Knowledge management and ethical vulnerability in AI

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Abstract
We have covered the current and future prospects of the combined use of AI and KM with respect to the Indian economy and its future automation prospects. The most likely fields to see automation in the coming years that would help the Indian approach to this field to be more efficient have been covered by us. Certain fields such as healthcare, farming, finances, and the IT sector are the primary concern around which the future prospects of India evolve. All in all, we have discussed the ethical vulnerability and ways to cope up and fill the gap between the goal and the issues that coincide.

Keywords Knowledge management · Artificial Intelligence · Ethical vulnerability

1 Knowledge management and introduction of AI

Knowledge management can be described as the purposeful process of defining, organising, retaining, and sharing employees’ knowledge and expertise inside a company. Finding, choosing, organizing, distilling, and methodically presenting information increases an employee’s comprehension in a specific area of interest.

Knowledge management entails identifying and analysing available and required knowledge assets, as well as knowledge asset-related processes, and then planning and controlling activities to develop both the assets and processes to meet corporate goals [1] United Kingdom.

Knowledge management is the systematic and explicit management of procedures that enable critical individual and societal knowledge resources to be discovered, developed, stored, shared, and used for good. The merger of information management and organisational learning is its practical manifestation [1]. The systematic method and strategy for locating, capturing, organising, distilling, and presenting data, information, and knowledge for a specific purpose and to benefit a specific organisation or community is known as international knowledge management [1] USA.

The process of generating, institutionalising, and disseminating knowledge among individuals to improve and organise corporate processes and practices (“Knowledge management-Investment and Finance Definition,” 2010). USA [KM is] (1) The application of an organization’s knowledge to gain a competitive advantage (2) the management and utilisation of an organization’s knowledge resources to gain a competitive advantage (“Knowledge management,” 2009). International [1]

Effective knowledge management in most firms needs a significant amount of time, focus, and energy which is done as the part of the execution or during the performance of the task and is incorporated into the ways of working. The pandemic COVID-19 has changed the flow of work and knowledge and has increased the urge for wide-scale connectivity of employees with management and data transfer. AI and knowledge management together improve IT capabilities in business throughout the spectrum of an organization, including customer/supplier service, recruiting and training needed analysis, and future business prospects with practical and strategic solutions. Organizations can utilize smart machines created by technologies such as Neural Networks, Intelligent Agents, and Genetic Algorithms to perform tasks such as user profiling, pattern matching, text mining, and semantic analysis of texts, contributing to driving knowledge management in organizations [2].
Considering that India is still in a progressive state of constantly delivering efficiency and updated solutions in AI, adapting and crafting the technology for its unique needs and development will indeed leverage long-term competitiveness. Artificial Intelligence aids the process of knowledge management in the following manner.

1.1 Simplification of knowledge discovery

Several technologies, such as cloud storage and wikis, have been created during the last two decades to facilitate record keeping and information sharing. Storage systems like this has allowed easy storage and sorting of data by storing it in different forms, such as structured, semi-structured and unstructured.

AI and machine learning can aid in solving problems by utilizing cutting-edge technology to streamline knowledge discovery while making it easier for users to locate the information needed faster and more efficiently. ML can track and learn from the employees’ search and then use that data to predict and provide the required information and data transfer.

1.2 Strengthen the collaboration among employees

An AI chatbot can curate all of the knowledge content stored in various knowledge repositories across the organisation. Employees can communicate with a chatbot to get the proper answers to their questions. Internal staff and external users will benefit from this, since they will be the ones engaging in meaningful dialogues.

For example, TIA, RICHA, and CARA are some of the Tata group’s most efficient employees. For Tata Capital’s customers, TIA has greatly simplified the loan procurement procedure. RICHA, which is partnering with Tata Steel, excels at customer service. On the other hand, employees at Tata Consultancy approach CARA directly to get rapid answers to their questions [3].

1.3 Amplification of learning and enhancement of skills

Providing a broad range of knowledge enhancement materials will subsequently improve all employees’ understanding of the organization. An AI system may encourage employees to learn new skills based on their current expertise and the information content they read, share, and contribute. By combining the various organizational systems, an AI algorithm will harness the power of data to assist employees in updating their skill set. The end result would be that employees’ skills will be enhanced, as they will be able to cross-train their present skills.

2 Approach of knowledge management in India

Over the previous two decades, the global industrial system has undergone significant changes. The reason for this change was to add value to the product and service offered by knowledge management to create new capabilities, improve performance, encourage innovation, and increase customer evaluations. Top Fortune 500 businesses
use knowledge management strategies by analyzing their users’ data and using it to understand how they react online, define their general demographics, and identify ways to improve the overall customer experience [4].

### 2.1 Fundamentals Behind Introducing Knowledge Management in India

The primary motivation for Indian IT businesses to use knowledge management was to obtain a competitive advantage over their competitors by knowing their clients and understanding their requirements. It has been demonstrated that knowledge management programs have assisted these businesses in improving their current services, enhancing the quality of their product, and developing new services by knowing their consumers’ needs [4]. It aids in projecting the future of their new creative initiatives in an approximately uncertain and huge GDP involving the market of roughly 687.6 million internet users in India alone. The following table depicts the data obtained from 9.70% of IT-based industries from the total of 194 companies situated in Kolkata(46) and Hyderabad(148).

| Sn no | Name of company      | Gaining competitive advantage | Retain key talent/satisfaction | Improve customer retention/satisfaction | Develop new services | Improved images | Avoid loss of key personnel |
|-------|----------------------|------------------------------|--------------------------------|----------------------------------------|----------------------|-----------------|--------------------------|
| 1     | Tata Consultancy services | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 2     | CMC                  | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 3     | IXIA                 | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 4     | Data core India Pvt Ltd | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 5     | Labvantage           | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 6     | Wipro               | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 7     | Ontrack Systems PvtLtd | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 8     | Infovision Software  | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 9     | Anshin Software      | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 10    | Compare Infobase     | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 11    | R S Software         | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 12    | Cognizant Technology | ✓                            | ✓                              | ✓                                      |                      |                 |                          |
| 13    | Usha Comm            | ✓                            | ✓                              | ✓                                      |                      |                 |                          |

Grand total = 13
9 = 69%
10 = 76%
11 = 84%
2 = 15%
5 = 38%

### 2.2 Acquiring data and sharing sources

For information gathering, the IT sector relies on internal communication. Many consulting firms, including HCL Technologies, Infosys, KPIT Tech, and Tata Consultancy Services, operate locally and globally, offering services that involve knowledge management to a diverse range of customers with varying cultural backgrounds and business practices. Indian software firms are aware of the potential of knowledge management systems and are currently utilizing them to enhance productivity, decrease errors, allow the reuse of software components, and share project lessons gained from its execution [5]. The dissemination of knowledge via online means is the primary motive of using knowledge management in these organizations. Although there is much scope for improvement in the present knowledge management system but the upcoming system is expected to provide exemplary benefits with more data in hand. Websites, journals, competitors, internal communication systems, and records are some of the sources used by the top IT consulting firms in India to acquire data. Below are some of India’s major software businesses that expertise in knowledge management-related services.
2.3 Managing goals and innovatory thoughts

The primary key to innovations is ideas, as there isn’t much to execute without them. Because execution is the key to learning, new ideas are required for any sort of improvement in reaching new innovatory aims. Ideas alone will not result in innovation; you must create a systematic procedure for handling those innovatory thoughts. Almost all businesses focus on collecting and executing ideas, which is critical in today’s ever-changing market. Knowledge management assists them in analyzing and planning how to imply their new ideas by evaluating and forecasting the future of the new project. If a firm fails to turn towards innovation, it will find it challenging to thrive in a fast-changing environment. We have witnessed numerous fast downfalls over time, the most notable example being Nokia itself. One of the major causes for Nokia’s downfall was a failure to focus on new ideas and inadequate knowledge management. The following is a list of the previously listed 20 firms, indicating how many of them are engaged in managing and creating new ideas [4].

| Sn no | Name of company         | Ideas Collecting Ideas | Innovations Implementing Ideas |
|-------|-------------------------|------------------------|-------------------------------|
| 1     | Tata Consultancy services | ✓                      | ✓                             |
| 2     | CMC                     | ✓                      | ✓                             |
| 3     | IXIA                    | ✓                      | ✓                             |
| 4     | Data core India Pvt Ltd | ✓                      | ✓                             |
| 5     | Labvantage              | ✓                      | ✓                             |
| 6     | Wipro                   | ✓                      | ✓                             |
| 7     | Ontrack Systems Pvt Ltd | ✓                      | ✓                             |
| 8     | Infovision Software     | ✓                      | ✓                             |
| 9     | Anshin Software         | ✓                      | ✓                             |
| 10    | Compare Infobase        | ✓                      | ✓                             |
| 11    | R S Software            | ✓                      | ✓                             |
| 12    | Cognizant Technology    | ✓                      | ✓                             |
| 13    | Usha Comm Grand total   | ✓ = 100%               | 13 = 100%                     | 4 = 30% |

2.4 Measuring benefits

In recent years, the Indian IT sector has grown at an astonishing rate. According to a NASSCOM poll, the domestic market has risen by 24%. Statistics reveal that the country’s software exports increased by 20.4% in 2002–2003, up from 4.9% in 1997 with a significant increase in software service exports. During 2019–20, India’s GDP was $128.6 billion, representing a 9.1% increase over the previous year (according to RBI). Computer services and ITES/BPO services accounted for 66.6 and 33.4% of total software services exports, respectively. The Indian IT sector employed around 4.36 million people contributing to 7.7% of India’s GDP in 2020. In recent years, the Indian IT sector has experienced enormous expansion by using knowledge management methodologies and obtaining massive profits through large-scale employment [6].

3 Application of knowledge management in India

Knowledge management since recent times has emerged as a critical organizational responsibility concerning big as well as small organizations. Due to this, there is a huge commotion of the resources being invested in enhancing, supporting, sharing, and retrieving knowledge. A considerable amount of this investment is towards the deployment of knowledge management in terms of AI. This step is majorly a part of the revolution that would help Indian industries, especially the IT industry, to explore their potential and reach a whole new level of intervening thrust that would help boost the results in an optimized yet lawful manner.

3.1 Farming

In Agriculture, with the help of knowledge management, fitter optimized models are being deployed. Despite the outright potential being yet to be explored, several startups and MNCs collaborating with the government are deploying various prototypes. Agriculture in today’s terms has turned to AgTech with advancement towards more optimized alternatives, such as image recognition, deep learning, and AI optimized results. The data concerning information and stats on Indian agriculture is stored in the cloud database and fed to various algorithms and analytic engines to make optimized decisions that would help increase the yield and profitability.

These AI-based algorithms are then chained to other factors, such as weather forecast, soil sensors, and
crowdsourcing to enhance the predictability of the yield. However, further advancements, such as autonomous tractors, smart drones, connected livestock, etc., are yet to be deployed on a large scale as R&D towards having a more optimized AI system with adequate knowledge management sources are being worked on by the officials [7].

3.2 Healthcare

Concerning the population of India, healthcare is one of the most crucial sectors that need to be updated technically with each step towards advancement. Compared to the doctor and nurses required per 1000 people, the current scenario is much lower than expected, which calls it alarmingly to step towards maximized medical advancement. The help of AI deployment in initiatives such as cancer prediction has led to the successful screening of early stages of cancer, preventing numerous deaths. However, the screening has not been limited just to cancer. It has been used to detect several other decisions, such as diabetic retinopathy, which is usually hard to detect at early stages [8].

The use of AI in healthcare facilities has led to more pro-active actions concerning individuals’ health. All this has led to the emergence of fields, such as AI-based radionics involving comprehensive quantification of tumor phenotypes by practicing quantitative imaging.

3.3 Software and consulting companies

In these times of high competitiveness between various organizations, more funds are flowing towards building a better product or providing a better service in optimized ways. Therefore, software development and consulting companies rely on knowledge management, such as document management, competence management, and statistical information, to nurture their growth.

AI helps make decisions that are based on strategy formation, training, and implementation of ideas. Thus, the growing number of industries in this field rely highly on AI implemented solutions. The application in real-time assistance has helped unleash the use of unstructured data to build effective streamlined sales.

3.4 Financial institutions

Financial Institutions in India are evolving day-by-day, although the overall expectations are yet to be met concerning the financial institution. However, numerous organizations have deployed AI solutions for making optimized and better-yielding decisions. In addition, the delivery of knowledge management through more innovative tools such as analyzing credit, the evaluation, the use of deep learning, the automation of the robotics process, and language processing have contributed to the fitter calculation of Indian financial institutions, preventing the institutions from entering into debts. Algorithms along with customer-facing AI have helped Indian financial AI services grow to make space for AI-based solutions [9].

Several individuals through word of mouth develop the fear of investing in the stock market as they either don’t have the resources or time to analyze the stocks. Support Vector Machines (SVM) and Artificial neural networks (ANN) are widely used to facilitate prediction models for stocks. Even the stock prediction model has been deployed for real-time usage, which has turned out to be a huge success in some scenarios, helping individuals invest accordingly.

4 Ethical issues of AI in delivery of knowledge management

Brene Brown defines vulnerability as “uncertainty, risk, and emotional exposure.”. In the context of Artificial Intelligence it can be defined as the concerns, risks and issues that arise from the emerging technology. AI offers numerous benefits (for example, advances in creativity, services, safety, lifestyle, and assisting in issue solving), but it also generates many fears and concerns (adverse impacts on human autonomy, privacy, and fundamental rights and freedoms) [10]. A primary and frequently cited ethical issue is that of informational privacy and data protection. AI based on machine learning offers a number of threats to data security. On the one hand, it requires huge data sets for training purposes, and access to those data sets may present data protection concerns. Another issue is that AI and its capacity to recognise patterns may offer privacy issues even in situations, where no direct access to personal data is possible [11]. Some more issues might include: algorithmic transparency, cybersecurity vulnerabilities, unfairness, bias and discrimination, lack of contestability, legal personhood issues, racism, human right issues, intellectual property issues, adverse effects on workers, privacy and data protection issues, liability for damage and lack of accountability [12].

Statistical fairness is insufficient in the case of large-scale government models since the environment in which the model operates is continuously changing. Understanding of critical areas of concern is important given the gravity of the impacts of AI technologies and the advancement of this technology for application in the development of a nation.
4.1 Ethical vulnerability of AI in India

India is a land of diversity. The people and the laws, culture, land, and rules are also diverse according to the community, and thus implementing AI systems in India is difficult. Training a model for so many different situations becomes an impossible job, making it necessary to understand ethical vulnerability. The ethical issues arise due to the following factors:

4.1.1 Large population

India has the second-largest population globally. Implementing AI systems in large-scale projects need the accurate collection and training of an extensive data set. Along with that, the risks of information and privacy leaks increase.

4.1.2 Poverty, illiteracy, and unemployment

A large population of India suffers from poverty, due to which illiteracy and unemployment rates are high. Thus, a large part of the population fails to receive adequate amounts of essential services. Using an AI system would not be feasible. Some people do not even have smartphones, internet connections, and networks, which makes the implementation of AI systems impossible. The collection of real and raw data sets through surveys or programs is also very tough.

4.1.3 Diversity and culture

The language, culture, and religion in India are diversified. Thus ethnic issues, racism based on gender, religion, looks, human rights issues, minority rights violations are bound to happen. Natural language processing is not feasible as the language/accent of the people changes every 15 km. Studies show there is persistent anti-muslim bias in large language models [13], and studies show “Muslim” is analogized to “terrorist” in 23% of test cases. In comparison, “Jewish” is mapped to “money” in 5% of test cases in GPT-3. These kinds of issues might lead to severe violations and riots in the community.

4.1.4 Law and constitution

Automated decision-making system in India is not feasible as the Indian constitution is quite complex and is drafted to protect the rights of such a diverse population at any cost. Thus, training the model becomes very complex. The country’s judicial system is also very different, and thus, reliability on an automated system decreases. There have been researches showing that the AI model cannot provide complete fairness, and AI fairness is a myth [14].

4.1.5 Under-developing country

India is an under-developing country. The technology, healthcare, education system, and infrastructure are not that advanced yet. That is why the implementation, deployment, and usage of AI systems in various fields is challenging considering the ethical issues of AI.

4.2 Ethical Vulnerability in different sectors

4.2.1 Farming

By 2050, the world population is estimated to grow up to 10 billion people, 16.4% of which will be situated in India only [15]. Feeding this enormous population will only be possible with transformed agri-food systems that are inclusive, resilient, and sustainable. This need can be met by bringing AI applications, such as autonomous tractors, smart drones, connected livestock, etc.

In 2021, the Pradhan Mantri Kisan Samman Nidhi (PM-Kisan) has around 111.5 million enrolled beneficiaries, with an average of 102 million-plus getting payments during 2020–21. These farmers depend solely on their fields. Implementing AI solutions such as autonomous tractors and smart drones will directly impact them.

In addition to all this, the usage of all these smart AI solutions requires ample cloud storage. Due to the poverty in India, it is not available to small-scale farmers.

4.2.2 Healthcare

Healthcare software, which can be used to automate tasks, such as detecting disease and finding potential illness, is greatly dependent on the subject pool used to train the machine learning model. The composition of this said pool affects the decision-making capability for the software, going so far as to make it discriminate between two groups. The Indian subcontinent, with a total area of 3.287 million km², has many different and unique environmental situations which mold the way natives physically look, their dialects, and different languages. Therefore, a model trained with a data set collected from the population of the northern region has a chance of not working or working with low efficiency.

4.2.3 Software and consulting companies

In the year 2016, there were 63 million micro, small and medium enterprises in India [16]. These are primarily
family-managed businesses that multiple generations have passed on. Most of these business tips and secrets are stored in physical documents. These documents, being handwritten, can not be managed by any AI software because of the high chances of the software not being able to recognize the handwriting, which can result in either unfinished or wrongly translated documents.

Furthermore, for real-time help, a large quantity of free cloud data storage will be required, which will be impossible in India, because the country is still expanding.

4.3 Financial institutions

AI failures are not as uncommon as one might think, nor do they happen only in small companies. In November 2019, Apple was accused of being gender biased when giving credit limits. The reason for this was the algorithm used for deciding the card limit. Data shows that even after having joint taxes and a higher credit score than the male applicant, female applicants were given a 20 times lower limit on their card. Due to this lack of understanding of the working of the algorithm, Apple could not pinpoint the cause of the problem [17].

One reason for such errors can be due to framing the problem statement incorrectly. For instance, if the algorithm is trained to optimize profit, it will automatically target customers with low credit scores and sell subprime loans.

4.4 How to cope with such vulnerabilities

4.4.1 Farming

The first and foremost step that should be taken to solve the problem of ethical vulnerability in farming will be to educate even the small-scale farmers about AI solutions. Guidelines should be laid for the MNC’s to share the finances with those farmers. Automation should be made more transparent and easily understandable, even for those who are not aware of the algorithms and techniques used.

4.4.2 Healthcare

For sectors concerning healthcare, developed AI software should be tested against people from different regions to minimize the chances of biased results that can occur during examination. The data set collected should have a fixed percentage of subjects from every region and should be taken into account to make a more diverse pool of data that can be used to train the ML model more efficiently.

4.4.3 Software and consulting companies

Software and consulting companies should be well aware and informed about their AI solutions to problems. These companies should make sure that the data set used for training is not biased. The data should be collected from customers of every dynamic background. Furthermore, the algorithms should be designed keeping the small business owners in mind and not particularly towards the profit of large MNCs. This will allow the business to grow instead of completely shutting them down.

4.4.4 Financial institutions

For financial institutions, it is clear that guidelines need to be put in place to help avoid bias, ensure safety and privacy, and make the technology accountable and explainable. The algorithms used should be made transparent. Ways such as Explainable AI (XAI) should be used to make it more intuitive to humans.

XAI is a broad term covering systems and tools to increase the transparency of the AI decision-making process to humans. This gives insights into the data, variables, and decision points used to make a recommendation.

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