The customization of knowledge management techniques in Information Technology Help Desk

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The Customization of Knowledge Management Techniques in Information Technology Help Desk

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Abstract

Information Technology (IT) has converted a majority of organizational activities to automatic and electronic-based. This conversion greatly increases Help Desk (HD)’s coverage on IT related areas. Alternatively, the adoption of business process reengineering and downsizing has led to the shrinkage of the size of HD. This not only leads to the loss of priceless knowledge, but also coerces HD to provide more service with less staff - the outcome is clear that users have to wait comparably longer before HD staff is available. This paper describes how generic Knowledge Management process can be customized to improve support process in HD.

INTRODUCTION

In the past two decades, the emergence of Information Technology (IT) has converted a large part of organizational activities from manual and paper-based to automatic and electronic-based. Such a conversion not only increases the complexity of IT infrastructure, but also increases the coverage of Help Desk (HD) on software, hardware, network and other IT related areas. It is quite common for a single HD to cover hundreds of thousands of software, hardware, application programs and network connection, sometimes it is difficult even to memorize all those names. What exacerbate the situation is the wide adoption of management methodology such as Business Process Reengineering (BPR) and downsizing. This leads to the shrinkage of the size of HD because the overall budget has been reduced. This not only reduced a significant number of experienced HD staff, but also led to the loss of priceless knowledge which is considered to be crucial for the daily operation within the HD boundary. Furthermore, the consequence for more service with less staff is quite obvious: user has to wait comparably longer before first level operator is available. In addition, the HD staff is no longer available for high-level and proactive support activity or training. According to a recent research conducted by the Help Desk Institute (Broome et al. 2002), most respondents in the HD industry have reported that their call volume has been increasing every year for the past ten years. Heckman and Guskey (1998) confirm that “help unavailable when needed” is the major reason for service delivery failure in the HD which in turn leads to user dissatisfaction. Moreover, the entire support process in between is indirect and slow, along with the opportunity to cause miscommunication and misinterpretation.

HD experts and academic researchers continue to look for ways with the purpose of relieving the above burden and the effort includes development of systems, support structures and models, but the hard work seems in vain. What goes wrong? Human always uses reflective design concept as a method to develop a system, in other words, we tend to solve a problem based on past experience and conscious reflection without local adaptation. For example, the New South Wales (NSW) Government tries to improve access to Sydney Airport, Port Botany and the City for people living in the west and south west of Sydney by building M5 East. But M5 East itself is actually creating congestion problem, more than 100,000 vehicles a day travel on the M5 East. This almost doubles the Roads and Traffic Authority’s calculation in its environment impact statement, predicting that 55,000 vehicles would be using the tunnel by 2011 (Smith 2005). This shows that rather than alleviate congestion, M5 East itself encourages more people to drive more often which in turn carries 7.1% passengers away from the East Hill Rail Lines (Smith 2004). Similarly, various support models, structures and technologies are designed to ease high volume of enquiries within the HD environment, however, such actions actually create...
more troubles in the real world if the problem domain and user's need have not been investigated thoroughly. This paper is conceptual and a work in progress—the potential contribution of this paper is the conceptual re-distributed Knowledge Management (KM) model based on the five stages of KM (Chait 1999 and Wig 1997) and the generic KM process that is currently being used within HD environment, which provides a framework to re-route simple and routine technical enquiries in a way that users can look for their own solution via the user self-help online Knowledge Management System (KMS), to ease the overload HD whose incoming enquiries are composed of a majority of simple and routine questions. Our future work will empirically test the validity of the conceptual re-distributed KM model of this paper. This paper also discusses the development of HD, ranging from support model, to support structure, to support tools.

The rest of paper is organized as follows. Section 2 describes the background of HD. Section 3 discusses the KM in HD. The conceptual re-distributed knowledge management model is outlined in Section 4. Finally, conclusion is given in Section 5.

BACKGROUND OF HELP DESK

Organizations have been investing heavily in IT and Information Systems (IS) development to solve business problems, to gain competitive advantage and to sustain organizational improvement. Consequently, the variety and complexity of software, hardware and network technology have greatly increased. This leads to the establishment of HD to provide technical support to users. HD, also known as computer call centre, contact centre, IT assist centre or support centre, is an access point to provide IT-related advice, information or troubleshooting action to user. Its responsibilities include first line incident support in case of IT failure, day-to-day communication between IT department and user, business system support and service quality report generating (Central Computer and Telecommunications Agency 1989). In short, it is a first contact place for user relating all IT support issues and one of the HD support specialists will attempt to provide a solution. The HD also acts as a facilitator to collect and analyse its data to help itself in a more proactive role (Marcella et al. 1996).

Before HD emerged, users either called whoever they knew, or so-called “computer expert”, in IT department when they required technical support (Smith 1996). However, this ad-hoc support framework has some shortcomings. Firstly, the IT staff might not be available for immediate assistance because they were usually occupied by other crucial projects. Secondly, excess amount of support duty would lead to high level of frustration within the IT department because they were not able to spend time on their tasks or projects. Thirdly, user usually called the wrong person, workgroup or even department for support. This often led to frustration and users were often required to make another call or be transferred to the person who was responsible for solving the problem (Middleton 1999 and Smith 1996). This not only delayed the support process but also interrupted the development and deployment of new services and systems in the IT department. Thus the idea of HD emerges with the purpose to minimize the above problems and to meet user’s expectation.

Evolution of Help Desk

Decentralized HD model was very popular in 1980s. In this model, organisation often contained more than one HD where various HDs were established by departments, branches and IT work groups. For example, there were nine different HDs in Western Kentucky University, user had to determine which HDs to call, depending on what the problem was, where the problem was and when the problem occurred (Kirchmeyer 2002). The decentralised model shared the belief that diverse support issues could be referred to related HDs easily so that timely response could be acquired. This concept worked well in the very beginning because computer system was simple and straightforward. As IT infrastructure became more complicated, organization-wide systems with more interconnected hardware and software, classification of problem domains became less distinct. In such situations, users became more confused with multiple HDs and they were often “bounced” from one HD to another before obtaining a correct solution.

Organizations then started to adopt centralized HD model. The idea is to merge various HDs into one and user only needs to memorise a single contact number for all IT related enquiries which make HD the first and single point of contact. This model not only consolidates the point of contact, it also helps to consolidate and standardize diverse support policies and procedures, service level agreements as well as HD support tools (Middleton 1999 and Kirchmeyer 2002). Other incentives for this model include better resource allocation, improve resolution rate and inter-division communication (Scullen 2001). Nowadays, some global corporations with offices all over the world implement another concept called distributed or virtual HD model. Though this model promotes HD of multiple physical locations, user can still keep in touch with them by using one contact number through the modern call routing technology (Tischler et al. 1998). In this way, HD is able to operate twenty-four hours a day, seven days a week regardless of the location. For example, Morgan Stanley, one of the
largest investment banks in the world, consists of four HDs in different sites (USA, England, Japan and Hong Kong) that enable them to provide enterprise-wide twenty-four hours HD service. Currently, HD is further categorised as internal or external. The former only supports organization-wide users whereas the latter supports external customers and is usually established by software and hardware vendor or internet service provider (Heckman et al. 1998).

Apart from different support models mentioned above, it is also important to discuss the current trend on outsourcing of HD. Dash (2000) reports that the worldwide outsourcing market in HD and technical support would exceed three and a half billion in 2002. Senior IT managers are likely to outsource functions that are immaterial to core business such as HD. The reasons commonly cited for this decision include: 1) in-house IT expert should focus on long term strategic infrastructure planning instead of being burnt out by routine troubleshooting duty, 2) outsourcers can do a better job than in-house HD because they are equipped with latest skill and technology, 3) it can increase HD productivity, efficiency and effectiveness which will lead to cost reduction, and 4) IT manager can be freed up from human resource issues such as difficulty in recruiting experienced HD staff, the need to maintain sufficient staff in peak hour and so on (Ketler et al. 1999). Senior management no longer debates whether to outsource HD. Its main concern is the degree of outsourcing - should it be full or partial, permanent or temporary, onshore or offshore, single or multiple vendors. Other considerations in outsourcing include data security, loss of control, loss of expertise and loss of flexibility. It is important to note that not every outsourcing project returns in triumph. To eliminate risk and increase transparency, organisation must build on strong alliance with outsourcing service provider.

E-support is another innovative support model in the HD industry. This model is gaining widespread use due to its ability to provide better, faster and cheaper service. Broome and Streitwieser (2002) describe all support actions that use internet or web as the primary communication channel to be included in e-support. One of the key stimuli in promoting e-support is the emergence of web-based tools. Users now can make use of email or web form to contact HD ignoring its actual service hours. In addition, users can access online resources, such as knowledge base and Frequently Asked Question lists (FAQ), to look for information that is useful to resolve their existing difficulties. Furthermore, HD analyst is capable of conducting web training or even using remote control technology to ease user's struggle. However, for HDs that attempt to implement e-support model, they must examine carefully if the current culture, resources and technology within the organisations are ready for such a deployment.

Support Structure in Help Desk

Although each HD is unique according to the organization's strategic investments, support doctrine, business it supports and customer expectations, generally HD can be divided into front line (first level), second- and third-level support as illustrated in figure 1 (Czegel 1999). Basically, enquiries come into the front line (first level) support from various sources. At this level, the first level operator will attempt to provide answers for simple questions. Users can choose to access HD through various channels which include telephone, web forms, email, fax or walk in. If first level operator cannot resolve the problem, it will be escalated to the second or third level support. Second level analyst, who possesses in-dept IT knowledge, will conduct a series of research and testing to solve the problem. If it involves on-site support such as hardware installation, second level engineer usually takes over the job. If the second level support staff still cannot handle the problem, then the case will be passed to the third level specialist such as database administrator, website developer or vendor to resolve the problem. Kajko-Mattsson (2003) reports that three levels concept currently dominates a large segment in HD support structures but some organizations choose to simplify it into two levels or even one level support as illustrated in figure 2 and 3 respectively.
Technology Issues

To support different users, HD should be equipped with high technology equipments to ensure efficient and effective troubleshooting. Fully loaded HD is never a by-product of sudden universal explosion, rather the transformation takes a long period of time with a lot of resources and efforts. According to Kendall (2002), HD in mid-late 1980s only contained a desk, a phone and a pen. At that time, senior management executives never recognized HD’s value. On the other hand, HD was viewed as a non-profit-generating function that always showed up as a cost on the ledgers (Czegel 1999). When the organization realizes IT malfunction will hinder individual user or sometimes the whole organization from working at optimal productivity, senior managements start to invest strategically on HD technologies. In addition, modern technology has also accelerated the delivery of HD evolution. High technology tools have been used to support, stimulate and accelerate the consolidation of multiple HDs.

Automatic Call Distribution system (ACD) plays an important role in promoting HD consolidation because it can handle a large number of calls simultaneously on a single phone number. ACD is a system that helps to manage the flow of phone calls, record historical data and generate call statistic report (Underwood et al. 2003). When user calls, the ACD that interconnects a finite number of HD operators will distribute the call to the first available operator. If all the staff are busy, the call will be placed in a queue. Most of the systems will then play a recorded message to inform the user that “all lines are currently busy and the first available HD operator will answer the call as soon as possible”. At the same time, the ACD keeps monitoring the queue, sending “the first user in the queue” to the next available operator and makes sure the calls are evenly distributed among the HD operators. An Interactive Voice Response system (IVR) is widely installed as a front end for the ACD. The IVR is an automated answering system that allows users to interface with other technology, such as mainframe, database and fax machine. It also allows the users to get information or to perform a specific function simply by selecting the required options from the menu via the telephone pad (Czegel 1999). Additionally, the ACD that possesses supervisory functions enables HD supervisor to monitor the workload, listen-in to calls, monitor queue status, re-route calls and re-configure ACD settings to fit different call patterns. Supervisory and management reports that include total incoming, outgoing plus abandoned calls, call answered, average talk time and average hold time can be generated by the ACD (Underwood et al. 2003 and Czegel 1999). These reports allow the HD to continuously enhance its performance by re-arranging manpower, purchasing or developing new technologies or changing ACD configurations. For example, if the statistic shows that there is an enormous number of abandoned calls in the morning then more staff should be added to the morning shift.

The emerging of HD management system is a major step for HD automation (Middleton 1999). Czegel (1999) depicts four basic functions of HD management systems as call information logging, ticket escalating, ticket storing and reporting. Call logging function enables the HD operator to record user’s personal detail, computer setting, and problem description in a ticket storing function or ticket repository. The HD operator always refers to that piece of record as a ticket. As soon as the user calls to request technical support, the HD operator has to open a ticket, fill in the details and then save it in the storing function. If the problem requires further escalation, the operator can forward or assign the ticket to a particular analyst or workgroup by the ticket escalating function. Analyst or workgroup who holds the ticket is responsible for updating all follow-up action, progress and resolution method into the ticket repository. When the problem is resolved, the ticket will be closed. The reporting function allows HD supervisor or manager to generate report with difference parameters, such as high
priority ticket, outstanding ticket, problem type and so on (Underwood et al. 2003). Reporting is a very powerful function to manage the daily operation of HD. For example, if there are too many outstanding tickets waiting to be resolved, it may be an indication to hire more staff; if there is a huge amount of tickets related to a software or hardware problem, then it may require a thorough check up on the system concerned.

HD expert system has been highlighted as a feasible application in the HD industry due to the scarcity, diverseness and expensiveness of expertise (Goker et al. 1998). The ever and fast expansions of IT often result in the HD staff require specific knowledge and expertise to understand and handle enterprise-wide system. Consequently, it makes the HD staff impossible to offer immediate assistance if one of the experts with a particular knowledge is unavailable. Expert system or knowledge-based system is a subset of artificial intelligence which imitates human reasoning process to solve specific problems (Turban et al. 2001). If an expert system is developed, the first level operator is able to provide recommendation and solution for a routine or even complex problem simply by entering its description plus symptom to the system. Then the embedded inference engine will try to find the best diagnostic method from the knowledge-based system. This way, the second and third level support staff can be freed for more important duty. However, Middleton (1999) argues that expert system and other artificial intelligence related system are not as widely used as expected. Some of the problems in developing HD expert system are high cost and time consuming in knowledge acquisition and knowledge base maintenance, high complexity of problem domains and difficulties in HD expert system development (Czegel 1999).

Remote control software is a HD software that makes use of modern data communication technology to view, access or even take control of computer to carry out troubleshooting over the network (Underwood et al. 2003). There are two types of remote control software: client based and web-based. The difference is that the client based one requires installing a small program called client, whereas web-based simply connects through the internet. Comparing to traditional on-site support method, remote control provides a quicker way for problem solving as long as the target computer has internet access and it also encourages user’s involvement in fixing a problem by watching and learning the required process through the technician’s demonstration. However, security is always an important issue with remote access. Auspiciously, most of the software can be configured so that the technician must gain permission from the user before viewing and controlling the target computer. Additionally, user can re-take control or even terminate the session at any time. In Griffith University, the HD is able to solve 75% to 85% of problems remotely whereas resolution rate drops to 53% without the aid of remote control software (Scullen 2001).

KNOWLEDGE MANAGEMENT IN HELP DESK

HD experts use both tacit and explicit knowledge to solve user’s problem. Tacit knowledge refers to skills, perceptions, assumptions and experiences that reside in the staff’s brain whereas explicit knowledge refers to written document, such as technical manual and guide book. KM, a methodology to manipulate tacit and explicit knowledge, has the capability to address “knowledge leaking” problem caused by BPR and downsizing (Chait 1999, Nonaka et al. 2001 and Smith 2001). To examine whether this contribution of KM can be extended to HD, it is critical to review the background of KM.

Back to mid 1980s, management tools and techniques such as Total Quality Management (TQM), downsizing and BPR were developed by western companies to aid in re-gaining market share occupied by the Japanese Company. However, both input and improvement are short-termed because these solution approaches are generic and easily available to all rival companies. Once an approach is proven successful, the rival company duplicates and adopts the same practice (Sharkie 2003). The practice of downsizing, BPR and outsourcing, which aims for process optimization as well as cost and time saving, have resulted in loss of many experienced employees along with their capability and knowledge which in turn has “drained” away organization’s inspiration and creativity (Coulson-Thomas 1997). Thus, organizations have to re-pay high, severe and long-term price in return for transient benefit. The worst is after several years of downsizing and BPR, companies in western world are now competing with each other on equal cost, quality and delivery performance levels. This means that the company has difficulties in differentiating with other challengers. What intensify the already fierce battlefield is the availability of cheap labour in Asian and other developing countries. Thus, the concept of KM is emerged to sustain long term competitive advantage by preserving organizational knowledge (Turban et al. 2001). Knowledge is now recognized as one of the most important management assets because knowledge enables organizations to utilize and develop resources, enhance their fundamental competitive ability and develop sustainable competitive advantage (Sharkie 2003). In other words, knowledge allows an organization to do better than rivals.

KM is designed to manage and capitalise on knowledge that accumulates in the workplace (Martensson 2000). This is achieved by organizing formal and direct process to create, store and retain knowledge for the benefit of
the organization (Dawson 2000 and Smith 2001). The entire process of KM (as illustrated in Figure 4) is divided into five stages: create, store, make available, use and evaluate knowledge (Chait 1999 and Wiig 1997). There are four methods to create organizational knowledge by means of the interaction between explicit and tacit knowledge (Nonaka et al. 2001). The first method is socialization. It is the process of developing tacit knowledge from tacit knowledge embedded in human or organization through experience sharing, observation and traditional apprenticeship. The second method is called externalization. This is the process of turning tacit knowledge into new explicit knowledge simply by transforming tacit knowledge in the form of document such as manual and report. The third method is combination. This is the process of merging and editing “explicit knowledge from multiple sources” into a new set of more comprehensive and systematic explicit knowledge. The last method is internalization. This is the process of embodying explicit knowledge as tacit knowledge by learning, absorbing and integrating explicit knowledge into individual’s tacit knowledge base.

The second and third stages of KM, store and make available, are often linked with technologies. Explicit knowledge created is collected and stored in some form of database or knowledge base in which the users have the right to access by using “search and retrieve” tools, intranets, web access and applications, groupware and so on (Alavi et al. 1999, Prusak 1999 and Smith 2001). Whether knowledge can create value or not, it is directly connected to the fourth stage of KM because knowledge has little value without use (Dawson 2000). Though the application of knowledge is varied in accordance with business nature, the focus is still on how to make use of knowledge to improve the current value chains. The fifth stage of KM is knowledge evaluation. This phrase eliminates incorrect or outdated knowledge (Alavi et al. 1999). In other words, organization must keep creating new knowledge and to replace any knowledge that has become invalid (Dawson 2000).

![Figure 4: The five stages of knowledge management (Chait 1999 and Wiig 1997)](image)

Basically, HD composed of HD support staff and technical equipment. Nevertheless, the actual axis of the overall support process in HD is knowledge. When user requires technical support, this means s/he lacks sufficient IT related knowledge to carry on her/his duty. The HD staff is responsible to help to solve the problem by using knowledge reside in some sort of repository, such as human’s brain, database or technical manual. One can easily imagine the predicament if HD only contains staff and equipments. When the five stages of KM together with IT are applied to preserve technical knowledge in HD, the combination works perfectly well in preserving HD’s knowledge (see in figure 5). The technical knowledge is converted by both externalization and combination. Externalization is used to convert skill, technique, experience and perception from experts into explicit knowledge and combination is used to combine and revise explicit knowledge from manual, guidebook and training documentation into a more systematical organized knowledge. In this way, both types of knowledge are converted to a form that can be stored in the electronic repository. Structure Query Language (SQL) can be applied to allow the HD staff to retrieve the required knowledge from the repository. More advance techniques such as search engine, agent technology and artificial intelligence can also be applied to retrieve this knowledge. The retrieved knowledge is used to resolve user’s problem. The shorter product life cycle in IT also means the knowledge resides in the repository is required to be evaluated regularly in order to maintain its validity. The outdated knowledge is either renewed and stored into the repository or removed permanently from the repository. These five stages have provided a framework to preserve knowledge in the HD. Undoubtedly, in order to maximize its effect, a certain degree of customization may be required depending on the organizations.
Figure 5: The generic process of knowledge management in help desk environment

CONCEPTUAL RE-DISTRIBUTED KNOWLEDGE MANAGEMENT MODEL

The five stages of KM have standardized the process of organizing knowledge in the HD. What is more, the combination of KM and database technology enables the HD to manipulate enormous amount of knowledge in a structured way. Both tacit and explicit knowledge are converted in a form that can be stored in knowledge base. The knowledge can later be retrieved and used by HD staff and user. No doubt that KM succeeds in dealing with the loss of knowledge caused by BPR as well as downsizing, but is that all the contribution that KM can make to the HD industry? Nonetheless, the potential of KM is far beyond that: effective customization in KM has the capability to deal with the overloaded HD. The best method to enhance the overloaded HD is to develop a trouble-free system, but it is technically impossible up to this moment. Another way is to stop user from calling the HD. Researches conducted by Knapp and Woch (2002) as well as Dawson and Lewis (2001) have provided a clue to resolve HD’s challenge: The former indicates that 80% of calls request no specialized knowledge whereas the latter points out that close to 50% of calls to the ITS Help Desk at Deakin University are related to login name and password. Both researches confirm that a majority of incoming enquiries and technical difficulties are simple and routine. Rather than calling HD, users are capable of solving simple and routine technical problems themselves if sufficient knowledge and guideline are provided.

To ease the overloaded HD, we propose a conceptual model to re-distribute simple and routine enquiries in the KM process within the HD environment in order to improve the support process in the HD.

Let us define the phrase “simple and routine technical enquiries” first. Simple and routine technical enquiries in this paper are referred to technical problems that can be solved by user if adequate relevant information is provided without direct or indirect intervention from the HD staff. These enquiries can be categorized into four types: account and password enquiries, service guidelines, hardware and software enquiries and miscellaneous enquiries. The account enquiries include account setup, termination, maintenance, login problem and suspension, whereas password inquiries include password retrieval, reset, syntax information and password invalid. On the other hand, service guidelines refer to guidelines on hardware installation, software installation, software purchasing, hardware purchasing and service purchasing. The hardware and software enquiries include performance and functional concerns in relation to the hardware and software. The miscellaneous enquiries include queries on missing and corrupted files, unreachable website and server plus their performances.

The above categories may need to vary depending on the types of software and hardware, users, users’ skill sets and business processes. To identify routine and simple enquiries, we propose to use the reports generated by the HD Management System and the ACD. These reports provide data and information on problem type, resolution method, call duration (time required to solve the problem) and so on. By inspecting the reports in a regular manner, the HD manager can work out which enquiries are routine and simple. For example, the HD management report may have indicated that there were many enquiries about “email login failure” in which most of them were related to “password invalid” and the required resolution method was merely to “reset password”. Thus by matching the above information with call duration in the ACD report, the HD manager could confirm the enquiries as simple and routine because the duration for each call was short. However, the advice of the HD staff can never be overlooked. Hence the classifications of the enquiries that have been deduced by the HD manager must be verified by the HD staff to ensure the accuracy. The proposed mechanism of identifying simple and routine enquiries is illustrated in figure 6.
CONCLUSION AND FUTURE WORKS

The generic KM process enables HD to create, store, make available, use and evaluate both tacit and explicit knowledge. These five stages not only allow HD to manipulate enormous amount of knowledge, they also solve the problem of knowledge loss associated with BPR and downsizing. By adding the proposed simple and routine technical enquiries identifying mechanism and user self-help online KMS to the generic KM process, simple and routine technical enquiries are re-distributed in a way that users can look for their own solutions instead of calling HD. Since a sizeable amount of enquiries are now re-routed to the user self-help online KMS, HD staff can be freed up to handle high level support issues, to participate in proactive support activities and to attend regular trainings. From the user perspective, rather than waiting in a long queue for a simple resolution, user can look for the most appropriate solution simply by using the system regardless of time and geographical restrictions. Alternatively, for those who have complicated enquiries, the waiting and troubleshooting durations will now be shorter because more staff are available and fewer users are in the queue. This means the user can
now enjoy a better, quicker and more direct service. Economically speaking, the user online self-help KMS is an extremely cost-effective support method because the average cost for a web self-help transaction is four hundred times less than a telephone transaction and eighty times less than an email transaction (Broome et al. 2002). Finally, the potential to convert the radical habit in user’s dependence upon the HD as well as promote self-learning atmosphere cannot be overlooked as an old Chinese proverb says “Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime.”

Future Works
At the time of submitting this paper, a preliminary survey, in form of an online questionnaire, has been sent to IT HDs that belong to thirty-six universities in Australia. The aim of this survey is to identify which HD(s) is/are currently overwhelmed by simple and routine technical enquiries. To achieve the aim, questions in the survey are mainly focused on incoming enquiry patterns: the total number of incoming enquiries per month, the composition of incoming enquiries, the composition of incoming enquiry channels, the reasons for “an increase” / “a decrease” in the total amount of incoming enquiries over the past twelve months, the composition of the solution methods and the average resolution duration. This survey also tends to collect data relating to the general formation of the HD such as the size of its user base, the size of the HD support team, its operational hours, its support structure and model. To be eligible for HD that is overwhelmed by simple and routine enquiries, one of the major criteria is 50% or more of its incoming enquiries must be routine and simple. By the time of the conference, the analytical results of the preliminary survey will be available for presentation.

The eligible HD(s) will be invited to participate in the main survey. The purpose of the main survey is to empirically test the validity of the conceptual re-distributed KM model of this paper. A survey questionnaire will be employed for data collection. The population sample to be used for data collection will include at least one management staff and one representative from every support level within each eligible HD. A cover letter explaining the purpose of the survey and a detailed description of the re-distributed KM model will be included in the survey package and the package will be mailed with a prepaid envelope to the participants. There will be five open-ended questions in the survey (see table 1). A qualitative analysis of the empirical data collected from the survey will be carried out:

1) to validate if the actual challenges match those mentioned in this paper (Q1).

2) to validate if the definition and classification of simple and routine enquiries defined by HD practitioners match those defined in this paper. Further adjustment can be made based on HD practitioner’s opinion (Q2).

3) to validate if the conceptual model has the ability to ease the overloaded HD by re-distributing simple and routine enquiries. Further customization can be applied based on HD practitioner’s suggestion (Q3 and Q4).

4) to offer alternative solutions to assist HD providing efficient and effective service (Q5).

| Q1: What are the challenges in the HD (e.g. insufficient staff, lacking equipments, overwhelming calls)? How are these challenges hindered the HD from providing excellent service? |
| Q2: Do you agree the definition and classification of simple and routine technical enquiries defined in this survey? If no, please provide your definition(s) and/or classification(s). |
| Q3: Do you agree the conceptual re-distributed KM model has provided a way to ease HD’s challenges? Please give reason(s). |
| Q4: Do you have any suggestion(s) to further improve the conceptual re-distributed KM model? Please state suggestion(s). |
| Q5: Do you have any suggestion(s) (other than the conceptual model) to assist HD to provide efficient and effective service? Please state your suggestion(s). |

Table 1 Five open-ended questions in the main survey

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