Integration of KMS for IT Help Desk – A Case Study

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ABSTRACT
One of the greatest challenges of running an Information Technology (IT) helpdesk is ensuring whether the end users are provided with the right support at the right time. This can be perhaps met by integrating a Knowledge Management System (KMS) with the IT helpdesk. The amount of time spent for day to day call logs and support can be reduced to a great extent, if KMS is in place. KMS can also assist the IT helpdesk to handle the support requests efficiently by using the desired, best possible and proven knowledge assets that exist in the knowledge repository. This case study focuses on testing our KMS UAR (Usability Availability Relevance) model with the IT helpdesk for its effectiveness. The second part of the case study aims to evaluate the benefits of integrating KMS with the IT helpdesk system, by conducting an extended evaluation with real time IT helpdesk support team at all levels.

INTRODUCTION

Most of the companies require day-to-day dynamic and dedicated IT support, for supporting the business operations without any system hurdles. In this emerging technology market, most of the companies have modernized their operations using data centers with sophisticated technologies and tools. This also requires a global helpdesk support tool and/or call logging provision for handling day to day IT call logs. The IT helpdesk team usually depends on some software tool to handle support tickets, for example, Request tracking tool (RT), Remedy etc. Most of these software tools provide some level of built-in features and Frequently Asked Questions (FAQs) for handling simple and common support issues. This may not always be adequate with the current trends and challenges with IT support considering the complex application systems and services. KMS is a collective term that is used to describe the creation of knowledge repositories, with their respective interface components, improvement of knowledge access and sharing as well as communicating through collaboration, enhancing the knowledge environment, and managing knowledge as an asset for an organization. The Knowledge repositories and portals have to be built and integrated with the IT help desk systems. Most of the IT teams go through great pressure to make the efficiency gains, and to provide a faster, robust, accurate and consistent support to the end users. Hence, it is important to improve the productivity of IT helpdesk operations through some suitable methodology, such as an integrated and relevant KMS. Considering the floating job market, there is always a possibility of the support staff shifting from one role to another. When the skilled staff leaves organization, they are also carrying their skills, experience and more importantly their support knowledge with them, but with this provision, the support knowledge will be maintained in the KMS. The knowledge repository will be useful for reuse and sharing by the IT helpdesk support team. The integration of KMS induces the interest among the knowledge workers, to learn other challenging and interesting knowledge articles during their idle time, to face new and complex requests, scenarios and solve them as and when they are made. This KMS integration capability would also help the management team to reward the IT helpdesk staff who contributes to new and/or the best knowledge assets or articles, in the KM repository for handling IT requests. Moreover, it can serve as a place for consolidating the relevant and useful Knowledge assets. From the studies made on current industry practices, it is found that most organizations use their internal support team, or external IT support service providers who provide onsite and remote IT support. The Implementation of KMS leads to the Return of Investments (ROI) with indirect savings and benefits

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by reducing the cost, support duration or turnaround time by improving the support response and reducing the number of support requests. It is very critical to ensure that the required processes and interfaces are put in place to ensure that the necessary knowledge required for the IT helpdesk is properly identified, captured, managed, and kept up-to-date, in order to make the IT helpdesk effective.

The KM infrastructure includes the IT systems, networks, file servers, intranet and portals. KMS will be evaluated in multiple dimensions, using the metrics such as usability, availability, and relevance. The primary task in building and implementing a KM solution will be identifying, gathering and structuring our knowledge. One of the conclusions from Delone and McLean (2003) was that the success of a complex, multi-dimensional interdependent Information System (IS) requires careful attention to be paid to the definition and measurement of each dimension of the dependent variables. Despite the multidimensional and contingent nature of IS’S success, an attempt should be made to reduce significantly the number of measures used to measure IS’S success, so that the research results can be compared and the findings validated. Both the knowledge worker (Drucker, 1993) and expert labour think that knowledge management is important to any entity. Jennex and Offmann (2000) suggested that organizational learning increases the likelihood of KM’s success. Kaplan (2002) mention that knowledge repositories should be made up of the documents with knowledge embedded in them, such as memos, reports, presentations and articles. Wei Dai et al (2003) focused on the multi agent approach since KMS is a complex thing. The author discusses the requirement of an infrastructure, such as coordination, cooperation, classification, assignments and execution. Heo et al (2003) reported that the IS success model has different degrees of importance depending on the firm’s characteristics. Firms with more centralized computing, place their emphasis on performance measures, on the quality of the system, information, users’ satisfaction, use of the IS and organizational and individual’s impact.

Sedera et al (2004) have mentioned relevance as an important dimension of the Information quality, and it can vary from one system to another and hence, there is likely to be high variance in the information quality in the practice. Jennex and Offman (2005) proposed a success model based on the Delone and Mclean (1992) IS success model, which consists of a few key dimensions such as “System Quality”, “Knowledge/Information Quality”, “Use/User Satisfaction”, “Perceived Benefit” and Net Impact. The proposed model does not include Experts’ satisfaction or feedback, as suggested by other authors. For this case study, three levels of satisfaction, namely users, experts and management staff are considered. As per above-mentioned authors, once the KMS is built or implemented, it is important to determine success or effectiveness. Rusli Abdullah et al (2005) described the ways to create knowledge repositories, enhancing the knowledge environment and how to manage it. Mainly they emphasize the evaluation of KM efficiency. Some of the recommended categories and inputs of the psychological and cultural factors are considered, for designing a suitable KMS framework. Stacie Peter et al (2007), indicates that the D&M model is dependent on the organizational context, and researchers need to apply or customize the model after thoroughly understanding it. Doll and Torkzadeh (1998) developed a multidimensional instrument for technology utilisation for the three functions, such as decision support, work integration, and customer service. Measures like those applied in Sedera et al.’s (2004) multidimensional success measurement instrument provide higher content validity than a single dimensional success measure. The evaluation model should be flexible; thereby, the evaluator can decide the primary and secondary quality factors based on the purpose. Brun et al (2009), proposed a multidimensional knowledge assessment framework to assess the potential for knowledge maturing in the context of an enterprise. In the case of complex quality factors, they can be further divided in to sub factors and then the appropriate measures for the quality sub factors can be identified. Allee (1997) indicates that the KM framework refers to an integration of organizational knowledge in an organisational culture, information technology infrastructure and the organization’s store of individual and collective experiences, learning, insights, and values. Lindse (2001) defines KM effectiveness, in terms of Knowledge Infrastructure Capability and Knowledge Process Capability. Knowledge process capability usually represents the integration of the KM processes into the organization, whereas the infrastructure capability represents the knowledge sources and users, with the support of technology or network within the organization. Beate List et al (2001) described in detail about the expert knowledge captured by the evaluation process. Brun et al (2009), proposed a multidimensional knowledge assessment framework to assess the potential for knowledge maturing in the context of an enterprise.

1. Knowledge Repository & Taxonomy:
A knowledge repository should be comprehensive, accurate, well-structured, easy, simple and efficient to use, with hypertext links, searching tools, and built using Content Management System (CMS). Knowledge Taxonomy is a useful way to identify the required mapping between problems with the respective knowledge repository. In order to construct knowledge taxonomy, one must first define what the required knowledge is, and how it differs from information and data. Some of the best
ways to deal with Taxonomy for the Help desk, are categorizing problems as common, frequent or rare based on the occurrence of the problems, or the impact they have created in the IT systems. The solution to the problems should be stored as a knowledge asset inside the knowledge repository. Knowledge taxonomy for the IT helpdesk support system is mentioned in the figure 1. From the diagram, it is clear that the IT Helpdesk support types are service requests, incidents and help/information. Each support type can be further broken in to sub types; for example, a service request may be for performing a backup of some data/files or an installation and upgrading of antivirus software on the end user’s PC. The incident category can be an incident reported by the end users such as email not working. The help/information type can represent any sort of question or query raised by the end user, which requires some answer in the form of a text or document or an immediate response.

Fig. 1: Sample Knowledge Taxonomy for IT Helpdesk

2. Kms Architecture For It Helpdesk Integration:

The UAR KMS designed by Venkata et al (2011), is an enhanced and comprehensive KMS with multiple features and aspects of Knowledge Management. The UAR KMS has been designed as an integrated multifunctional system that can support all major knowledge management and processing activities. The main advantage of the proposed KMS technology framework is that, it contains both technological factors and all other supporting quality factors for KMS’ effectiveness. The proposed KMS technology framework has been applied to the database, and system support teams for a few companies, to validate its effectiveness. The proposed KM System Architecture found in Figure 2 comprises of several layers, as there are different types of knowledge stake holders, such as Knowledge Workers, who make use of the KMS, Knowledge experts, who review the quality of the knowledge shared and IT-Infrastructure staff who utilize and contribute to the KMS by evaluating the infrastructure components and enhancing the infrastructure. The management team, which aims to improve the customer satisfaction, should be involved as key stakeholders of the KMS. In addition to this system agents should be interfaced with KMS, which can collect the metrics through automatic feedbacks. The knowledge can be found in relational data stored in the database, data warehouse, non-relational data (internal applications, emails, messages, conference materials, files, documents, videos, audios, online books) and corporate/public social media tools. The KMS system should be interfaced with all sources of knowledge for IT helpdesk, to maximise the benefits for the IT helpdesk support staff to efficiently handle the support tickets, and also to support the clients in a better way. By constructing multi-modal agent services, the required knowledge can be extracted or converted, and then fed into the knowledge repository.

3. Kms integration process:

Most IT helpdesk tools are well equipped with call logging and request logging, which helps to track the status of the reported problems and issues. In conjunction with this, a repository of common problems and resolutions should be developed. This not only reduces the amount of knowledge to be remembered by the support staff, but also helps them to ensure that consistent responses are provided to the end users. The knowledge repository is also an excellent source of information for better planning and execution. This can usually be done by identifying the most common problems and/or service requests. The standard operating procedures or workarounds are usually provided to the IT helpdesk team. Such information will reduce the number of ‘simple’ calls to the help desk, which eases the workload, and allows the help desk staff to concentrate on the more difficult cases, rather than doing repeated tasks.

The first and foremost important step is to spend time in identifying the actual requirements from the IT helpdesk support engineers, on the most challenging issues and repeated occurrence of problems, which they get during their day-to-day system support works. This is to be ensured for the maximum benefit obtained with the help of the knowledge assets in the knowledge repository. The end product of these efforts should be a long list of desirable knowledge assets to be kept in the knowledge repository. Prioritising this list to produce a primary list of the key knowledge assets to be stored in the Knowledge repository, the lower priority items become a secondary list, to be tackled.
once the initial benefits of the KM activities have been realised. Once the requirements are identified, the knowledge assets should be classified and/or categorized and structured well in the KM repository database. Apart from this, the structure of menus and links should be uniform in the ticketing tool and knowledge portal. In addition, there exists a need to form a team which can assist in creating and updating contents in the knowledge repository as a daily or weekly activity. The second important step is to design and develop a KMS and integrate it with the IT helpdesk system. Figure 3 illustrates the graphical representation of the integration cycle.

![Fig. 2: Architecture of UAR KMS.](image)

Implementing Knowledge Repository:
A knowledge repository is usually built as a database system or file store, to be an online information resource. The knowledge repository should be built using the Content Management System or equivalent technology or customized method.

Implementing Interfaces:
It is recommended to use web-based technologies, and wherever possible integrate them into a single, seamless, and consistent interface for users. Most importantly, the interfaces should be linked in an appropriate way with the existing helpdesk tool, such as ticketing or request tracking or call logging tools. A well-designed search engine is a necessary interface towards meeting this goal.

Analyzing the Usage:
The KMS and its repositories, which are accessed by the knowledge workers, should be monitored periodically. Some of the ways in which this can be done, are listed below:
- Use standard web statistics such as hits and trends
- Identify search engine usage by logging all users of the search engine and summary reports showing the most common searches, along with the failed search terms.

Conduct Evaluation:
The Evaluation of the KMS and the benefits of integration of the KMS with the IT Helpdesk can be done through a simple manual or automatic feedback system. The evaluation aims to suggest the strengths and weaknesses of the KMS and report missing or incorrect knowledge assets in the repository.
Refine KMS and Interfaces:
Periodically KM Systems and interfaces have to be refined and updated based on the evaluation, dashboard and reports obtained from the helpdesk tool. Figure 4 illustrates an integration of the UAR KMS with the IT Helpdesk tool. The required knowledge assets for solving the IT helpdesk requests are built in the Knowledge Repository, and can be retrieved from it through Search Interfaces.

The required solution, best practice and/or FAQs can be found in multiple formats such as Text files, Word files, Excel Files, Images, Audio, Video, HTML, PDF etc. Hence, a multi-modal agent would be interfaced with the KMS, which will transform multiple source formats of the knowledge assets into a uniformed file type and stored in the Knowledge repository.

Fig. 4: Integration Interface.
Table 6: Average Score from Users and Experts.

<table>
<thead>
<tr>
<th>Allocation</th>
<th>Type</th>
<th>Derived Score from K-Seekers</th>
<th>Derived Score from K-Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>Weighted Dimension Group</td>
<td>3.16</td>
<td>3.24</td>
</tr>
<tr>
<td>10%</td>
<td>Non Weighted Dimension Group</td>
<td>0.45</td>
<td>0.45</td>
</tr>
<tr>
<td>Overall KM System Score</td>
<td>3.61</td>
<td>3.69</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Guideline Table.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale of 0 to 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding</td>
<td>4 to 5</td>
</tr>
<tr>
<td>Extremely Effective</td>
<td>3 to 4</td>
</tr>
<tr>
<td>Effective</td>
<td>2 to 3</td>
</tr>
<tr>
<td>Somewhat Usable</td>
<td>1 to 2</td>
</tr>
<tr>
<td>Not Usable</td>
<td>0 to 1</td>
</tr>
</tbody>
</table>

**Evaluation Methodology:**

The KMS and Knowledge Sharing Portal Effectiveness Evaluation cycle has multiple dimensions for evaluation such as Organizational-Level (1) evaluation, Users-Level (2) evaluation, Systems-Level (3) evaluation, Experts-Level (4) evaluation, and Infrastructure-Level evaluation (5). The supporting infrastructure and system’s capability should be thoroughly evaluated for assessing the effectiveness of the KMS. Hence, apart from the users’, experts’, and organizations’ feedback, the supporting infrastructure feedback should be considered as part of the evaluation cycle, apart from the evaluating process capability through users and experts. The KMS evaluation should be treated as a process that employs participants who are representatives of the target population to evaluate the degree to which the knowledge sharing portal meets the specific usability, availability and relevance criteria. This is an important consideration for this study, because the users involved, in the exercise frequently use the knowledge repository, portals & KMS. As part of evaluating the KMS, using Multi-Dimensional and Hybrid evaluation methods, the list of key metrics given below were developed for calculating the effectiveness of KM systems:

- **KMS_USABILITY_SCORE**
- **KMS_AVAILABILITY_SCORE**
- **KMS_RELEVANCE_SCORE**
- **KMS_INFRASTRUCTURE_SCORE**
- **KMS_MGMT_SCORE and**
- **KMS_SYSTEMS_SCORE**

The Effective Knowledge Share Score (EKSS) is a comparative measure of the Usability, Availability, Relevance and Search for Knowledge Assets, and UAR KMS, along with other supporting factors. It is a composite weighted average means of effectiveness measuring UAR_KMS for the IT helpdesk. It is used to distinguish whether the knowledge assets available in the knowledge repository are effective or not, and also to measure the impact of the knowledge being shared in the repository or portal, and its quality. The input and interim metrics needed for arriving EKSS are listed below:

- **WEIGHTED MEANS OF USABILITY SCORE (30%)** (WUS)
- **WEIGHTED MEANS OF AVAILABILITY SCORE (30%)** (WAS)
- **WEIGHTED MEANS OF RELEVANCE SCORE (30%)** (WRS)
- **KMS INFRASTRUCTURE, MANAGEMENT, SYSTEM SCORES (10%)** (NW_OS)

150 IT helpdesk professionals of all levels participated in this survey; they work for 24X7 Computing Services Private Limited. It is an IT service company which provides infrastructure, network, systems management and support for its domestic and international clients. The online survey focused on the three dimensions, namely, Usability, Availability and Relevance. The users were given a set of 27 questions with a five-point Likert scale score card. The online survey questions are found in Tables 8, 9 and 10 in the Appendix. Diwakar Krishnamurthy, et al (2011) have described the way of using Weighted Arithmetic Mean(WAM) for customer sessions; it has provided an option for using WAM for KMS evaluation, used in this case study for calculating weights. The main aspects of the normal user profiles of the participants were similar in the following ways:

- Knowledge Of Computing and using collaborative tools
- Professionals with moderate or intermediate IT helpdesk, systems and network support

The main aspects of the expert user profiles of the participants were similar in the following ways:

- Expert knowledge in the IT helpdesk and support
- Willingness to review and provide ranking in a constructive way
- Professionals with the right qualification and real time System and Network Administration experience of more than 5 years

Tables 1 and 2 contain the sample evaluation score obtained from both the normal and expert users. Tables 3 and 4 contain the evaluation measure for three dimensions, each with 30% weight for a total of 90%, and the remaining 10% has been calculated based on the feedback from the management staff, supporting infrastructure and background system measures. Table 5 contains non weighted measures considered for this evaluation.
Table 6 lists the overall derived score from K-seekers and K-Experts (L2 and L3 IT helpdesk staff). Table 11 has some sample management questions and Table 12 contains the infrastructure questions, which are found in the Appendix. The interface provision was created in the support ticketing tool to link with the KMS database/knowledge repository through the search facility. Every engineer will key in the type of problem or issue in the search list, and the search utility will fetch the list of relevant knowledge assets from the internal knowledge repository. If, the keywords are not found, a record will be created in the knowledge database, and an alert will be sent to the Knowledge Auditing and Management team to start working on new knowledge assets for the repeated problem. The rating from both users and experts are calculated between 3 and 4, and hence the KMS is effective and useful for the IT helpdesk support. The productivity improvement measures are derived, using a dashboard.

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The authors thank the team of 24x7 Computing Services Private Limited, Chennai, India, for their support and encouragement in implementing the UAR KMS in their organization. Their cooperation was invaluable for integrating the proposed KMS, knowledge repository and interfaces into their IT helpdesk tools in a short time frame. The authors also thank the entire IT helpdesk team who participated in the extended evaluation, in order to assess the effectiveness of the KMS and its benefits to their day to day IT helpdesk support.

4. Results:

The findings from the evaluation exercise indicate, that both knowledge seekers and knowledge providers responded favourably to most of the usability, availability and relevance measures of the IT helpdesk tool. Based on the users’ evaluation, the KMS effectiveness score was 3.61, whereas experts rated the effectiveness score as 3.69, on a scale of 0 to 5. As per the guidelines given in table 7, both the scores are between 3 and 4, which indicates, that the evaluated KMS used for the IT helpdesk has been extremely effective. The suggested integration method, KMS evaluation approach, metrics and rating mentioned in this case study, were helpful to archive the unused and irrelevant knowledge assets of the knowledge repository of the IT helpdesk team. Some of the key improvements identified are listed below:

- Number of support requests prior to the UAR KMS integration was 1,567 per month
- Number of support requests reduced to 896 per month post the integration
- Number of support requests prior to the UAR KMS integration was 2 per month
- Number of knowledge assets built prior to the UAR KMS integration was 144
- Number of new knowledge assets almost doubled, and went up to 320 post the integration

Conclusion:

In this case study, we have attempted to integrate the UAR KMS with the IT helpdesk system, to a) validate the effectiveness of the knowledge sharing and productivity of the IT helpdesk staff and b) reduce the turnaround time in fixing IT related issues using a knowledge repository. The UAR KMS complements the IT helpdesk support system by ensuring, that all the required knowledge assets of all types are reused and consolidated in a single KM repository using a Multi Modal Agent. This case study also concludes that there exists a need for building an efficient and easy-to-use search facility. The periodic evaluation of the KMS, the supporting infrastructure, interfaces and effectiveness metrics would be highly helpful to maximize the return on investments, and also provide a way for the management to identify the potential capabilities of the technical support team and areas of focus.

REFERENCES


