hours for a union employee) required updating the data for the entire group of users. By detailing the problem resolution process, the IS person helped the user understand how his or her request was being addressed 'behind the scenes'. As a result of this justification OCB, the support person not only provided the user with know-how but also know-why knowledge (Santhanam *et al*., 2007) about the technical features in the HR/payroll system.

Personalization organizational citizenship behaviour

The fourth and fifth categories of OCB refer to providing personalized information and solutions tailored to users' business domains or to technical features. We refer to the behaviours customized to users' business process and data as a *personalization-business* OCB and the customized solutions concerning technical functionality (e.g. workaround solutions) as a *personalization-technology* OCB. To perform the personalized behaviours, a support person relies on specific details contained in the support ticket.

In one example, a user made an inquiry about the status of a grant payment request in the SRM system. In this instance, the support person took the initiative to contact another group to obtain more details specific to that grant account and offered personalized information about the account billing. The personalization OCB is evident in the following record:

> User Request Payment with Hospital Grant for Online Payment Request.
> Support Response [I] Talked to Finance source in the Help Desk area. Any G/L [general ledger] acct. # beginning with a 3, as Mary's is, is an equity account, and should not be used to pay bills of this sort. [I] Suggested a G/L acct. # beginning with a 6.
> [SRM, April 2007]

Sometimes, personalization-business OCBs were observed when user-reported problems were related to the workflows (control) between two technical applications. Under such circumstances, the personalized extra-role behaviour was not tailored to the business processes and/or data of the user's unit; rather, it involved processes, stakeholders and data from another business group. For example, when assisting a particular user with a data discrepancy issue between the SAP/R3 system and business intelligence application, BW, the IS support person demonstrated extra effort, as reflected in the following:

> User Request Work Authorization in SAP/R3 is different in BW
> Support Response I met with KH in the BW team to discuss Bob's concern that the data in the Work Authorization/Visa Expiration report is not what is in SAP/R3. We verified that the data [are] correct and the problem maybe understanding how/what data [are] being captured. KH has offered to do a training session for Kitty and Ed. I have forwarded Kitty and Ed an appointment (training session) for Friday 5/2 from 10–12 noon at the location xxx.
> [HR/payroll, April 2008]

In the preceding instance, the IS person not only initiated the meeting with the support specialist for the BW system but also coordinated a training session on data entry and validation on the upstream data processing for the user. This proactive behaviour connected stakeholders in

the IS support community – system specialist and end-users from different units – in problem diagnosis and resolution. Moreover, this extra-role behaviour oriented to the business processes helped to streamline data processing across business units. Imagine the workflow of the information on visa and work authorization as a river. The resultant training sessions for the two data analysts – 'upstream' of the workflow – are likely to have a positive impact on the work of the data analyst, the 'downstream' of the business process and data flow.

Information systems personnel's services were also customized to technical features. When a required technical feature was not available, IS personnel were found helping users by developing workaround solutions. As shown in the following example, users attempted to apply different deduction methods for two transactions – union dues and a political action fee – but that feature was not available in the HR/payroll system. The support person did some research and proposed the following workaround:

> User Request Need Reports and Two Union/Political Action checks.
> Support Response [I] created two BW [business warehouse] reports: (1) Union Dues (2) Political Action, and attach[ed] them to the two checks and mail[ed] with a note that in the future the deductions will be on separate checks with separate reports, as they [customers] requested.
> [HR/payroll, April 2007]

As indicated, the interactions between users and IS personnel were complicated by the complexity of the integrated IS (HR/payroll and SRM) and the dynamics in users' interactions with these systems. This complex, dynamic environment presented knowledge challenges to the IS support personnel. In this instance, the IS staff demonstrated customer-oriented extra-role behaviours that exceeded user expectations and enhanced user learning and utilization of the newly implemented IS.

Moreover, different types of OCBs may require different levels of competence from the IS staff. For example, anticipation OCBs would rely on support personnel's accumulated experiences in handling similar problems such that they could anticipate the consequence of an action in making adjustments to the system. This was evidenced in the case of updating the federal work study tables for payroll processing. In the case of a business personalization OCB, such as in helping to solve Mary's equity account problem, the support person benefited not only from a solid knowledge base concerning both business processes and technical functionalities but also from problem-solving capabilities. These findings suggest that certain problem domains appeared to be associated more closely with some types of OCBs than others. We further explored the patterns of associations between the five types of OCBs and the contextual factors of IS support work through the quantitative analyses described in the following section.

ORGANIZATIONAL CITIZENSHIP BEHAVIOURS AND INFORMATION SYSTEMS SUPPORT CHARACTERISTICS: QUANTITATIVE ANALYSIS AND RESULTS

Table 3 provides the frequency distribution of OCB instances by the three periods given system types (panel A), users (panel B), task types (panel C), problem types (panel D) and problem causes (panel E). Table 3, panel A, shows that, overall, the HR/payroll system had a greater

Table 3. Descriptive statistics of OCBs and non-OCBs

Panel A. Number of OCBs and non-OCBs by system types and periods					
		HR/payroll system (*SYSTEM* = 1)		SRM system (*SYSTEM* = 0)	
Period	Frequency	OCBs	Non-OCBs	OCBs	Non-OCBs
Period 1: 2007–2004	197 (33.2%)	40 (40.8%)	58 (59.2%)	27 (27.3%)	72 (72.7%)
Period 2: 2007–2010	191 (32.2%)	35 (34.7%)	66 (65.3%)	18 (20.0%)	72 (80.0%)
Period 3: 2008–2004	205 (34.6%)	35 (35.0%)	65 (65.0%)	26 (24.8%)	79 (75.2%)
Total	593 (100.0%)	110 (36.8%)	189 (63.2%)	71 (24.1%)	223 (75.9%)
Panel B. Number of OCBs and non-OCBs by users and periods					
		University (*USER* = 1)		Hospital (*USER* = 0)	
Period	Frequency	OCBs	Non-OCBs	OCBs	Non-OCBs
Period 1: 2007–2004	197 (33.2%)	27 (12.6%)	41 (19.1%)	40 (10.6%)	89 (23.5%)
Period 2: 2007–2010	191 (32.2%)	24 (11.2%)	45 (20.9%)	29 (7.7%)	93 (24.6%)
Period 3: 2008–2004	205 (34.6%)	25 (11.6%)	53 (24.7%)	36 (9.5%)	91 (24.1%)
Total	593 (100.0%)	76 (35.3%)	139 (64.7%)	105 (27.8%)	273 (72.2%)
Panel C. Number of OCBs and non-OCBs by task types and periods					
		Informational task (*TASK* = 1)		Diagnostic task (*TASK* = 0)	
Period	Frequency	OCBs	Non-OCBs	OCBs	Non-OCBs
Period 1: 2007–2004	197 (33.2%)	18 (6.3%)	85 (29.8%)	49 (15.9%)	45 (14.6%)
Period 2: 2007–2010	191 (32.2%)	12 (4.2%)	82 (28.8%)	41 (13.3%)	56 (18.2%)
Period 3: 2008–2004	205 (34.6%)	8 (2.8%)	80 (28.1%)	53 (17.2%)	64 (20.8%)
Total	593 (100.0%)	38 (13.3%)	247 (86.7%)	143 (46.4%)	165 (53.6%)

Panel D. Number of OCBs and non-OCBs by problem types and periods

		Control related		Data related		Function related		Role related	
Period	Frequency	OCBs	Non-OCBs	OCBs	Non-OCBs	OCBs	Non-OCBs	OCBs	Non-OCBs
Period 1: 2007–2004	197 (33.2%)	13 (8.6%)	22 (14.5%)	19 (19.8%)	26 (27.1%)	30 (11.2%)	75 (28.1%)	5 (6.4%)	7 (9.0%)
Period 2: 2007–2010	191 (32.2%)	23 (15.1%)	26 (17.1%)	6 (6.3%)	18 (18.8%)	12 (4.5%)	74 (27.7%)	12 (15.4%)	20 (25.6%)
Period 3: 2008–2004	205 (34.6%)	22 (14.5%)	46 (30.3%)	9 (9.4%)	18 (18.8%)	19 (7.1%)	57 (21.3%)	11 (14.1%)	23 (29.5%)
Total	593 (100.0%)	58 (38.2%)	94 (61.8%)	34 (35.4%)	62 (64.6%)	61 (22.8%)	206 (77.2%)	28 (36.9%)	50 (64.1%)

Panel E. Number of OCBs and non-OCBs by problem causes and periods

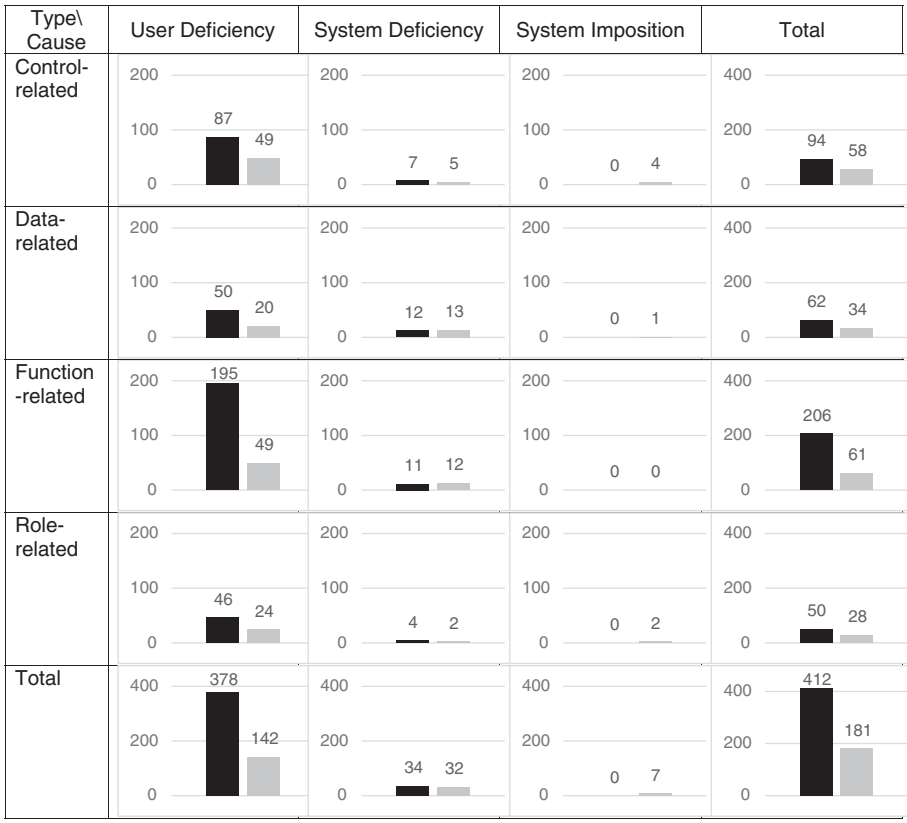
		User deficiency		System deficiency		System imposition	
Period	Frequency	OCBs	Non-OCBs	OCBs	Non-OCBs	OCBs	Non-OCBs
Period 1: 2007–2004	197 (33.2%)	53 (10.2%)	122 (23.5%)	11 (16.7%)	8 (12.1%)	3 (42.9%)	0 (0.0%)
Period 2:2007–2010	191 (32.2%)	41 (7.9%)	123 (23.7%)	11 (16.7%)	15 (22.7%)	1 (14.3%)	0 (0.0%)
Period 3: 2008–2004	205 (34.6%)	48 (9.2%)	133 (25.6%)	10 (15.2%)	11 (16.7%)	3 (42.9%)	0 (0.0%)
Total	593 (100.0%)	142 (27.3%)	378 (72.7%)	32 (48.5%)	34 (51.5%)	7 (100.0%)	0 (0.0%)

number of tickets with OCBs as compared with the SRM system (i.e. 110 vs. 71, 36.8% vs. 24.1%). It would appear therefore that there are more OCBs related to SRM system usage in the first and third periods whereas there are more OCBs related to HR/payroll system usage during initial implementation. Further, Table 3, panel B, demonstrates that the percentage of tickets from the university that have OCBs is higher (35.3%), as compared with those from the hospital (27.8%). Table 3, panel B, also indicates that the percentage of tickets that have OCBs for the university remain similar over the three periods, whereas the percentage of tickets that have OCBs for the hospital is larger in the first period. Table 3, panel C, demonstrates that there are more OCBs for diagnostic tasks as compared with information tasks (143 vs. 38 OCBs; 46.4% vs. 13.3%). For informational tasks, the number of OCBs also reduces as time passes. Table 3, panel D, shows that, overall, there are about one-third of the records with OCBs for different problem types except for function-related problems. Table 3, panel E, indicates that, when the problem cause is associated with the system itself (system deficiency or system imposition), we observe more OCBs on the basis of percentage of the observations in each group.

We use Figure 1 to demonstrate the number of OCBs by problem types and problem causes. The cell with the largest number of observations is function related and caused by users' lack of knowledge. There are 244 records (195 + 49) that are function related and caused by users' lack of knowledge regarding the function. Among the 244 records, 49 of them indicate OCBs. The second largest problem type is control related and again caused by users' lack of knowledge. We observe a total of 136 records where 49 of them demonstrate OCBs.

Table 4 provides the frequency distribution of the five categories of OCB by the characteristics of IS support: systems, users, task types, periods, problem types and problem causes. First, Table 4, panel A, suggests that there is a higher percentage of personalization-business-type OCBs but a smaller percentage of education-type OCBs for the HR/payroll system as compared with the SRM system. Similarly, the users from the university received a higher percentage of personalization-business-type OCBs but a smaller percentage of education-type OCBs, as compared with the users from the hospital (Table 4, panel B). Second, and as shown in Table 4, panel C, customer-oriented OCBs were more likely to occur when performing diagnostic tasks, as compared with informational tasks. There are more education-type OCBs for informational tasks than diagnostic tasks. Third, Table 4, panel D, shows that there are more anticipation OCBs and personalization-technology OCBs in periods 2 and 3, whereas there is a decreasing trend of justification OCBs over time. Fourth, Table 4, panel E, demonstrates that justification OCBs are more likely to occur with control-related problems, whereas education OCBs are related to function-related problems. For role-related problem types, we observed more anticipation and personalization-business OCBs. Further, there are more anticipation (42/51), education (26/27) and personalization-business OCBs (42/47) associated with the problem cause of user deficiency, as shown in Table 4, panel F.

We also use Figure 2 to show how the number of different types of OCBs is related to problem types and causes. First, there are more observations related to users' lack of knowledge (user deficiency). Second, given user deficiency, there are more personalization-business OCBs for control-related problems and more education OCBs for function-related problems.



Note: Solid black bars represent the number of non-OCB observations and gray bars represent the number of OCB observations

Figure 1. Number of OCBs based on problem types and problem causes.

To further investigate the association between the contextual factors (*SYSTEM*, *USER*, *TASK*, *PROBLEM* and *CAUSE*) and the five types of customer-oriented OCBs, we performed a multivariate analysis of covariance (MANCOVA) (Bachrach & Jex, 2000). The MANCOVA results are presented in Tables 5 and 6. Table 5 provides descriptive statistics of the contextual factors by the different types of OCB. The HR/payroll management system (*SYSTEM* = 1) is related to personalization OCBs, whereas information retrieval tasks (*TASK* = 1), as well as hospital users, are associated with the education OCB category.

Un-tabulated results show that (1) we do not violate the homogeneity assumption of covariances ($p = 0.00$); (2) Wilk's lambda is 0.733 ($p < 0.01$), which suggests that OCB categories depend on the contextual factors; and (3) the *F* statistics for *TASK*, *PROBLEM*, *SYSTEM*, *USER* and *CAUSE* are respectively 25.669 ($p < 0.01$), 2.768 ($p < 0.02$), 7.028 ($p < 0.00$), 3.474 ($p < 0.00$) and 12.253 ($p < 0.00$). These significant statistics suggest that the associations between the contextual factors and OCB categories are different.

Table 4. Descriptive statistics of OCB categories

Panel A. OCB categories by system types

	HR/payroll system (*SYSTEM* = 1)	SRM system (*SYSTEM* = 0)	Total
No OCB	189 (63.2%)	223 (75.9%)	412 (69.5%)
Anticipation	28 (9.4%)	23 (7.8%)	51 (8.6%)
Justification	19 (6.4%)	11 (3.7%)	30 (5.1%)
Education	7 (2.3%)	20 (6.8%)	27 (4.6%)
Personalize-business	34 (11.4%)	13 (4.4%)	47 (7.9%)
Personalize-technology	22 (7.4%)	4 (1.4%)	26 (4.4%)
Total	299 (100.0%)	294 (100.0%)	593 (100.0%)

Panel B. OCB categories by users

	University (*USER* = 1)	Hospital (*USER* = 0)	Total
No OCB	139 (64.7%)	273 (72.2%)	412 (69.5%)
Anticipation	23 (10.7%)	28 (7.4%)	51 (8.6%)
Justification	14 (6.5%)	16 (4.2%)	30 (5.1%)
Education	3 (1.4%)	24 (6.3%)	27 (4.6%)
Personalize-business	23 (10.7%)	24 (6.3%)	47 (7.9%)
Personalize-technology	13 (6.0%)	13 (3.4%)	26 (4.4%)
Total	215 (100.0%)	378 (100.0%)	593 (100.0%)

Panel C. OCB categories by task types

	Informational task (*TASK* = 1)	Diagnosing task (*TASK* = 0)	Total
No OCB	247 (86.7%)	165 (53.6%)	412 (69.5%)
Anticipation	12 (4.2%)	39 (12.7%)	51 (8.6%)
Justification	2 (0.7%)	28 (9.1%)	30 (5.1%)
Education	18 (6.3%)	9 (2.9%)	27 (4.6%)
Personalize-business	4 (1.4%)	43 (14.0%)	47 (7.9%)
Personalize-technology	2 (0.7%)	24 (7.8%)	26 (4.4%)
Total	285 (100.0%)	308 (100.0%)	593 (100.0%)

Panel D. OCB categories by periods

	Period 1	Period 2	Period 3	Total
No OCB	130 (66.0%)	138 (72.3%)	144 (70.2%)	412 (69.5%)
Anticipation	12 (6.1%)	20 (10.5%)	19 (9.3%)	51 (8.6%)
Justification	15 (7.6%)	10 (5.2%)	5 (2.4%)	30 (5.1%)
Education	14 (7.1%)	4 (2.1%)	9 (4.4%)	27 (4.6%)
Personalize-business	20 (10.2%)	9 (4.7%)	18 (8.8%)	47 (7.9%)
Personalize-technology	6 (3.0%)	10 (5.2%)	10 (4.9%)	26 (4.4%)
Total	197 (100.0%)	191 (100.0%)	205 (100.0%)	593 (100.0%)

Panel E. Number of observations by OCB categories and problem types

	Control related	Data related	Function related	Role related	Total
No OCB	94 (61.8%)	62 (64.6%)	206 (77.2%)	50 (64.1%)	412 (69.5%)
Anticipation	18 (11.8%)	11 (11.5%)	12 (4.5%)	10 (12.8%)	51 (8.6%)
Justification	11 (7.2%)	6 (6.3%)	10 (3.7%)	3 (3.8%)	30 (5.1%)
Education	3 (2.0%)	1 (1.0%)	20 (7.5%)	3 (3.8%)	27 (4.6%)

(Continues)

Table 4. (Continued)

Personalize-business	20 (13.2%)	10 (10.4%)	6 (2.2%)	11 (14.1%)	47 (7.9%)
Personalize-technology	6 (3.9%)	6 (6.3%)	13 (4.9%)	1 (1.3%)	26 (4.4%)
Total	152 (100.0%)	96 (100.0%)	267 (100.0%)	78 (100.0%)	593 (100.0%)

Panel F. Number of observations by OCB categories and problem causes

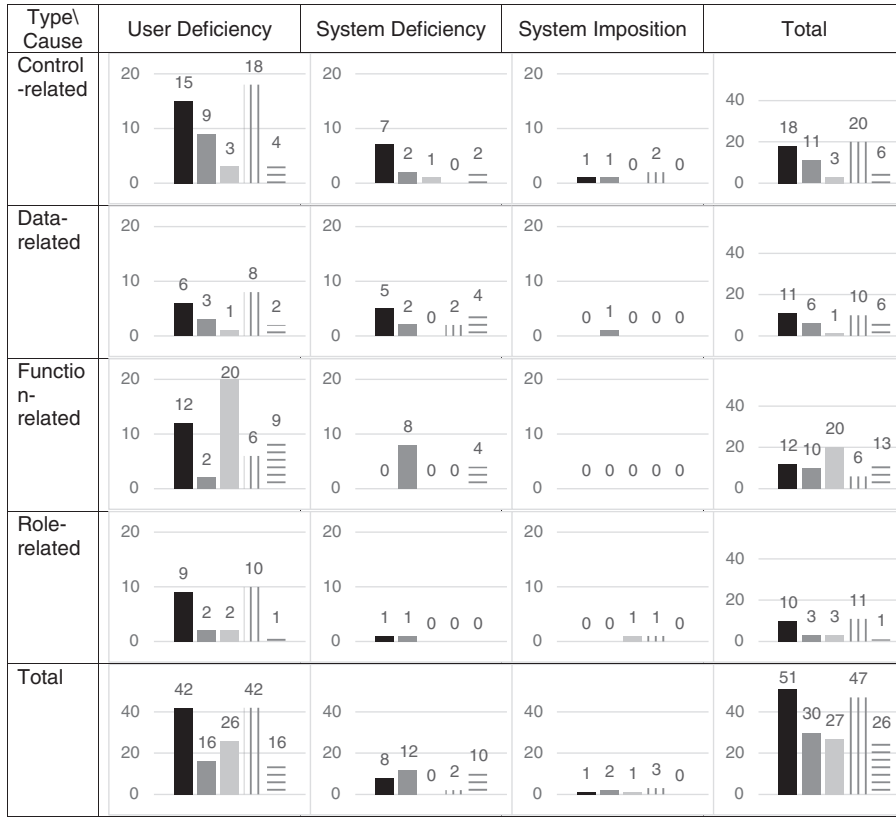
	User deficiency	System deficiency	System imposition	Total
No OCB	378 (72.7%)	34 (51.5%)	0 (0.0%)	412 (69.5%)
Anticipation	42 (8.1%)	8 (12.1%)	1 (14.3%)	51 (8.6%)
Justification	16 (3.1%)	12 (18.2%)	2 (28.6%)	30 (5.1%)
Education	26 (5.0%)	0 (0.0%)	1 (14.3%)	27 (4.6%)
Personalize-business	42 (8.1%)	2 (3.0%)	3 (42.9%)	47 (7.9%)
Personalize-technology	16 (3.1%)	10 (15.2%)	0 (0.0%)	26 (4.4%)
Total	520 (100.0%)	66 (100.0%)	7 (100.0%)	593 (100.0%)

Such differences are further explained in Table 6, which shows the difference between the average of the variables *TASK*, *PROBLEM*, *SYSTEM*, *USER* and *CAUSE* for each OCB category. For example, for *TASK*, it shows that the difference between the average *TASK* for the anticipation OCB and the education OCB is -0.43 ($p < 0.01$). The significant -0.43 means that the average of *TASK* for all the anticipation OCB observations is smaller than that for all the education OCB observations, suggesting that, compared with diagnostic task (*TASK* = 0), information tasks (*TASK* = 1) are more related to education OCBs than anticipation OCBs.

Similarly, compared with diagnostic tasks (*TASK* = 0), information tasks (*TASK* = 1) are more associated with education OCBs than justification OCBs (-0.60, $p < 0.01$). Also, compared with personalization-business or personalization-technology OCBs, informational tasks are also more related to education OCBs. We find a similar pattern for user types (*USER*) but an opposite pattern for system types (*SYSTEM*). Conversely, problem types are more associated with education OCBs as compared with personalization OCBs. Last, causes of problems are more related to justification OCBs.

DISCUSSION

The research objectives of our study were (1) to identify customer-oriented OCBs in IS post-implementation support and (2) to examine the contextual factors that are associated with customer-oriented OCBs. Prior OCB research has identified common types of citizenship behaviours such as helping behaviours, civic virtue and individual initiatives in performing organizational tasks (Podsakoff *et al*., 2000) and new forms of OCB (e.g. employee sustainability, social participation and knowledge sharing) by knowledge workers (Dekas *et al*., 2013). Yet, the forms of OCB are not clear in knowledge-intensive customer service contexts such as IS support, neither are the contextual factors that are associated with the customer-oriented OCBs. The lack of findings on OCBs in the customer service setting may be due to the difficulty that employees and managers encounter in distinguishing in-role (expected) from extra-role (discretionary) behaviours in the service sector. Our study employed a mixed-methods research to examine the extra-role behaviours of IS staff in supporting organizational use of



Note: Solid black bars: anticipation OCBs, gray bars: justification OCBs, light gray bars: education OCBs, vertical stripe: personalize-business OCBs, horizontal stripe: personalize-technology OCBs

Figure 2. OCB types by problem types and problem causes.

enterprise technologies and to gain insights into the conditions under which a certain type of customer-oriented OCBs is likely to be enacted. By carefully examining the records of the interactions between IS personnel and business users on resolving a system use problem, we identified five citizenship behaviours that IT staff applied in support of users, revealed the associations between those customer-oriented OCBs and the characteristics of IS support work and uncovered a temporal pattern of the customer-oriented OCBs during the post-implementation phase. In the subsections that follow, we discuss the findings that arise from the study.

The five-type classification of customer-oriented organizational citizenship behaviours

Information systems use involves three key components (user, task and technology) such that a user applies one technical function to complete a work task. Situated among users, work tasks and technical systems, IS professionals serve as a medium and demonstrate five major types of citizenship

Table 5. Descriptive statistics of system, problem, cause, task and user groups based on different OCB types

	OCB categories	*N*	Mean	Standard deviation
SYSTEM	Anticipation	51	0.55	0.503
	Justification	30	0.63	0.490
	Education	27	0.26	0.447
	Personalize-business	47	0.72	0.452
	Personalize-technology	26	0.85	0.368
PROBLEM	Anticipation	51	2.27	1.150
	Justification	30	2.17	1.053
	Education	27	2.85	0.770
	Personalize-business	47	2.17	1.222
	Personalize-technology	26	2.35	0.892
CAUSE	Anticipation	51	1.20	0.448
	Justification	30	1.53	0.629
	Education	27	1.07	0.385
	Personalize-business	47	1.17	0.524
	Personalize-technology	26	1.38	0.496
TASK	Anticipation	51	0.24	0.428
	Justification	30	0.07	0.254
	Education	27	0.67	0.480
	Personalize-business	47	0.09	0.282
	Personalize-technology	26	0.08	0.272
USER	Anticipation	51	0.55	0.503
	Justification	30	0.53	0.507
	Education	27	0.89	0.320
	Personalize-business	47	0.51	0.505
	Personalize-technology	26	0.50	0.510

behaviours directed to users. Among the five types of OCBs identified, anticipation OCBs and personalization-business OCBs accounted for the majority (54%, 98 out of 181 instances).

In particular, anticipation OCBs accounted for 28% (51 out of 181) of the total OCBs. This dominance is observed in the support service in relation to the SRM system (Table 4, panel A) and provided to both the hospital and university users (Table 4, panel B). This frequency of anticipation OCB may be explained by the accumulated experience and competence of the IS personnel with regard to common system use problems. For example, one common SRM issue reported by departmental administrators from the hospital or academic units was the shopping-cart failure due to a discrepancy in ordered quantity or order value. An important business rule in managing shopping carts in the SRM system was the 'three-way match' rule, which specifies that a vendor invoice will be automatically paid by the accounts payable only when the invoice matches the initiating PO and the confirmation receipts of the order delivery. Any differences in terms of the number of items or pricing in an order would trigger an error message in processing the order. As IS personnel understood this common issue with the SRM application, they would likely offer anticipation OCBs when supporting those SRM users. This suggests that the accumulated knowledge of IS support personnel has a potential impact on their proactive and anticipatory helping behaviour.

Table 6. MANCOVA results

	OCB type (I)	OCB type (J)	Average difference (I − J)	Standard deviation	*p*-value
TASK	Anticipation OCB	Justification OCB	0.17	0.105	0.592
		Education OCB	**−0.43**	**0.108**	**0.001**
		Personalize-business OCB	0.15	0.092	0.577
		Personalize-technology OCB	0.16	0.110	0.700
	Justification OCB	Education OCB	**−0.60**	**0.121**	**0.000**
		Personalize-business OCB	−0.02	0.106	1.000
		Personalize-technology OCB	−0.01	0.122	1.000
	Education OCB	Personalize-business OCB	**0.58**	**0.110**	**0.000**
		Personalize-technology OCB	**0.59**	**0.125**	**0.000**
	Personalize-business OCB	Personalize-technology OCB	0.01	0.111	1.000
PROBLEM	Anticipation OCB	Justification OCB	0.11	0.231	0.997
		Education OCB	−0.58	0.239	0.153
		Personalize-business OCB	0.10	0.203	0.996
		Personalize-technology OCB	−0.07	0.242	1.000
	Justification OCB	Education OCB	−0.69	0.267	0.107
		Personalize-business OCB	0.00	0.235	1.000
		Personalize-technology OCB	−0.18	0.269	0.986
	Education OCB	Personalize-business OCB	**0.68**	**0.243**	**0.058**
		Personalize-technology OCB	0.51	0.276	0.447
	Personalize-business OCB	Personalize-technology OCB	−0.18	0.246	0.980
SYSTEM	Anticipation OCB	Justification OCB	−0.08	0.112	0.975
		Education OCB	0.29	0.116	0.127
		Personalize-business OCB	−0.17	0.099	0.488
		Personalize-technology OCB	−0.30	0.118	0.118
	Justification OCB	Education OCB	**0.37**	**0.129**	**0.046**
		Personalize-business OCB	−0.09	0.114	0.969
		Personalize-technology OCB	−0.21	0.131	0.581
	Education OCB	Personalize-business OCB	**−0.46**	**0.118**	**0.001**
		Personalize-technology OCB	**−0.59**	**0.134**	**0.000**
	Personalize-business OCB	Personalize-technology OCB	−0.12	0.119	0.908
USER	Anticipation OCB	Justification OCB	0.02	0.110	1.000
		Education OCB	**−0.34**	**0.113**	**0.033**
		Personalize-business OCB	0.04	0.096	0.999
		Personalize-technology OCB	0.05	0.115	0.998

(Continues)

Table 6. (Continued)

	OCB type (I)	OCB type (J)	Average difference (I − J)	Standard deviation	*p*-value
	Justification OCB	Education OCB	**−0.36**	**0.126**	**0.057**
		Personalize-business OCB	0.02	0.111	1.000
		Personalize-technology OCB	0.03	0.128	1.000
	Education OCB	Personalize-business OCB	**0.38**	**0.115**	**0.014**
		Personalize-technology OCB	**0.39**	**0.131**	**0.036**
	Personalize-business OCB	Personalize-technology OCB	0.01	0.116	1.000
CAUSE	Anticipation OCB	Justification OCB	**−0.34**	**0.082**	**0.001**
		Education OCB	0.12	0.085	0.708
		Personalize-business OCB	0.03	0.072	0.999
		Personalize-technology OCB	−0.19	0.086	0.247
	Justification OCB	Education OCB	**0.46**	**0.095**	**0.000**
		Personalize-business OCB	**0.36**	**0.084**	**0.000**
		Personalize-technology OCB	0.15	0.096	0.632
	Education OCB	Personalize-business OCB	−0.10	0.087	0.877
		Personalize-technology OCB	**−0.31**	**0.098**	**0.021**
	Personalize-business OCB	Personalize-technology OCB	−0.21	0.088	0.142

For readers' convenience, we highlighted the significant results in bold

Our analysis also reveals different associations between the five dimensions of OCBs and the two elements of system use – technical systems and user groups. First, different types of OCBs were observed in the support for the two technical applications (Table 4, Panel A). Personalization-business OCBs occurred more often in supporting the HR/payroll system than SRM system, accounting for 30.9% (34 out of 110) of all the OCB instances in the HR/payroll system and 18.3% (13 out 71) in the SRM system. In contrast, anticipation and education OCBs together accounted for about 61% (43 out of 71) of OCBs associated with the SRM system. This may be explained by the business functions that each technical system serves. The HR/payroll system manages employee personnel and position-related information and facilitates the processing of payrolls. Managing personnel benefits and payroll processing involves complex business policies and rules, which may lead to personalized assistance with regard to complex issues associated with HR/payroll system use. By contrast, the SRM system enabled the process of procurement, starting from initiating a PO to delivering the ordered equipment and paying the vendors. Hence, while supporting the SRM system, IS personnel were more likely to exhibit extra-role behaviours in anticipating the consequence of, or in providing education concerning, detailed procedures for completing a system-enabled procurement task.

Second, our findings show that the occurrence of OCBs varied between the two user groups, university and hospital. Although OCB instances accounted for 35.3% of all the 215 university tickets, only 27.8% of the total 378 hospital tickets were associated with an OCB (Table 4, panel B). In addition, the dimensions of OCBs varied across the two user groups. In our data sample, IS workers were more likely to exhibit education OCBs in support of hospital users than academic users, as reflected in the proportion of education OCBs (22.9% for hospital and 3.9% for university). One possible explanation is that employees from the hospital needed more hands-on training regarding those IT-enforced processes. Prior studies of technical support have found that assistance requested by end-users varied with their computer system knowledge and skills (Mirani & King, 1994) and evolved over time (Deng & Chi, 2012). As the requests for system usage support differed by the two user groups, IS personnel were found exhibiting different types of extra-help behaviours when responding to each user group.

Another important finding of this study pertains to the timing of OCB instances. The occurrence of OCBs shows a temporal pattern such that personalization-business OCBs are more pronounced in early post-implementation periods, whereas anticipation OCBs and personalization-technology OCBs become more dominant later. Moreover, occurrences of OCBs evolved over time. Overall, the occurrence of customer-oriented OCBs in a support task slightly decreased in relation to the SRM system: from 27.3% in period 1 to 24.8% in period 3 (Table 3, panel A). This also held true for the support provided in relation to the HR/payroll system: decreasing from 40.8% in period 1 to 35% in period 3. This decrease in OCB instances was due mainly to the reduced OCBs associated with function and data domains (Table 3, panel D). This suggests that IS support personnel were less likely to perform OCBs 1 year after the initial system implementation, possibly because users had gradually learned to adapt the new application to their work routines (or vice versa) and had become more familiar with the data and functionalities offered by the new systems. The evolution patterns in OCBs echo the findings regarding post-adoptive use of a new financial system by Boudreau & Robey (2005). Meanwhile, OCBs enacted for solving control-related and role-related problems were found to increase over time: from a total of 18 instances in period 1 to 33 instances in period 3. This pattern of OCB evolution may be due to increasing complexity of system use problems in those two domains.

The interplay between customer-oriented organizational citizenship behaviours and characteristics of information systems support

Although our qualitative data analysis reveals the five classifications of customer-oriented citizenship behaviours, the MANCOVA analysis suggests that the enactment of different types of OCBs was closely associated with the characteristics of the system use problems on hand. When the problems related to *user* deficiency (lack of knowledge and/or incorrect operation), more *personalization-business OCBs* and *anticipation OCBs* were observed across all four problem domains (functionality, data, workflow and role). In contrast, when the problems related to *system* deficiency, *more personalization-technology OCBs* were observed among the two problem domains of data and functionality. *Justification OCBs* were more likely to occur when the problems were workflow and system deficiency related. *Education OCBs* were more likely to be performed when problems were related to user deficiency with regard to technical

functionality. No clear patterns were found regarding system imposition (the new features and routines imposed by the system) owing to the small numbers of OCB instances collected. Figure 3 summarizes these key patterns and serves as a guide for our discussion.

First, more OCBs were observed when an IS use problem was related to user deficiency, as compared with those related to system deficiency and system imposition. The OCB instances associated with user deficiency reached 142 (out of 181), accounting for 78% of all OCBs (Table 4, panel F). Three types of OCBs were observed, depending on the domain of system use problems. When users lacked knowledge of technical features, IS support personnel were more likely to provide them with additional information or hands-on walkthroughs. For example, when using the SRM system, employees frequently encountered problems with processing a PO, such as not knowing their approver(s) or the account to charge a purchase. Hence, IS support persons were more likely to exhibit education OCBs, as shown in the G/L account example. As the problem domain became more complex (i.e. data or workflow related), IS personnel enacted more extra-role behaviours tailored to a user's business process. During our site interview with the support centre manager, the manager recalled an episode of medical lab order for rats. The lab staff did not set up their order properly in the SRM and found out that 'their' rats were delivered to the wrong location. The support person assigned to that task went through a detailed diagnosis and even took the initiative to communicate with multiple units to resolve the issue. Because of the integrative nature of the systems, IT staff was more likely to draw users' attention to the inter-relations of data and processes across business units, helping them to anticipate the consequences of their actions when using the system. Prior studies have found that user deficiency is the major cause to system use problems (Deng & Chi, 2012), which led to users' passive use (or non-use) of system features (Boudreau & Robey, 2005). Under these circumstances, the citizenship behaviours of IS support staff towards this group of users will likely enhance users' learning about the new system and potentially promote IS post-adoptive use.

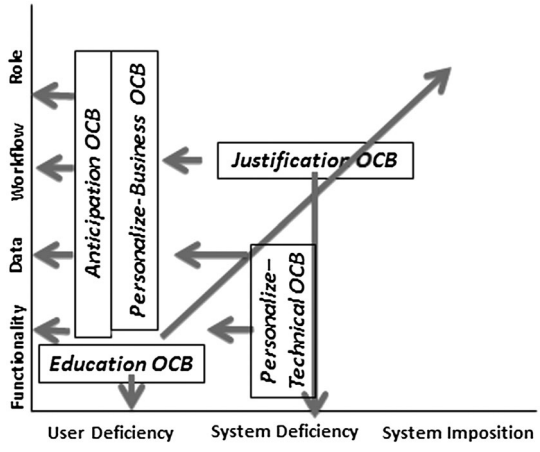


Figure 3. Customer-oriented OCB and IS support characteristics.

In addressing problems caused by system deficiency, IS personnel were found to extend justification OCBs and personalization-technology OCBs. In the former case, the problem domain was often related to workflow. For example, the HR/payroll system manages employee personnel and position-related data and facilitates the processing of payrolls. Managing personnel benefits and payroll processing involves complex business policies and rules. As shown in the example of employee vacation hour overstatement, users were familiar with their business domain, but not clear about system-generated data (e.g. vacation hours). In this regard, the justification OCB enhanced users' understanding of the data updating process. In the case of personalization-technology OCB, the system use problems were often related to functionality or data, such as missing features or incorrect data in a master data file. IS personnel were found to manually fix data configuration issues or to initiate new functional requests to address specific problems.

As Figure 3 depicts, our data analysis did not suggest a simple one-to-one relationship between problem causes, problem domains and customer-oriented OCBs. Instead, we found that, as the problem domain became more tied to business integration (from technical functions to data, workflow and role), more types of OCB were observed (i.e. in addition to the education OCB). To some extent, those OCBs became more challenging to perform, requiring IS staff to gain an in-depth understanding of the problem and to acquire comprehensive knowledge concerning the two versions of business processes, the ones enforced by the technical system and the ones that users accepted and applied.

The interactions between IS support personnel and business users can be viewed as a mutual problem-solving process during which both parties are involved in information sharing and problem solving. By engaging in the process, they are able to develop a shared understanding of problem domains, thereby sharing knowledge derived from the context. This problem-solving process is often described as a two-step process (Cross & Sproull, 2004), namely the information source of first understanding the problem as experienced by the knowledge seeker and, second, the information source of applying the IS personnel's knowledge to the problem on hand. Unlike problem-solving episodes between consultants, which may be a 2-min hallway conversation (Cross & Sproull, 2004), the problem-solving process for an IS support task takes a longer time, ranging from a couple of hours to a day or two. When the problem domain is well defined by users, such as when they request facts about a technical feature, then the knowledge source (IS support personnel) transfers declarative knowledge, which may only take a few minutes. In those cases, IS personnel fulfil their job responsibility by satisfying the information requirements of the users. However, when procedural knowledge (know-how) and diagnostic knowledge (know-why) are required, or when a system usage problem needs to be replicated and analysed, IS support personnel rely on their knowledge of both the technological and business domains, thereby developing a good understanding of the overall problem context. In these circumstances, the problem-solving processes in the post-implementation support not only take longer but are also likely to foster customer-oriented citizenship behaviours.

CONTRIBUTIONS, IMPLICATIONS AND FUTURE RESEARCH AGENDA

In this paper, we have examined the workplace behaviours of IS professionals by focusing on their support service interactions with users. Our analysis (qualitative and quantitative) of the data reveals five major types of customer-oriented OCBs enacted by IS support personnel and also demonstrates the dynamic and evolving patterns of the associations between the types of OCBs and the contextual factors (system, user, task and problem) in post-implementation support. Our findings contribute to the OCB literature on customer orientation and to the literature on IS professionals and IS users, providing practical implications to organizations.

Contributions

Our study contributes to the existing body of knowledge in relation to the citizenship behaviours of IS professionals in support of customers, albeit in a particular organizational setting. We identified five categories of customer-oriented extra-role behaviours in the IS support context, extending prior studies on customer-oriented OCBs (Rafaeli *et al*., 2002). Prior studies of citizenship behaviours originated at the organizational and group levels, but Podsakoff *et al*. (2000) called for new research to develop theories at the individual citizenship construct level and to identify the potentially unique antecedents and consequences of the different forms of citizenship behaviours. We have responded to this call by developing a multidimensional framework for customer-oriented OCBs at the individual level and by identifying a set of unique antecedents of different types of customer-oriented citizenship behaviours. The classification of extra-role customer-oriented behaviours – anticipation, education, justification, personalization-business and personalization-technology – enhances our understanding of the dynamics and complexity of the knowledge-intensive interactions between IS professionals (service providers) and IS users (customers). Moreover, the unique set of antecedents offers novel insights into the conditions under which each form of citizenship behaviour in support of customers was enacted. These findings have a potential to facilitate the assessment of extra-role customer-oriented behaviours in future empirical research.

We may also claim to have advanced our understanding concerning the interactions between users and IS professionals post-implementation. Prior studies on IS support have tended to investigate the problem-solving process, involving both users and IS professionals (Das, 2003), and have focused on knowledge transfer between IS professionals and users (Santhanam *et al*., 2007). From a different perspective of IS support, our study identified IS professionals' customer-oriented behaviours that would enhance users' learning and use of new technologies, thereby contributing to research on IS post-adoptive use and extended use (Jasperson *et al*., 2005; Hsieh *et al*., 2011). Recent research on sociomateriality argues that humans (users) and technical artefacts do not exist independently of each other. Rather, the two elements are interwoven to create work practices (Orlikowski & Scott, 2008). In this regard, our study offers new insights on how the extra-role behaviours by IS professionals were enacted as a result of the interactions between users and technical systems and how these extra-role behaviours varied at different points in time and in different contexts.

Moreover, this study demonstrates the value of collecting secondary data at multiple points in time and of combining qualitative and quantitative analyses (Mingers, 2001; Newell & Edelman, 2008) to investigate the complex and dynamic interactions between IS professionals and users in an organizational setting. Prior research has noted that interviews or surveys provide insights into perceived system usage but provide less reliable views of users' problem-solving behaviour (Ravasio *et al*., 2004; Novick *et al*., 2007). The potential risks and biases of interviews or survey data in IS support are due to users' difficulties in recalling past experiences or their 'bounded rationality' (Simon, 1991). Analysing secondary data contained in the ticket records allowed us to mitigate those risks and potential biases. Moreover, our method of combining qualitative and MANCOVA analyses offers a contemporaneous means of studying the dynamic and evolving patterns of OCBs and contextual factors in real-world settings, which would otherwise be difficult to obtain with other approaches, such as surveys (Mirani & King, 1994; Ceaparu *et al*., 2004). For example, our analysis of the data at three different post-implementation periods shows that extra-role behaviours directed to workflow issues (e.g. the disconnected data flow between the SRM transaction and business intelligence (BI) reporting) increased across the three periods. Meanwhile, fewer discretionary behaviours associated with technical functions (e.g. how to process a PO) were observed. This analysis added value to our understanding of the evolving patterns in IS support personnel's customer-oriented behaviours and the underlying influencing factors.

Implications

Practically, our findings on customer-oriented OCBs and their evolving patterns provide a useful guide to IS support personnel on how to enhance IS service quality via such extra-role behaviours as those identified in this study. These additional helping behaviours may be especially important in supporting those frustrated users when the installed IS prevented them from completing their work tasks. Studies on end-user frustration suggest that a good strategy in improving IS use is to 'bridge the gap between what user know and what they need to know, thereby leading to more successful, less frustrating user experience' (Ceaparu *et al*., 2004, p. 336). By offering customer-oriented OCBs, IS support personnel may be better able to anticipate user needs and provide them with the relevant information and advice, thereby reducing the likelihood of requiring similar service assistance later (Mirani & King, 1994).

Our findings also offer several useful guidelines on how to improve and assess users' understanding of the installed IS. First, OCBs improve the quality of information exchange and enrich knowledge flow such that a variety of knowledge (including specific business and technical knowledge and referrals) flows between information seekers and providers. Second, OCBs, especially education OCBs, help to ensure that actionable knowledge is acted upon effectively and efficiently. Creating and delivering actionable knowledge, such as referrals and pointers, are critical to problem solving in a knowledge setting (Cross & Sproull, 2004). As a result of the kind of customer-oriented OCBs that have been identified in this study, IS workers may enable users in gaining greater understanding of their activities vis-à-vis the technology in use (personalization OCB) and may also prompt users to think 'out-of-the-box' about their system usage (anticipation OCB) or to pay attention to issues that they may have not previously encountered or considered (education OCB). Organizations can also deploy alternative strategies

in relation to the promotion of different OCBs. They may also usefully consider incorporating customer-oriented OCBs in their development and implementation of reward and incentive policies as such extra-role behaviours require more effort and expertise on the part of IS professionals in terms of building an affinity with users.

Concluding comments and future research agenda

Those IS professionals in our study extended extra-role behaviours to users of the new systems while attempting to resolve those users' problems. However, those citizenship behaviours are by no means costless. An OCB occurrence is likely to incur additional time and effort on the part of an IS support person. As reflected in the example of the 1-h call regarding the G/L account display and setting, the IS staff person concerned spent more time than might usually have been expected on walking a customer through system functionalities in attempting to ensure that the user fully understood the system features. This is consistent with the findings of Rafaeli *et al*. (2002) who reported that customer calls of longer than a 3-min duration provided more occurrences of OCBs than shorter calls. OCBs can increase the time spent on each service interaction and may thus be seen to reduce the efficiency of the support service. Hence, it remains an open and interesting question to investigate the appropriate balance between service effectiveness (e.g. the enactment of OCBs) and service efficiency (e.g. time spent on customer interactions).

We also need to acknowledge the limitations of our study. It was conducted in a large healthcare organization in the USA, and although we may generalize to theory, we cannot claim to generalize our findings to other contexts (Lee & Baskerville, 2003). Moreover, our study focused on the development of a categorization of customer-oriented OCBs and related contextual factors in a particular IS support context involving an HR/payroll management system and an SRM system. The IS support context represents a knowledge-intensive environment where IS personnel and business users engage in joint problem solving (Das, 2003) and frequent knowledge transfer (Santhanam *et al*., 2007). Thus, the OCB classification should be applied to other customer service settings with caution and cannot be considered to be comprehensive. Further research utilizing mixed methods in different contexts and time frames can build on the current research effort.

Limitations notwithstanding, our study highlights the customer service aspect of IS support and shows it to be a promising and value-added source for promoting more effective organizational IS usage. Despite the important role of IS professionals in organizational use and support of installed technologies, extant research on this topic has mainly focused on either the post-adoptive behaviours of users or the problem-solving behaviours of IS professionals. Such studies fail to consider the complex and dynamic interplay between business users and IS professionals during IS post-implementation. To shed light on this important yet under-explored topic, we adopted a customer service perspective and undertook an in-depth investigation of those extra-role, customer-oriented behaviours performed by IS professionals towards business users in resolving system usage problems. In this regard, our study suggests that it is time to update our view of IS professionals' role in organizational use of IS and to revisit managerial practices and policies on IS human resources.

Future research can be undertaken in several promising directions. First, our dataset from the ticketing database mainly reflected the service records provided by IS professionals. Customers (business users) may well have different accounts of the same service interactions and may perceive OCB differently (Podsakoff *et al*., 2000). Moreover, individual users develop different professional identities around technology artefacts, such as viewing themselves as a helpful mediator between technology and other people (Stein *et al*., 2013). The different identities of users may influence their interactions with IS professionals, such as exploring technology usage and functionality themselves rather than asking the IS department for help with technology use problems. Hence, future research on customer-oriented OCB could usefully consider the variety of professional identities users may have in relation to IT. Second, women remain under-represented in the IS profession (Trauth, 2002; Howcroft & Trauth, 2008; Galliers & Currie, 2011). Incorporating the individual characteristic of gender into the set of antecedents to OCB behaviour may provide new insights into managing the diversity of IS professionals. Similarly, cross-cultural characteristics (Leidner, 2010) might usefully be incorporated into future studies. Last but not the least, future research could usefully examine the relationship between IS support personnel and business users (Carr, 2006). In consultant professional networks, interpersonal relationships and connections are important for knowledge seekers as these help to ensure that the knowledge source is accessible and willing to engage in productive problem solving (Cross & Sproull, 2004). Likewise, good interpersonal relationships between IS support personnel and business users will be more likely to enact IS personnel's customer-oriented OCBs. We trust that the conceptualization of customer-oriented OCBs developed in this study provides a basis for this future research to further investigate other important antecedents and to assess the outcome of those citizenship behaviours on the performance of individuals and organizations with respect to IS post-adoptive use.

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Robert D. Galliers became Bentley University's inaugural University Distinguished Professor in 2009, having served as Provost since 2002, heading up Bentley's progress to university status and EQUIS and EDAMBA accreditations. He also holds a fractional appointment as Professor of Information Systems in the School of Business and Economics at Loughborough University. Previously, he served as Professor and Research Director in the Department of IS at the LSE, Lucas Professor of Business Management Systems and Dean of Warwick Business School, both in the UK, and earlier as Foundation Professor and Head of the School of IS at Curtin University in Australia. He received the AIS LEO Award for exceptional lifetime achievement in IS in 2012 and was awarded an Honorary Doctor of Science degree by Turku University, Finland, in 1995. He is a Fellow of The Royal Society of Arts, the British Computer Society and the AIS. He has been keynote speaker at more than 60 major international conferences and symposia including the Australasian, European, Mediterranean, Scandinavian and UKAIS Conferences on IS. He has over 300 publications to his name, including 90 journal articles and 12 books – the most recent of which being *Critical Perspectives on Business and Management: Management Information Systems* (Taylor & Francis, 2015) and *The Oxford Handbook of Management Information Systems* (Oxford University Press, 2011). His work has been cited over 7500 times according to Google Scholar and is trans-disciplinary in nature, focusing primarily on organizational innovation/transformation, the processes and practices of IS strategizing, knowing in organizations and the intra-organizational and extra-organizational impacts of ICT. He is the editor-in-chief of *The Journal of Strategic Information Systems* – one of eight journals in the AIS Senior Scholars' 'basket' of eight leading IS journals.

APPENDIX A: RELEVANT CATEGORIZATION OF ORGANIZATIONAL CITIZENSHIP BEHAVIOUR FOR KNOWLEDGE-INTENSIVE CUSTOMER SERVICE

OCB categories	Definition	Example	Key references
Helping behaviour (altruism and courtesy)	Voluntarily helping co-workers with work-related issues or problems or preventing the occurrence of work-related problems	'Coming in on a weekend to help somebody', 'Giving coworkers career advice', 'One of my team members helped me write a macro.'	Dekas *et al*. (2013), Organ (1988), Podsakoff *et al*. (1990, 2000)
Individual initiative	Engaging in task-related behaviour at a level beyond what is minimally required or generally expected (e.g. volunteering to take on extra responsibilities)	'Going above and beyond on deliverables', 'Being the point of contact for a group or product', 'Cleaning up existing code'	Dekas *et al*. (2013); Podsakoff *et al*. (1990, 2000)
Knowledge sharing	Sharing knowledge or expertise with co-workers	'Conversing with non-engineers to explain engineering topics'	Dekas *et al*. (2013)

APPENDIX B: SUMMARY OF THE INTERVIEWS CONDUCTED AT THE RESEARCH SITE

Date	Formal role	Technical application(s)	User groups	Length of interview (min)
7 December 2007	Support centre manager	Both SRM and HR/payroll applications	Both hospital and university users	75
7 December 2007	Lead support specialist	SRM application	Hospital users	60
7 December 2007	Lead support specialist	HR/payroll application	University users	60
29 March 2008	Lead support specialist	SRM application	University users	45
29 March 2008	Lead support specialist	HR/payroll application	Hospital users	45

APPENDIX C: ILLUSTRATION OF THE CODING SCHEME OF ORGANIZATIONAL CITIZENSHIP BEHAVIOURS

Category	Definition	Example
None	No OCB instance identified	'Educated or trained the customer as to the correct procedure'
Anticipation	Anticipating customer requests (sharing consequence/ next action)	'…Told xxxxxx what to do to update the document, and how to send it into Workflow. Also advised her what to do if document doesn't allow changes'
Justification	Offering explanations and justifications (additional information on why problem occurred)	'The specified application had an incorrect configuration setting… Changes were made to the WSR for Executives. The configuration changes impacts the function PART, which determines the partial period salaried amount.'
Education	Educating the customer	'…customer had a question about parked document. I gave the customer a walkthrough of how to get a parked document into workflow.'
Personalization-business	Offering personalized information/solution on business processes and rules	'…requesting the Fund number which was missing from the xxxxxx Create ISR…xxx will enter the ISR#4xxx information, plus Fund, into SAP, which creates the position that needs to be filled for an employee starting today…'
Personalization-technology	Offering personalized information/solution on technical features	'…Employee #4xxx error in Batch 11 due to incorrect Birth date on IT0002. Date was the same as hire date. HR shared services has corrected so batch was re-run and employee was able to be paid.'

APPENDIX D: EXAMPLES OF CODING DISCREPANCIES AND RESOLUTION

Examples	Initial coding and resolution of coding discrepancies
User request: 'question concerning Travel processing in the SAP system. User asked about the lack of workflow for trip # 1xxxxx for person. # 18xxx.'	During the initial coding, the two coders *disagreed* on their coding of OCB type: coder 1 considered it as '*anticipation* OCB', whereas coder 2 regarded it as '*justification* OCB'.
Support response: 'The user had not submitted the trip into workflow – I arranged for it to be launched (I launched it myself!)'	To resolve the issue, the two coders first discussed their rationale for the coding and agreed that '*justification* OCB' was demonstrated only when additional information

APPENDIX D: (Continued)

Examples	Initial coding and resolution of coding discrepancies
	and explanation were offered on the cause of the problem or on the status of the problem resolution. With regard to this incident, the IS employee explained the cause of the system use problem as expected; therefore, it did not constitute a '*justification* OCB'. However, it remained a question of whether it was part of IS employees' job responsibility to submit the trip and traveller information into the workflow. The two coders then consulted the site manager who confirmed that the submitting part should be performed by users; thus, it was the employee's discretionary behaviour. On the basis of the discussion and consultation, the two coders reconciled the type of OCB to be '*anticipation*'.
(SRM, April 2007)	
User request: '*on SRM system* Work Flow: Per the message in the "Welcome Notes" in SAP, I may be one of the SAP approvers who is no longer receiving the workflow assigned. I did not receive anything either Friday or today so far. Please check this for me and restore the workflow that was in effect prior to Friday if that is the case.'	During the initial coding, the two coders *disagreed* on their coding of OCB type: coder 1 considered it as '*education* OCB', whereas coder 2 regarded it as '*justification* OCB'.
Support response: 'I checked the workflow tables and the cost centers that the user is responsible. All have owners and designees listed. I explained to her [user] that these tables were probably updated this weekend. She [user] will call back if she experiences any problems' (SRM, April 2007)	To resolve the issue, the two coders first discussed the difference between 'education' versus 'justification' OCB; that is, the former refers to the extra help from additional hands-on or walkthrough training, whereas the latter is related to additional information for the cause/status of a problem. In this case, after the IS employee did his expected job (checking the role assignments in workflow tables), the employee offered additional information (tables being updated that weekend) as a potential explanation for the problem cause. As a result of the discussion, both coders agreed that the OCB type should be 'justification'.