A Study to Analyze the Impact of Knowledge Management (KM) practices in IT Service Delivery Industry in India

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Abstract: Information Technology (IT) Industry in India is growing fast. Organizations across the world are outsourcing the IT services to take advantage of cost and time differences. India plays vital role in supporting the outsourcing services by taking advantage of the language skills and skilled workforce. Knowledge Management (KM) is critical for the continuity of the services and success of the organisations in different domains. This paper analysis the impact of Knowledge Management in Information Technology (IT) Service Delivery Industry in India. The study reveals Knowledge Management improves the performance of the Service Delivery organization. Methodical implementation and continuous improvement of Knowledge Management practices would further accelerate and improve the customer experience.

Key Words: Knowledge Management, Information Technology, Service Delivery Industry

1. INTRODUCTION
Global business environment becomes increasingly competitive day by day. There is a growing need for service-based organizations to adopt the best practices, tools and methodologies as part of implementation of Information Technology Service Management (ITSM). Information Technology service provider organizations have either implemented or in the process of implementing the Information Technology Infrastructure Library (ITIL) framework to continuously measure and monitor their Information Technology operations to improve service delivery and customer satisfaction. Knowledge Administration is a critical step in Service evolution phase of Information Technology Service Management. While few larger service providers through experience have matured their service management process over the years, many small, medium, and few large organizations still face significant challenges in improving service management processes. Repeatable processes and services could be automated by combining various automation tools available in the market for knowledge management and Information Technology service management.

1.1 Global Information Technology Industry
Recent Market report of Gartner says that the spending of entire international IT sector that include IT solutions, data center systems, business applications and telecom providers is likely to exceed $3.7 trillion during 2019, which shows an improvement of 4.5% over 2018. This growth in international IT sector started in 2018 and is expected to grow in the future too.

Today the greatest and fastest growing segment in the International IT sector is the Internet of Things (IoT). It has grown at an astonishing rate of 30% within a five-year span from $700 million in 2016 and is expected to be over $2 billion by 2021.

1.2 Information Technology Industry in India
Information Technology in India is growing at a rapid pace. It comprises of two components namely - IT services and business process outsourcing (BPO). The sector has gone from contributing 1.2% to India’s GDP in 1998 to 7.7% in 2017. Based on the data released by NASSCOM, the sector aggregated revenues of US$180 billion in 2019 growing by over 13%. The export revenue was recorded at US$99 billion and domestic revenue at US$48 billion. As of 2020, more than 4.36 million employees were accounted as India's IT workforce. United States is the largest employer accounting for about two-thirds of India's IT service exports.

1.3 IT Service Delivery
IT Service Delivery refers to the way in which an organisation provides users access to IT services that include Infrastructure, Applications, data storage and other business resources. They cover design, development,
deployment, operation and retirement. These stages of service delivery are executed by IT professionals. Quality of IT service delivery is evaluated by metrics that are included in the service level agreement (SLA).

1.4 Knowledge Management
Knowledge management is the conscious process of defining, structuring, retaining and sharing the knowledge and experience of employees within an organization. The main goal of knowledge management is to improve an organization's efficiency and save knowledge within the company. Successful knowledge management will improve an organization in several ways. It will ensure that the specialized knowledge of employees does not leave with them or go unutilized by other employees who would benefit from that knowledge. It allows for better situational awareness, as well as opening doors for learning about best practices, lessons learned, and overall organizational improvement.

1.5 Knowledge Management in India
Knowledge Management is a relatively new but a fast emerging concept in India. It promotes integrated approach to identifying, managing and sharing information assets of an organization. The information assets may include but are not restricted to databases, documents, policies, procedures and also expertise in employees.

1.6 Knowledge Management in Organisations
Organizations rely heavily on the Knowledge to support the business. Advances in technology, innovations and policies are practically every day evolving globally. Knowledge management (KM) is a serious and vibrant structural resource that helps in the global competitive business environment to reach competence, effectiveness and viable gain. In the new Digital Evolution Information Technology (IT) is a key driver of many business functions. Knowledge Management is a key component of service management which plays the major role.

2. OBJECTIVE

A Study to analyze the impact of Knowledge Management (KM) practices in IT Service Delivery Industry in India. Large IT organizations with minimum of 50,000 employees and having offices in multiple locations providing 10+ years of service in India are considered for the study.

3. METHODOLOGY

We have used both primary and secondary data for this study. The primary data was gathered from stakeholders as part of weekly service delivery review meetings observations. Primary qualitative data was collected through observation due to time limitation and to minimize the cost of data collection. The secondary quantitative data was gathered from Service Now IT Service Management Configuration Management Data Base (CMDB). The category of Organizations taken for study are IT service delivery companies operating out of India. Most of the large IT service companies in India having more than 10 years with minimum of 50,000 employees and having offices in multiple locations in India are considered for the study. Research is being done as a part time basis, availability of researcher time, cost and efforts are limitations.

4. ANALYSIS

We have considered IT organizations having more than 50000 employees and operating out of multiple locations in India. Considering the time, efforts and cost, we have selected one IT organization for this study. We have taken 12 months primary and secondary ticket data for the analysis. The data categories contain both incident and Service request tickets. The KM implementation started prior to data analysis period and improvements have been continuously implemented on ongoing basis.

The below table-1 and graph-1 gives an overall monthly combined ticket trend for Incidents and Service requests serviced by the organization. The overall ticket volume is in decreasing trend due to KM implementation.

Table-1: Monthly ticket trend combined (Incidents and Service Requests)

| Month | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|
| Tickets | 2045 | 2189 | 2098 | 1897 | 2058 | 1721 | 1865 | 1576 | 1456 | 1510 | 1397 | 1340 | 21152 |
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Graph -1: Monthly ticket trend combined (Incidents and Service Requests)

The below table-2 and graph-2 gives monthly ticket trend for Incidents and Service requests serviced by the organization. The overall ticket volume is in decreasing trend for both Incident and Service request. The incident is contributing to 64% of overall volume and service request is contributing to 36% of overall volume.

Table -2: Monthly ticket trend - Incidents and Service Requests

| Month    | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Incident | 1443   | 1366   | 1271   | 1179   | 1399   | 1056   | 1132   | 1067   | 912    | 991    | 895    | 867    | 13581      |
| Service Request | 602 | 823   | 827   | 718   | 659   | 662   | 733   | 509    | 544    | 519    | 502    | 473    | 7571       |
| Grand Total | 2045 | 2189   | 2098   | 1897   | 2058   | 1721   | 1865   | 1576   | 1456   | 1510   | 1397   | 1340   | 21152      |

Graph-2: Monthly ticket trend - Incidents and Service Requests

The below table-3 and graph-3 gives an overall monthly combined ticket trend for Incidents and Service requests serviced by the organization by location. The volume contribution from Bangalore is 9%, Chennai is 20%, Hyderabad is 24%, Indore is 9%, Mumbai is 2% and Noida is 37%.
Table -3: Location wise Monthly ticket trend combined (Incidents and Service Requests)

| Month    | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Bangalore| 129    | 168    | 224    | 165    | 215    | 180    | 154    | 135    | 117    | 128    | 119    | 107    | 1841        |
| Chennai  | 411    | 431    | 535    | 403    | 383    | 353    | 368    | 303    | 266    | 289    | 287    | 274    | 4303        |
| Hyderabad| 524    | 555    | 441    | 405    | 488    | 421    | 454    | 385    | 352    | 346    | 340    | 326    | 5037        |
| Indore   | 198    | 212    | 189    | 149    | 176    | 156    | 126    | 113    | 119    | 123    | 117    | 1824    |             |
| Mumbai   | 34     | 42     | 29     | 31     | 41     | 25     | 34     | 34     | 26     | 31     | 27     | 23     | 377         |
| Noida    | 749    | 781    | 680    | 744    | 755    | 596    | 699    | 593    | 582    | 597    | 501    | 493    | 7770        |
| Grand Total | 2045  | 2189   | 2098   | 1897   | 2058   | 1865   | 1576   | 1456   | 1510   | 1397   | 1340   | 21152   |             |

Graph-3: Location wise Monthly ticket trend combined (Incidents and Service Requests)

The below table-4 and graph-4 gives monthly ticket trend for Incidents serviced by the organization by location. The volume contribution from Bangalore is 7%, Chennai is 21%, Hyderabad is 25%, Indore is 9%, Mumbai is 2% and Noida is 36%.

Table -4: Location wise Monthly ticket trend – Incidents

| Month      | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Incident   | 1443   | 1366   | 1271   | 1179   | 1399   | 1059   | 1132   | 1067   | 912    | 991    | 895    | 867    | 13581       |
| Bangalore  | 72     | 99     | 96     | 95     | 98     | 93     | 91     | 70     | 68     | 73     | 62     | 64     | 981         |
| Chennai    | 289    | 267    | 260    | 224    | 284    | 182    | 224    | 256    | 214    | 249    | 214    | 203    | 2866        |
| Hyderabad  | 393    | 341    | 256    | 253    | 337    | 285    | 316    | 262    | 248    | 253    | 215    | 210    | 3369        |
| Indore     | 136    | 129    | 146    | 101    | 149    | 106    | 136    | 77     | 68     | 66     | 63     | 62     | 1239        |
| Mumbai     | 23     | 34     | 24     | 21     | 38     | 16     | 27     | 30     | 21     | 27     | 16     | 19     | 296         |
| Noida      | 530    | 496    | 489    | 485    | 493    | 377    | 338    | 372    | 293    | 323    | 325    | 309    | 4830        |
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Graph-4: Location wise Monthly ticket trend - Incidents

The below table-5 and graph-5 gives monthly ticket trend for Service request serviced by the organization by location. The volume contribution from Bangalore is 11%, Chennai is 19%, Hyderabad is 22%, Indore is 8%, Mumbai is 1% and Noida is 39%.

Table -5: Location wise Monthly ticket trend - Service Requests

| Month  | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Service Request | 602    | 823    | 827    | 718    | 659    | 662    | 733    | 509    | 544    | 519    | 502    | 473    | 7571        |
| Bangalore       | 57     | 69     | 128    | 70     | 117    | 87     | 63     | 65     | 49     | 55     | 57     | 43     | 860         |
| Chennai         | 122    | 164    | 275    | 179    | 99     | 171    | 144    | 47     | 52     | 40     | 73     | 71     | 1437        |
| Hyderabad       | 131    | 214    | 185    | 152    | 151    | 136    | 138    | 123    | 104    | 93     | 125    | 116    | 1668        |
| Indore          | 62     | 83     | 43     | 48     | 27     | 40     | 20     | 49     | 45     | 53     | 60     | 55     | 585         |
| Mumbai          | 11     | 8      | 5      | 10     | 3      | 9      | 7      | 4      | 5      | 4      | 11     | 4      | 81          |
| Noida           | 219    | 285    | 191    | 259    | 262    | 219    | 361    | 221    | 289    | 274    | 176    | 184    | 2940        |

Graph-5: Location wise Monthly ticket trend - Service Requests
The below table-6 and graph-6 gives monthly ticket trend for Incidents -High level categories serviced by the organization. The volume contribution for Application software is 2%, Data center is 15%, End user computing is 32.5%, Interface Infra is 3%, Network is 14%, Security Software is 0.5% and System Software is 33%.

Table -6: Monthly ticket trend - Incidents (High level Categories)

| Month         | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Gran Total |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
| Incident      | 1443   | 1366   | 1271   | 1179   | 1399   | 1059   | 1132   | 1067   | 912    | 991    | 895    | 867    | 11450      |
| Application Software | 35     | 33     | 32     | 17     | 31     | 18     | 21     | 17     | 14     | 11     | 3      | 3      | 192       |
| Data center   | 259    | 229    | 201    | 158    | 219    | 158    | 162    | 165    | 124    | 149    | 161    | 156    | 1710      |
| End user computing | 543    | 498    | 415    | 379    | 499    | 363    | 384    | 359    | 311    | 333    | 270    | 264    | 3735      |
| Interface Infra | 48     | 41     | 34     | 74     | 45     | 17     | 13     | 20     | 21     | 24     | 29     | 26     | 314       |
| Network       | 311    | 256    | 223    | 198    | 227    | 165    | 196    | 156    | 138    | 133    | 102    | 97     | 1631      |
| Security Software | 5      | 5      | 3      | 5      | 7      | 3      | 4      | 2      | 1      | 1      | 3      | 2      | 42        |
| System Software | 242    | 304    | 363    | 348    | 371    | 335    | 352    | 348    | 303    | 340    | 327    | 319    | 3826      |

Graph-6: Monthly ticket trend - Incidents (High level Categories)

The below table-7 and graph-7 gives monthly ticket trend for Service request - High level categories serviced by the organization. The volume contribution for Application software is 47%, End user computing is 45%, Middleware software is 1%, Network-Vpn Client is 2% and Hardware upgradation is 5%.
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Table –7: Monthly ticket trend - Service Requests (High level Categories)

| Month          | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Service Request| 602    | 823    | 827    | 718    | 659    | 662    | 733    | 509    | 544    | 519    | 502    | 473    | 7571       |
| Application Software| 269   | 368    | 360    | 336    | 310    | 316    | 360    | 255    | 282    | 252    | 238    | 222    | 3568       |
| End user computing| 270   | 392    | 393    | 332    | 310    | 280    | 307    | 228    | 236    | 231    | 218    | 209    | 3406       |
| Middleware software| 5     | 9      | 7      | 3      | 1      | 5      | 4      | 2      | 2      | 3      | 1      | 1      | 43         |
| Network-VPN Client| 14    | 18     | 14     | 3      | 9      | 17     | 13     | 3      | 1      | 7      | 18     | 16     | 133        |
| Hardware upgradation| 44    | 36     | 53     | 44     | 29     | 44     | 49     | 21     | 23     | 26     | 27     | 25     | 421        |

Graph-7: Monthly ticket trend - Service Requests (High level Categories)

The below table-8 and graph-8 gives an overall monthly Knowledge articles created, and knowledge article utilized by the support team. The articles created and utilized percentage is in increasing trend as part of KM implementation.

Table -8: Monthly Knowledge Article Creation & Usage trend

| Month    | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| KA Created| 50     | 60     | 78     | 96     | 125    | 165    | 204    | 273    | 338    | 423    | 547    | 610    | 2969       |
| KA Utilized| 2      | 5      | 8      | 14     | 20     | 32     | 45     | 54     | 67     | 89     | 95     | 112    | 543        |
Graph-8: Monthly Knowledge Article Creation & Usage trend

The below table-9 and graph-9 gives an overall monthly customer satisfaction trend for an year. The customer satisfaction level is increasing on month on month basis.

Table -9: Monthly Customer Satisfaction trend

| Month    | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| CSAT     | 75     | 72     | 68     | 77     | 81     | 75     | 86     | 88     | 79     | 91     | 90     | 92     | 974         |

Graph-9: Monthly Customer Satisfaction trend

The below table-10 and graph-10 gives an overall monthly customer contact channel ticket trend for Incidents and Service requests serviced by the organization. The volume contribution for Voice is 7%, Chat is 74%, Email is 15% and Self Service is 4%.
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Table -10: Monthly Contact Channel trend combined (Incidents & Service Requests)

| Month   | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Tickets | 2045   | 2189   | 2098   | 1897   | 2058   | 1721   | 1865   | 1576   | 1456   | 1510   | 1397   | 1340   | 21152      |
| Voice   | 198    | 114    | 142    | 114    | 156    | 130    | 97     | 77     | 117    | 122    | 89     | 1413   |
| Chat    | 1525   | 174    | 164    | 147    | 154    | 129    | 1365   | 1140   | 1044   | 1094   | 916    | 879   | 15619      |
| Email   | 290    | 294    | 274    | 263    | 303    | 235    | 328    | 295    | 234    | 237    | 234    | 230    | 3217       |
| Self Service | 32 | 35 | 38 | 44 | 50 | 62 | 75 | 84 | 97 | 119 | 125 | 142 | 903 |

Graph-10: Monthly Contact Channel trend combined (Incidents & Service Requests)

The below table-11 and graph-11 gives an overall monthly customer contact channel ticket trend for Incidents serviced by the organization. The volume contribution for Voice is 4.5%, Chat is 70%, Email is 19% and Self Service is 6.5%.

Table -11: Monthly Contact Channel trend (Incidents)

| Month   | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Incidents | 1443   | 136    | 127    | 117    | 139    | 105    | 1132   | 106    | 912    | 991    | 895    | 867    | 13581      |
| Voice    | 114    | 48     | 56     | 35     | 75     | 52     | 28     | 23     | 17     | 76     | 77     | 30     | 631        |
| Chat     | 1072   | 104    | 956    | 893    | 103    | 767    | 774    | 719    | 599    | 611    | 506    | 504    | 9482       |
| Email    | 225    | 236    | 221    | 207    | 240    | 178    | 255    | 241    | 199    | 185    | 187    | 191    | 2565       |
| Self Service | 32 | 35 | 38 | 44 | 50 | 62 | 75 | 84 | 97 | 119 | 125 | 142 | 903 |

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Graph-11: Monthly Contact Channel trend (Incidents)

The below table-12 and graph-12 gives an overall monthly customer contact channel ticket trend for Service request serviced by the organization. The volume contribution for Voice is 10%, Chat is 81% and Email is 9%.

Table-12: Monthly Contact Channel trend (Service Requests)

| Month   | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | Grand Total |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| Service Request | 602    | 823    | 827    | 718    | 659    | 662    | 733    | 509    | 544    | 519    | 502    | 473    | 7571        |
| Voice   | 84     | 66     | 86     | 79     | 81     | 78     | 69     | 34     | 60     | 41     | 45     | 59     | 782         |
| Chat    | 453    | 699    | 688    | 583    | 515    | 527    | 591    | 421    | 449    | 426    | 410    | 375    | 6137        |
| Email   | 65     | 58     | 53     | 56     | 63     | 57     | 73     | 54     | 35     | 52     | 47     | 39     | 652         |
| Self Service | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0           |

Graph-12: Monthly Contact Channel trend (Service Requests)
5. FINDINGS AND RECOMMENDATIONS
Systematic Knowledge Management implementation in the IT Service Delivery organization helps to better track the tickets raised by the customers, provides self-service opportunities for the customers and improves the support response and resolution time. Continuous Service improvement activities helps to accelerate service management and Knowledgement Management activities. The analyses reveals the ticket volume trend is getting reduced over the period of time and overall Customer satisfaction is improving month on month basis. The adoption of KM shows improvement as both Knowledge article creation and usage by the support team is evident. Self service channel is utilized for incident tickets, but the same could be leveraged for service request tickets to improve the support cycle time and further customer satisfaction.

6. CONCLUSIONS
The study shows Knowledge Management (KM) practice implementation and usage in IT Service Delivery Industry in India is having positive impact. Considering time, cost and effort, one of the large IT organization with 50,000 employees and having offices in multiple locations providing 10+ years of service in India was chosen for conducting the study. This study used one year primary and secondary data consisting of incidents and requests registered by the customers. The knowledge article creation and usage trend shows consistent improvement month on month basis, which is an indication of the benefits seen by the stakeholders. The customer satisfaction is consistently on the positive trend and self-service channel usage for incident reporting and resolution is encouraging. The Self-service channel could be leveraged for Service Requests as well. Overall Knowledge management contributes to the betterment of the service levels and improves the customer satisfaction. Knowledge Management creates a positive environment by having all the implicit and explicit knowledge documented, utilized, reviewed and improved as part of continuous improvement cycle.

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