

# Study on Indian Outlook for Considering IT based KM Tool for Promoting S & T in India At Global Level

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**Abstract**— Knowledge is helpful in organizations to develop and exploit resources, to improve their competitiveness and to develop sustainable competitive advantages. KM plans to manage on knowledge by organizing formal and direct method to manage organizational knowledge in the workplace. As India is emerging as a super power and Indian scientific landscape is witnessing a rampant change with an impressive growth. The total output of Indian S&T is progress year after year still needs attention at the global level. The citation impact of Indian publications must increase and match at least the global average. Though the knowledge commission has implemented various interesting schemes for the promotion of Indian S & T, however no study in the past has been done to understand and explore the factor those are inhibitors and facilitator. The current study would help to understand the factors responsible for the growth of the scientific culture in India as well as identify the right set of Knowledge management initiative.

**Keywords**—Knowledge Management (KM); S & T India;

## I. INTRODUCTION

India is known for distinguished class of being a country with immense knowledge, learning and culture at the global level and entire world recognizes it as a potential country for world's future. However, the lack of proper knowledge infrastructure has affected its vision to be a home for world class research. Nevertheless, the change can be manifested through the development of knowledge oriented economy i.e. the infrastructure of knowledge management.

The practice of knowledge management has its application in various fields and at different levels. Managing knowledge is a good practice to be adopted by individuals on a micro level and in various organizations and bodies on a macro scale. It helps the users in researching and updating oneself before starting a new venture. It acts as an asset which can reap benefits if harnessed properly. With the initiative of IT based KM these benefits become manifold by enabling its users to easily share the created knowledge and accessing the created knowledge pool irrespective of the time zones, thereby inculcating a collaborative spirit among the users. In our country this IT based initiative for KM has been successfully implemented in some areas which have been listed below [1].

- Disaster Management programme monitoring tool.
- Disaster Risk Management programme monitoring tool.
- National Programme for Capacity Building of Engineers for Earthquake Risk Management (NPCBEERM) / National Programme for Capacity Building of Architects for Earthquake Risk Management (NPCBAERM) programme monitoring tool.
- Map centres.
- Automatic content updating facilities.
- Emergency contact management facilities.

Similarly the Government of India (GoI) has initiated a so called "NKN connecting knowledge institution". The Platform has been created with the mindset that the stakeholders of knowledge creation, dissemination in various areas like research laboratories, universities and other institutions of higher learning to get connected with the aim of providing a platform that should be available as a backbone network to connect the stakeholders. The services available at this platform are broadly classified as Generic services, community services, special service where-Generic services: relates with all ICT services, Community services: establishing connectivity with Eurogrid, content dissemination, Special service: VPN facilities.

The portal has been designed comprehensively. However, it may be evaluated critically. It emphasized the objective of connecting the stakeholders in a common platform with the intent of sharing knowledge for educational need. The platform is restrictive in the sense of the existing knowledge base availability and an integrated engine that could help to provide the knowledge for researchers. In the absence of such integrated and comprehensive KM tool the long term goals could not be addressed appropriately and the initiative to boost science and technology would be restrictive.

The current study would analyze the gap for transforming National Knowledge Network as National Knowledge Management Network. The survey would explore domain of understanding IT as a key driver for the promotion, the socio-economic influence, stakeholders involved and their responsibilities, inhibitors for IT based KMI and the suggestion on development of a comprehensive system.

# These are personal views of the author and not of the office to which he is attached

## II. BACKGROUND

To achieve the objective of the study, it is imperative to understand the current situation and similar study done in this subject. The topic under study press the need to conduct literature review from two different perceptive i.e., from the angel of Indian scientific reach and landscape against the global scientific landscape as well as the impact of IT as a tool for Knowledge management to boost Indian Science & Technology.

India as a country has always recognized Science and technology as a key priority of the nation's vision to be called as a developed nation. Looking back to the various initiative like government directives such as the Scientific Policy Resolution (1958), the Technology Policy Statement (1983), Science and Technology Policy (2003) and Science, Technology and Innovation Policy (2013). Similarly the space program, the energy program etc. were clear manifestation of the fact that scientific foundations were key priority for India. However, in the changing global landscape of science and technology the relative strength of Indian research and development was eroding in the last two decades. [2]

Thomson Reuter in 2012 has conducted very interesting studies for Indian Government to investigate the trend of Indian scientific Exposure. The study indicates a growth rate of 66% with an average growth rate of 13%. It can be seen through figure- 1 projecting the Indian scientific contribution at global level, the figure is divided into four quadrants to depict the area of Indian scientific strength. However, if we look at the y axis, it is revealing that the total percentage is less than 3.5 % of the world total output.

Nevertheless, if we look at the ratio of the quality vs. quantity the results are not such promising as can be seen that the un-cited paper are on high class. The report indicated that the Indian scientific community should explore all the possible means to quality and total scientific outcome [3]. The real challenge is to connect the entire stakeholder through a system like a knowledge management system. Development of system that provide almost one roof solution to the knowledge stakeholder KM is used to represent, organize, create usage, and evaluate knowledge in its many forms

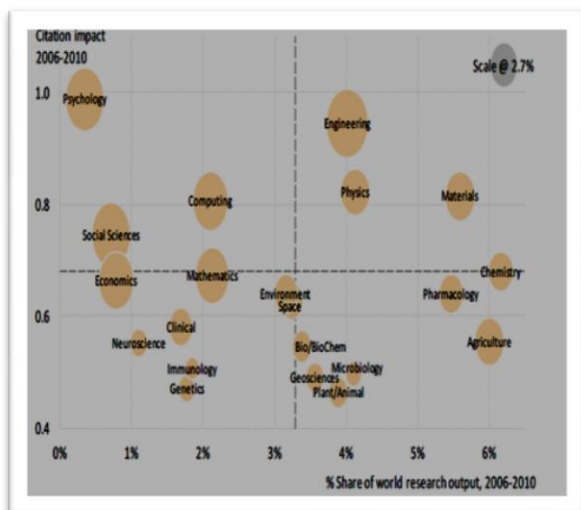


Figure 1: Scatter plot for world's research output [2]

To build effective technologies for KM, further understanding is needed on how individuals, and/or organizations use knowledge.

Gallupe (2001) [4] states that KM is an information management tools. They should be capable of handling the richness, the content, & the context of the information. The essentials of the building block of KM should be knowledge generation, codification and transference. Ruggles 1997 [5] express not all IT based tools can qualify the definition of KM tool. Tsui [6] KM tools have seen many improvements since the year 2000. These tools are broadly classified as data and text mining. Groupware, Intranet, knowledge bases, Taxonomy, Ontologies.

## III. SCOPE OF THE RESEARCH

The current research envisaged the need to explore the new trajectory i.e the trajectory of knowledge management. The challenge is that creation of such system requires a thorough investigation for understanding the dynamics of the knowledge management system. The study would help the key stakeholders to consider the result as the input for creating a coherent system.

### A. Research Methodology

The research study combines qualitative and quantitative techniques over three major parts which results in three findings at different. The combination of these two techniques yield better result and provide a strong foundation for analysis, kalplan et al. [7]. The qualitative analysis in the research methodology is in lines with the grounded theory research strategy [8, 9].

The first questionnaire had been floated generously to corporate and academic to record their responses. The response has been recorded with 136 users, 84 generators, 26 system administrator and 14 funding agencies through online survey that further helps in identification of element for different construct for measurement and also for the analysis using statistical techniques to derive the results. The second questionnaire is exhaustive and consisted of almost 24 question representing six parameter extracted through analysis of first questionnaire, to examine the status of the knowledge management of the organization. The response for the second questionnaire has been recorded either through online survey or direct interview with 136 users, 86 generator, 24 System Administrator and 14 funding agencies. The sample size is relatively less as this is the only way to validate the result of the parameter identified that can claim to give better results.

The current study has been conducted with the help of response recorded through a questionnaire that was uploaded at <https://www.surveymonkey.com/s/FCBNZ93> website. The questionnaire has been developed keeping five variables into consideration i.e,

- IT as a key driver for KM in India,
- The number of stakeholders Involved and their responsibilities: (Stakeholder)
- Development of the system that would promote, connect and achieve the mission
- The influence of socio-cultural in IT based KMI. (Socio-cultural)
- Inhibitors for IT Based solution for KMI in S&T in India

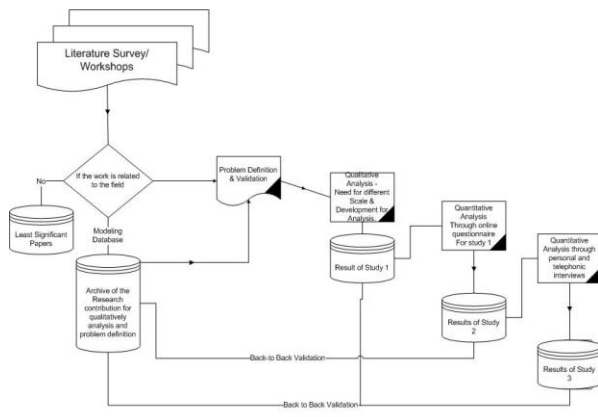


Figure 2: Research Methodology

IV. RESULTS AND FINDINGS

A. Variable 1: IT as a key driver for KM in India

Figure 3 depicts that majority of the respondents feels that KM would help the organizations in resource creation i.e, time and finance. The second preferred option is that KM helps the organization to bring the knowledge experts in one platform. The interesting observation is that the organization have almost close ties for all the option i.e., availability of Knowledge experts, information technology application, resources and correct guidance. This indicates that KM has a multifaceted impact to the organization and can align the justification for organization to adopt the KM in their organization.

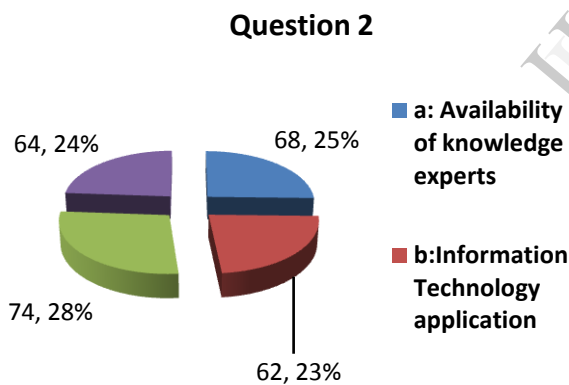


Figure 3: Factors responsible for KM adoption in Indian Context

Figure 4 depict that KM has many building block and majority of the solution available in the market are not visible and to validate our stakeholder and their opinion. It is clearly manifested that 40% are of the opinion that they have heard but not seen. The same question is also recording the fact that which medium would be most convenient and it can be seen that 33% of the total population believe that IT has the potential to deliver the building block of the KM.

Question 7

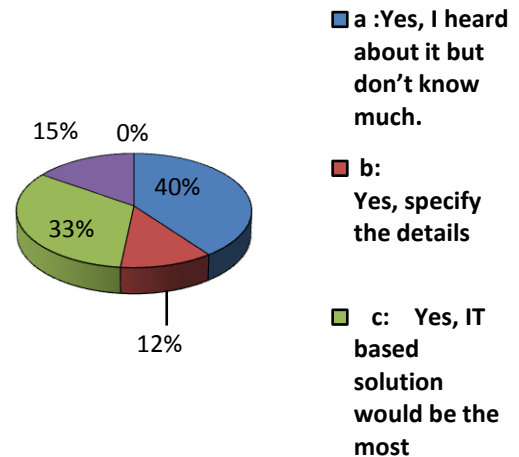


Figure 4: The coverage and awareness of KM at the Organization level

B. Variable 2: The number of stakeholders Involved and their responsibilities

Figure 5 is an interesting finding that justifies that typical modules that exist in KMI are acquisition, creation, transference, utilization and retention which is mapped with the roles like Users, generators, system administrator and funding agencies. Interesting it can be seen that acquisition module is best mapped with generator and system administrator and has a distribution of 30%. It is indicating that generator and system administrator can be defined as the one who captures the information and make the information register to the IT based system. Few are of the believe that the User also has his role in acquisition and this indirectly means that still the relationship of different roles and their corresponding modules in KMI is not very clear and need some training and awareness to create a correct solution. Similarly it can be seen through (creation) Figure 5 that majority of the respondents believe that Transforming and combining the gathered information to a meaningful result, Prioritizing the research directions, evolving flexible schemes and informing the target audience comes under the responsibility of generator and funding agency. This indicates that the system that has to be designed for promotion of S&T through KMI should create a system that should help the funding agencies to utilize those systems for decision making that help them to prioritize research direction disseminating it to the intended audience. The system designed in the absence of any such functionality would not serve the purpose of the KMI in its totality. Transference module of KM is related with Ensuring specialized knowledge distribution and availability to the users and it is one of the critical services of the KM tool. The module helps in distribution of the knowledge wealth to the intended user and ensures that the correctness of the information and its relevance should be maintained. It can be seen in question 3 figure 6 that majority of the respondents feel that system administrator which hold an 27 % of the population size is responsible for this role. However, 22 % believe that it should be responsibility of all roles for transference. Utilization module of the KM is dedicated to the User and interestingly the respondents are of the opinion that 24 % of the population believe it to be dedicate only to the

user and 24 % believe it to be for all the roles and it is clearly evident in question 4 through figure 6.

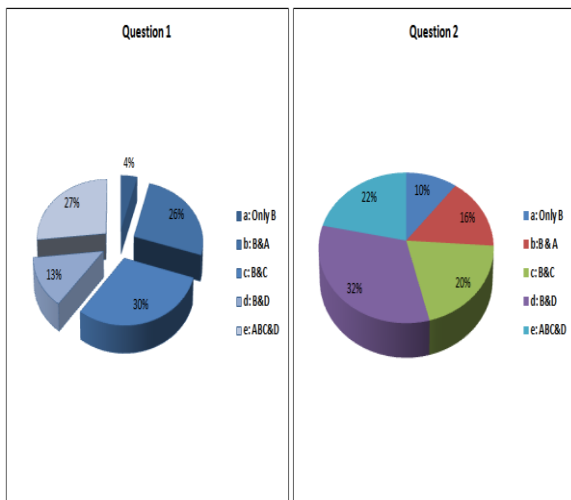


Figure 5: KM Module distribution and Ranking.

Undoubtedly, the knowledge wealth can be used by across all roles but when a specific role for e.g., creator uses the knowledge wealth he will be termed as user and not the creation and this indicated the any KM that should be designed should always educate and train the audience to avoid ambiguity in developing the tool. The retention module is related with storing, securing the knowledge and periodically ensuring the relevance of the content based upon user preference and usage pattern. Ideally it should be the key responsibility of the knowledge creator to estimate the relevance of the subject matter but this measurement is not that easy and therefore the system administration should have control to understand the relevance based on the usage of the content. The system administrator should also be concerned with the efficacy of the information and therefore proper technical control should be designed to make the system robust enough from compromising it with wrong doers. If we look at the responses, it is evident that the majority of respondents are of the believe that system administrator should be responsible for this module and account 27 % of the total population as can be seen in question 5 figure 6 .

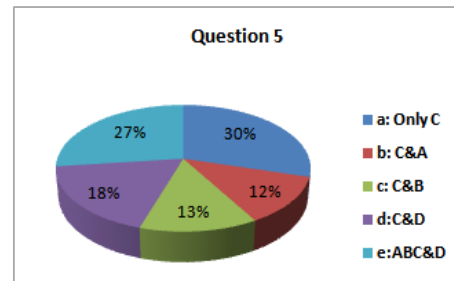
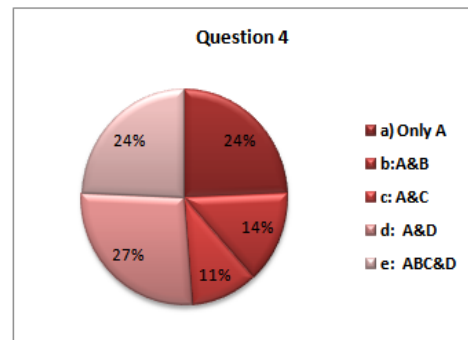
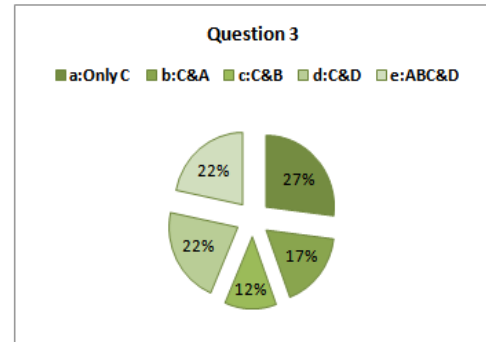


Figure 6: Distribution of KM Module Vs Job Roles.

C. Variable 3: Development of the system that would promote, connect and achieve the mission

As we can see that IT based KM tool has the potential to the best tool for S&T promotion and therefore the essential service should be evaluation that will support the organization to examine the size and scope of the KM solution. The most important of all services is the search and retrieval as indicated by much other research in different part of the world. To validate the same in Indian context, we have requested the respondent with three option i.e., the search and retrieval for IT based KM is Essential, Secondary or non Essential. It is clearly manifested with figure 7 (question No. 2) that of the respondents considers it to be an essential component. Cataloguing and archiving is also essential service for document management system which is a subset for KM. In the absence of this, it is indicating that organization is not utilizing the knowledge asset properly or they do not have the mechanism to take the inventory of such knowledge asset. Upon investigation with the respondents to understand the



status of their organizational ability to adopt KM or to know if they have some miniature version of KM in their organization, it can be seen through figure 7 question 4 that 88 % of the organization has implement such measures on the contrary majority of the population i.e., a total of 116 they say they have but limited and 58% feel that there should be an alternative model. This indicated that there is a huge scope for having Knowledge management environment to be addressed at the organization level. (Qs2, 4)

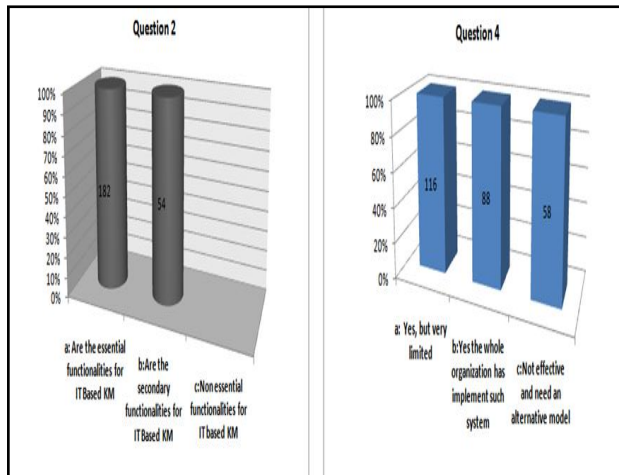


Figure 7: The role of KM in the achieving organization mission and the penetration of KM into the organization

The fundamental question related with the success of the IT based KM platform lies with its functionality and in this context understand the need to have correct functionality to achieve the objective is the most important concern. In light of this fundamental question we have gathered data to understand that the important function that should be addressed before designing the KM solution and in this respect we have measured few indicators like designing the GUI, the associative tool to be part of suit of KM, their perceptive, the apprehension on registering the Knowledge wealth to the IT based KM tool etc. These indicators would unearth many of the hidden information that might be useful for the organizations that are responsible for S&T promotion as well as engaged in planning for KMI. In furtherance to the above explanation we can see figure 8. The response in this light is measure the impact of switch for traditional method of knowledge dissemination to the modern method of so called IT based KM. The new method has the implication to cause digital divide and in this light care examination form different role of the respondent would throw light. Understanding the response in respect with responses like I don't think such initiatives will promote digital divide, Yes, but not much, Yes, User friendliness in the system would be very critical and has to be addressed with due care would strengthen the justification for right set of KM tool. The data clearly depict that user friendliness is very import with a score of 69 % however, few set of respondents i.e., 14 % believe that the digital divide may cause due to such initiatives.

### Question 5

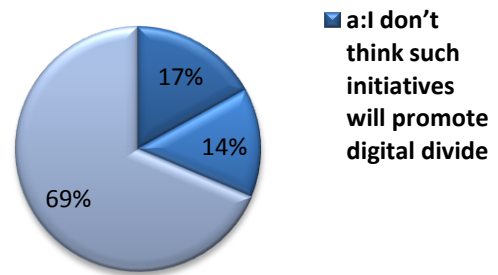


Figure 8: Response on the basis of perception of the respondents for KM based Solution

The second interesting findings in terms of the distribution of the score for the most effective service that available at the IT based KM. The number of services considered is as follows:

It can be seen through figure 9 that knowledge repository base out right topped the list with a score of 32 % indicating that the data base of the IT based KMI should be considered as very critical and the richness of it would dictate the success of the tool. The second on the list is the data mining techniques to be embedded at the tool. The importance of this service at the KM tool is that it will help the users to fetch the right set of information as an when required. It is necessary to understand that the knowledge is directly proportional to the information relevance and if the user would not get the right set of information it will not serve the very meaning of the IT based KMI. Collaborative tool such as emails and messengers with a score of 21 % of the total respondents are also considered as relevant. Though these services are Value added service (VAS) but some time in collaborative research environment VAS plays an important role and generates lot of value addition to the organization. E- Learning and IT based KM has to a large extent similarity except to the fact that the former is designed for enhancing skill set and knowledge and the latter is design for primarily decision making capabilities with the objective to enhance knowledge base. It can be seen that e-learning is ranked as 4th with a score of 9%. The other parameters are as 5, 2, 5, 3, 1, 2, 1 % respectively indicating that all the above services has its impact on the IT based KM tool.

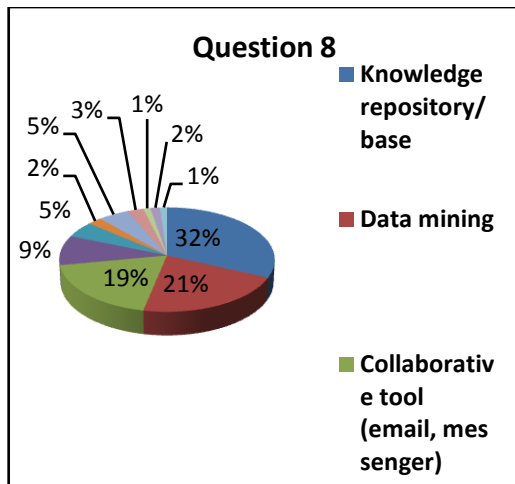


Figure 9: Functionalities to be available in IT based KM solution

#### D. Variable 4: The influence of socio-cultural in IT based KMI

The most interesting question to explore was to define the appropriate set of definition of IT based KM with our set of respondents. Knowledge management can be defined as a continuous learning and acquiring of knowledge, systematic approach to creation, management, sharing and application of knowledge, managing knowledge using IT tools and techniques and others. It can be seen that Systematic approach to creation, management, sharing and application of knowledge emerged out to be the most abstract form of representation of IT Based KM with a score of a score of 55 % and the second preferred definition would be Managing knowledge using IT tools and techniques with a score of 25% distribution. This indicates if option b can be achieved through our IT based KM, it will justify the objective of the solution. A variable have to be considered for a physiological aspect and perception of the user in the knowledge creation domain. This variable is one of the most important drivers for the success of the IT based KMI i.e., the inhibition for sharing your knowledge wealth. As we can see in Figure 10 that knowledge repository is ranked as first in term of the priority of the respondents as a tool for IT based KM. The knowledge creation group has been asked to share their views in term of the inhibitions for sharing their knowledge wealth and they have been given with the option likes Fear for losing the economic benefit, Fear for losing the due acknowledgements, Fear of getting exposed, Lack of protection controls (including legal, administrative, technological), Unhealthy organizational environment. Majority of the respondents feel the fear of not getting due acknowledgement to their work with a score of 34 %, the other prevailing factor among the respondents is lack of protection controls i.e., the legal and administrative environment not suitable for knowledge creation group and rank as 34 % of the population size. Similarly unhealthy organizational environment is also considered as a reason for this fear for not sharing, 24 % of the population feels that unhealthy organization environment is the concern that has to be address irrespective of any technological measure to solve the problem.

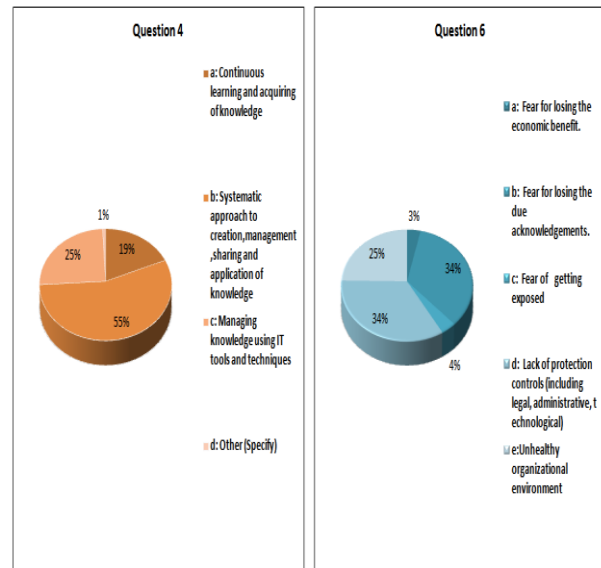


Figure 10 Factors that are promoting IT based KM with its corresponding apprehensions

#### E. Variable 5: Inhibitors for IT Based solution for KMI in S&T in India

The government of any country plays a major role in bringing innovations in the existing system which leads to its development. As seen from Figure 11, a frequency of 160 of the population does not have any experience of government initiative to adopt IT based KM for promotion of S&T in the country. This factor is a potential inhibitor in the promotion of S&T in the country. Due to this slackness on the part of our government, a very effective way of carrying KM remains dormant in many areas of our country, which can otherwise create a strong network for exchanging and building up the existing knowledge base of our country. 70% of the population do have some experience of the IT based KM as a separate scientific promotional activity but there definitely exists chance for further improvement. A very low percentage of the population has experienced Non-IT based /any other initiative.

This distribution analyses the penetration of IT based KM in various sectors/fields of our country. As seen from the recorded response of the respondents, majority feels the presence of IT based KM is maximum in R&D and educational institutions followed by Information and Technology organizations. The least penetration of IT based KM is in the defence sector. The educational institutions, R&D sector and Information and Technology sectors are familiar with the IT tools and techniques therefore it is natural for them to make maximum use of these techniques in their work therefore there is a need for the other sectors also to adopt this technique for strengthening KM. Widespread use of IT based KM will facilitate the knowledge seekers to expand their horizon and bring about developments at a personal level and also at the national level.

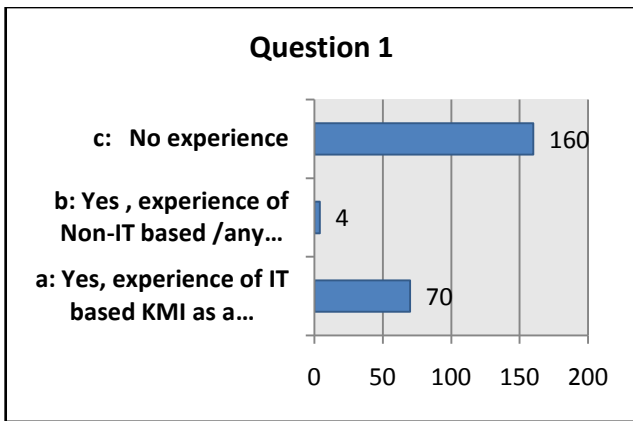


Figure 11: Awareness on Government based KMI adoption

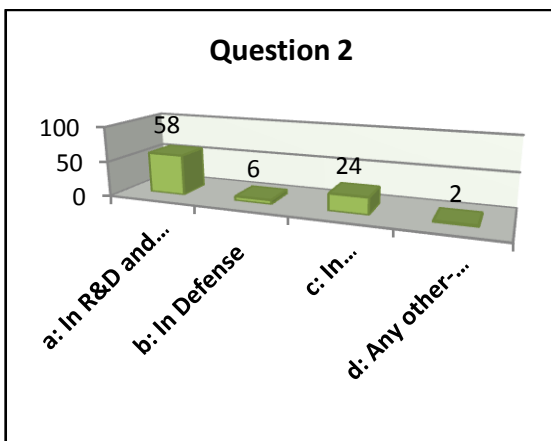


Figure 12: Distribution of KMI in different verticals of Government sector

A prime factor which can have a positive as well as a negative impact on the development of S&T in our country is the collaborative spirit of working amongst the members of the scientific community. A healthy spirit amongst the members will bring about the growth of S&T whereas a non healthy spirit will bring stagnation to its development and can also deteriorate the existing S&T culture in the country. As seen in Figure 13, 72 % of the population agrees to the fact that there exists a collaborative spirit to some extent amongst the Indian scientific community but with a scope for its improvement. 10% of the population completely agrees to the fact that the prevailing collaborative spirit among the members is enough for the development of S&T, this means that there is a vast scope for improvement. A portion of the population which is 15% feels that the collaborative spirit is completely missing in the Indian scientific community.

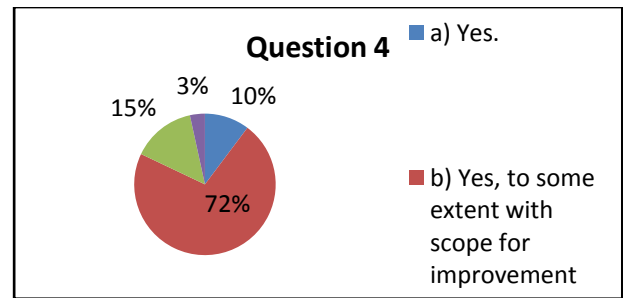


Figure 13: Collaborative spirit with Indian Scientific Community

## V. ADVANCED ANALYSIS

It can be seen in Fig 14 analysis of the inclination of the subjects or stakeholders towards different variables and it reveals that the IT based km should have various components and interestingly it can be seen that the respondent considers Var 1, 3, 4 as a high weightage variables and Var 2 and Var 5 as left opted for Variables. This indicates that Var 1, 3, 4 is the integral part of the solution. Further it can be see that figure 14(a) measuring IT as a key driver for KM in India and its distribution among different role indicates that user and generator are the mostly affected roles for this variable. Similarly figure 14(a) measuring the functionality of the IT based KMI and it can be seen that users and creator consider the functionality as most important. Similarly User and creator consider that socio- cultural aspect also has a deep significance in designing the IT based system for KMI.

### Relevance of variables among the stakeholders

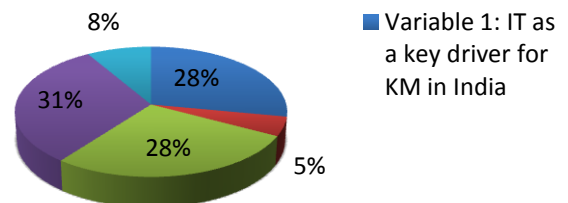


Figure 14: Ranking of different variable that has implication with IT based KMI in India

#### A. Correlation Analysis: Relation b/w the diff. variables (inverse or direct).

V1: IT as a key driver for KM in India,

V2: The number of stakeholders Involved and their responsibilities: (Stakeholder)

V3: Development of the system that would promote, connect and achieve the mission

V4: The influence of socio-cultural in IT based KMI. (Socio-cultural)

V5: Inhibitors for IT Based solution for KMI in S&T in India

INTERPRETATION

Figure 15 i.e., “IT as a key driver for KM in India” and its correlation with our variable help us to understand that the external influence on the variable would have corresponding effects on different variable and this observation would be very critical in the context of solution development. If we look at the correlation values its can be seen that Variable 1 (V1) Vs Variable 2 (V2) = .56, this indicates that V2 (Number of Stakeholders and their responsibility) has a moderate level of association and this gives us the inference that the size of the IT based solution would increase the responsibility of the stakeholder and their number but would settle at one point of time and its vice-versa. It would be an interesting finding for the organizations to understand their corporate culture and business objective and based on that they may design the IT based system. Moreover, with the correlation of .56 it can also be inferred that the settling point at which the roles and responsibility would not increase at a given time could also turn out to have a detrimental effect on the productivity of the organization. V1 Vs V3, indicates that the relationship is very weak in upward direction with a value of .088, this indicated that IT as a key driver for KM in R&D in India and the functionality of the system are two different oriented variable and it also indicates that though the stakeholders considers V1 (IT as a Key driver) they believe that the functionality, the size and the nature of the solution is very specific related with organizational need. V1 Vs V4 depicts that there is a slightly negative and this indicated that that the change in Socio-Cultural construct (V4) of the country may have the negative change in V1. The value is -.11 which is not a significant value. However, the negative change is anticipated. In the case of V1 VS V5 the value indicate that the variable are negatively correlated with -.46 i.e. IT as a key driver has negative impact to the socio cultural construct.

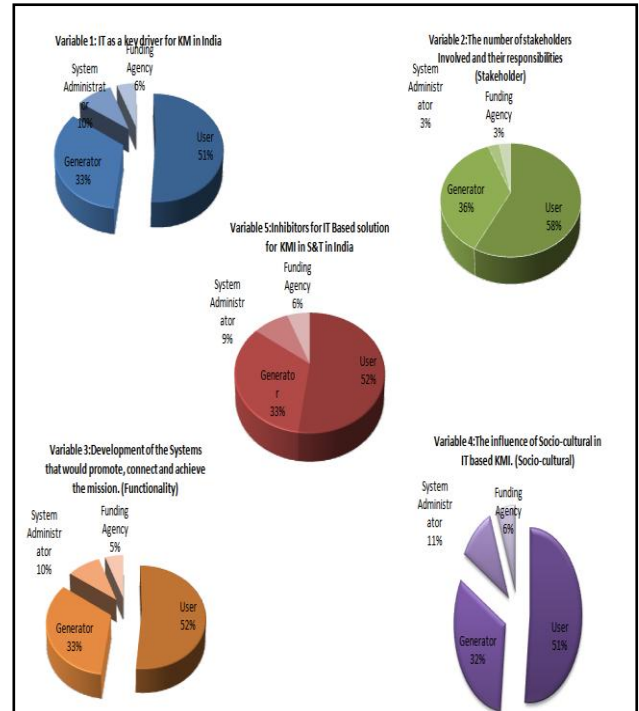


Figure 14 (a) measuring the over highlights of the survey with its corresponding variable

Further V2 i.e., (Number of stake holders involved) have positive relationship with V1, V3 and V4 with a score of .56 , .59 and .56 respectively indicating that stakeholder base will have positive response with Development of the system that would promote, connect and achieve the mission, V4: The influence of socio-cultural in IT based KMI. (Socio-cultural) and negatively co-related with V5 with -.3. V3 has the most strengthens with V4 and vice versa with the score of .79 and .78 respectively. Similarly, V5 has a better correlation strength with V3 and V4 with a score of .51 and .55 respectively.

The result shown in Figure 15 is computed using equation 1

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}} \dots\dots\dots(1).$$



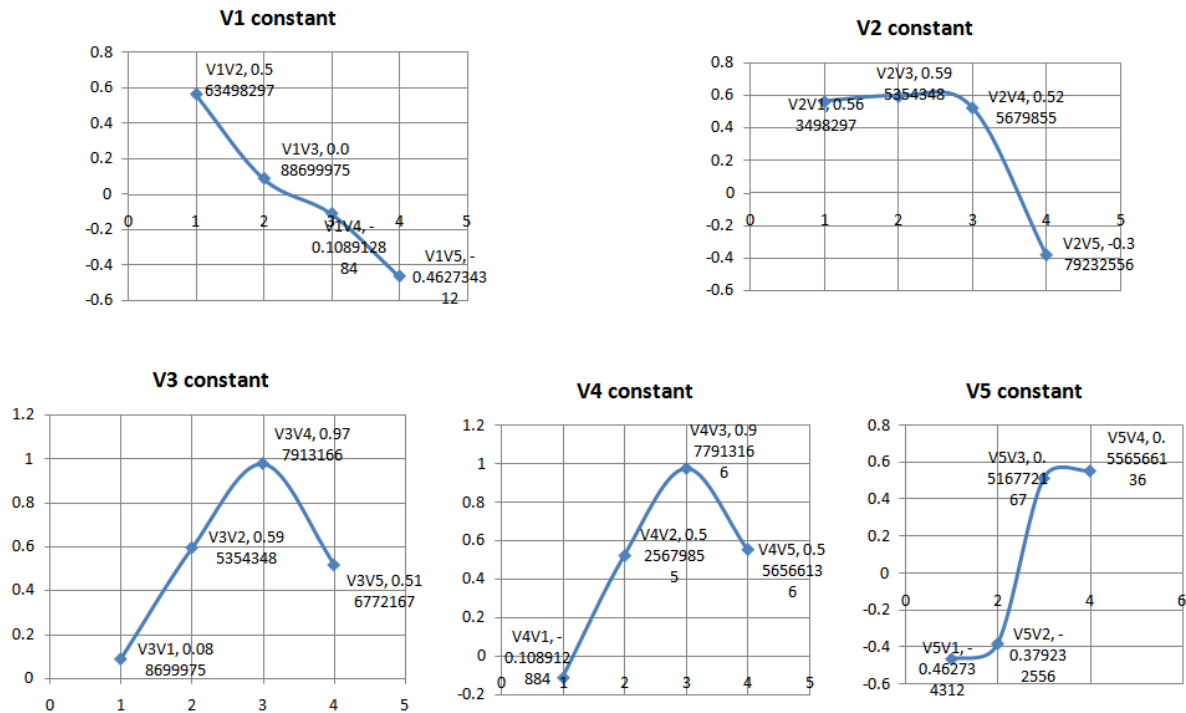


Figure15: Correlation Chart for Different Variables

## VI. CONCLUSION

The above study would be very useful for researchers those are working in the direction of understanding the potential of Knowledge Management and its usefulness in Indian scientific landscape. The current research has unearthed many interesting information from different stakeholders involved in defining the scientific landscape. Various variables were used to measure the different aspect of Knowledge management and Indian scientific community opinion and using descriptive statics the result were presented.

## ACKNOWLEDGMENT

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