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Theme:
AI and Management Science

Guest Editor

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Guest Editor's Note



Artificial Intelligence (AI) in the present-day context is assuming and contributing in a bigger and bigger way to our society. In the beginning of the new millennium, the subject that emerged as a harbinger of the development of science and technology is still striding steadfastly towards the new era.

The development of artificial intelligence in the present day, be it in the field of science, the arts, or commerce, is felt in every sphere of activity.

The contributors to this programme have presented their perceptions in very exquisite, innovative, and classic ways and deserve stupendous admiration.

Mr. Debasish Basu, ACA, CAIIB, and Ex-Financial Analyst, Punjab National Bank, has stressed in his article entitled "Application of Artificial Intelligence in the Management Field" that AI will prove to be more affordable, effective, and perhaps even more unbiased in its activities than humans. However, managers shouldn't be alarmed by such a scenario. It simply implies that the focus of their work will shift to activities that only people can perform.

Dr. Samir Ghosh, Professor, Department of Commerce of Vidyasagar University (a state university), District: Paschim Medinipur, West Bengal, has focused in his article entitled "Contribution of Artificial Intelligence in Research Activities of Management Science: A Critical Analysis" on the fact that an artificial intelligence-based system that seeks to support management in these endeavours must be capable of overcoming the same barriers encountered by human managers in the innovation process.

Dr. Soumitra Lahiri, M.Com., FCA, CMILT, PhD, an insolvency professional, has emphasised in his article entitled "Impact of Artificial Intelligence in Domestic and Professional Life" that though our numerical abilities and vocabulary, or rather our person-centric intelligence factor, could be on a diminishing scale, the ease of life that has come about thanks to artificial intelligence cannot be overlooked. Every pound of flesh needs a drop of blood or two! Thus, at the cost of convenience in day-to-day life, there is no harm if we have become slaves of our laptops, desktops, or tablets. It is worth the sacrifice. Since the prologue was with a controversial quote of Albert Einstein, let the epilogue too be with a quote of the same genius.

Dr. Sreeparna Chowdhury, Assistant Professor, Department of B.Ed., Shri Shikshayatan College, Kolkata 700 071, has focused in her article entitled "AI and Internal Management of Educational Institutions: A Post-Pandemic Perspective" on the fact that the efforts and skills of both humans and machines must be merged in the guiding process. Students will succeed if human and AI help are combined in a synergistic way. An integrated strategy will increase advantages while minimising dangers associated with technology adoption.

Dr. Gouranga Patra, Associate Professor, Department of Management, Adamas University, Barasat, Kolkata, West Bengal 700 126 •E-Mail: gourangapatra13@gmail.com, has emphasised in his article entitled "Digitalization in Healthcare: A Road Map of AI and ML for Enabling Innovative Healthcare Services" that

it is needless to say that modern healthcare systems are going to undergo 180-degree changes in comparison to traditional processes of operations. It is also true that private healthcare systems are adopting this high-end technology in their healthcare services. Using AI, ML, Block Chain, and other technologies helps healthcare from disease detection to diagnostics to final billing in a faster way, which not only develops satisfaction but also saves lives for people who are in critical condition. Therefore, the life expectancy level of the patients increases, which is one of the core objectives of healthcare informatics. In the present study, we are trying to explain the mechanisms of different technologies and their application to various diseases like cancer, lung disease, and cardiovascular disease.

Mr. Mridul Kumar Ghosh, M.Sc. (Organic Chemistry, Jadavpur University, Kolkata) - 1st Class; MBA- Finance (IISWBM, Kolkata, under the University of Calcutta) - 1st Class; Financial Analyst and Ex- Officer of West Bengal Financial Corporation, Kolkata AND Prof. Lakshmi Kanta Sinha Ray, Assistant Professor, Institute of Business Management, Jadavpur, Kolkata 700 032, has focused in their article entitled "Return on equity or wealth maximisation of enterprise: which is preferable to shareholders? on the fact that it is clear that a lot of data are to be processed properly every time with the help of computers to have a clear picture of an industry and management of the unit to declare the corrective action promptly so that the wealth of shareholders gets increased or maximised and management can do easily with the help of artificial intelligence (AI), which is becoming popular day by day and will rule the world in the near future.

Mr. Ramanendu Chatterjee, M.Sc. in Mathematics (IIT, Kharagpur), M.Tech. in Computer Science (ISI, Kolkata), Execution Head, TwoPiRadian Infotech, 7AF/2, 18/3 Gariahat Road, Kolkata 700 019, has emphasised in his article entitled "The Scope of Roboethics in Business Ethics" that we are in the midst of a robotics revolution where robots have stepped in for 4-D tasks (dull, dirty, dangerous, and dirty), and it is expected that robots, combined with AI, will help create situations where the human workforce may need to work alongside collaborative robots very soon. This paper is intended to give a broad brush overview of robotics, robotic ethics, AI ethics, and the symbiotic evolution of AI ethics and robotic ethics. The need for a symbiotic coevolution of business ethics and robotics has been discussed, with the possibility of the evolution of a new field of managerial robotics. The three fundamental areas—Ethical Decision Making, a Code of Ethics for all participants, an Accountability—have been briefly introduced. They merit far deeper study and analysis, which is likely to take place once the involvement of business ethicists happens in a bigger way. The endeavour that has been made through the publication of this journal has highlighted the specific areas that need attention through artificial intelligence and satisfied the appetite of researchers and practitioners.

Prof. Anitha Sharon, Research Scholar, VIT Business School, Vellore Institute of Technology, Chennai 600 127; Prof. J. Reeves Wesley, Professor, VIT Business School, Vellore Institute of Technology, Chennai 600 127; and Dr. Malay Bhattacharjee, Assistant Professor, VIT Business School, Vellore Institute of Technology, Chennai - 600 127 in their article entitled "Workplace Spirituality & Emotional Intelligence: A New Paradigm" have highlighted that competent employees are the greatest asset of any organisation. The potential performance of employees plays a vital role in the context of the diverse challenges faced by the organisation. In order to maintain and develop their competencies, the employees should have an open mind towards a spiritual work environment and emotional intelligence. Workplace spirituality and emotional intelligence are necessary for the development of skills and knowledge in potential employees.

I anticipate that readers will enjoy this issue. Before I conclude, I want to convey my heartfelt gratitude to the editorial team and reviewers for their excellent support of this initiative to make this programme a success.

Dr. B.K. Bhattacharya

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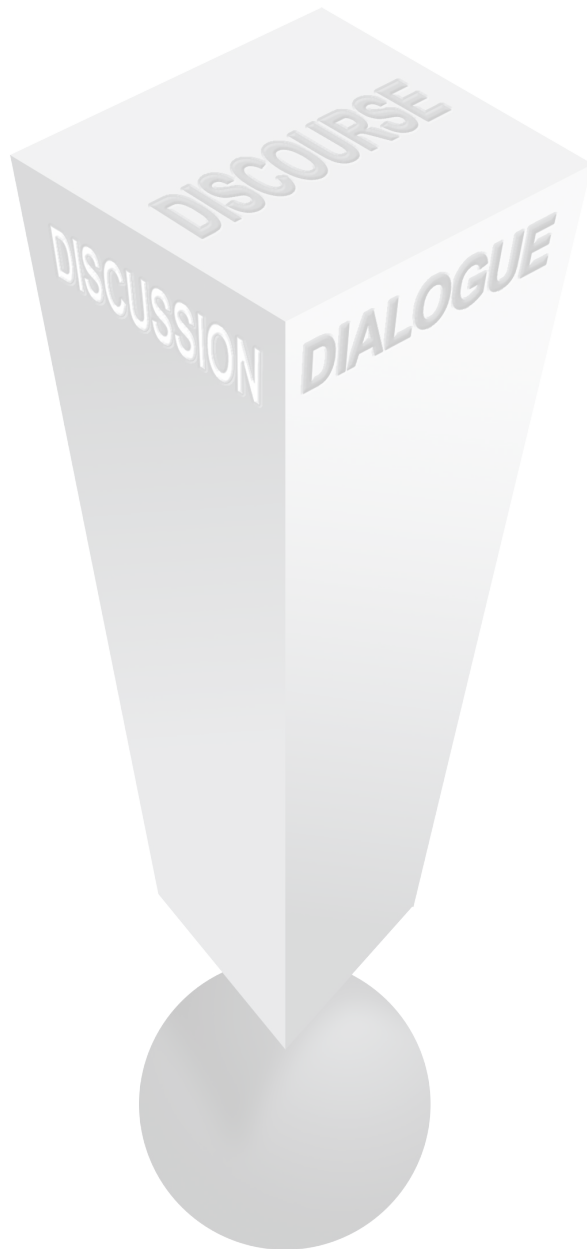
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Contribution of Artificial Intelligence in Research Activities of Management Science: A Critical Analysis

Dr. Samir Ghosh, *Professor, Department of Commerce, Vidyasagar University (A state university) District: Paschim Medinipur, West Bengal*

Abstract

The research is expected to drive theoretical and practical innovation in artificial intelligence via data processing, knowledge discovery, and digital technology, with the aim of influencing research policy development and implementation. In highly volatile and changing environments, ever more competitive global markets, rival technologies, and dramatically changing political landscapes, business managers are using AI in the innovation process. With the increased implementation of electronic services and automation, coupled with the general transformation to digitised organisations, the role of innovation management will change. AI has been extended in various sophisticated work fields based on some specific terms and conditions, but if the terms and conditions change, AI will fail.

An artificial intelligence-based system that seeks to support management in these endeavours must be capable of overcoming the same barriers encountered by human managers in the innovation process.

Key terms: AI, digital organisation, innovation.

Artificial intelligence is reshaping the research activities, concepts, and methodologies in managerial science. In empirical research, researchers have collected data based on sampling to represent the population, but in such research, the primary limitation is that

due to the small sample size, the population is not represented correctly.

AI is already used in banks to loanees before sanction of loans to study their minds of loan utilisation and repayments.

The research field of big data includes interdisciplinary areas like computer science, mathematics, statistics, information science, and other application domains such as geography, biology, medicine, neuroscience, and environmental science. The research would be fundamentally rooted after a literature review to find out research gaps. These in turn help to develop knowledge about the area of research, the data analysis methods used in the articles, etc. The research is expected to drive theoretical and practical innovation in artificial intelligence via data processing, knowledge discovery, and digital technology, with the aim of influencing research policy development and implementation. These include, but are not limited to, intelligent machines for smarter business decisions, internet video and face detection and recognition, product recommendation and prediction algorithms for default, risk, or market trend value, and health necessary for improving strategic management and decision-making.

Other applications involve model-driven and data-driven decision support systems, prediction and early warning systems, situation awareness and risk management, recommender systems, fuzzy transfer learning, concept drift, multi-criteria, and multi-level decision-making, and typically, this results in powerful software tools organisations can use to support decision-making.

Literature Review:

In this study, some articles are reviewed as follows:

Research Scholars are eagerly waiting to see whether artificial intelligence (AI) and digital education can replace humans roles at workplaces and reshape existing organisational systems (Brynjolfsson and McAfee, 2017; von Krogh, 2018). With certain constraints in information processing, is it possible for AI to deliver higher quality, greater efficiency, and better outcomes than human experts? (Agrawal et al., 2018a; Bughin et al., 2018).

Considering AI's capacity to replace traditional 'human' tasks in organisations, the question now arises: is it possible for AI to contribute to innovative thinking for the long-term survival of the organisations? (Lengnick-Hall, 1992; Porter and Stern, 2001) In the current scenario, humans are unique in innovative thinking; now the question arises whether AI will replace human innovative thinking in the future or not. (Amabile, 2019).

There are several exogenous factors, like highly volatile and changing environments, ever more competitive global markets, rival technologies, and dramatically changing political landscapes, for which business managers are using AI in the innovation process. (Jones et al., 2016; O'Cass and Wetzels, 2018; Spieth et al., 2014). At present, the volume of information has increased, and as the competitiveness of the market also rises, AI is needed to solve problems with voluminous information (Hajli and Featherman, 2018). In many areas, the cost of each innovation has been increasing with its riskiness quite dramatically (Schilling, 2017). Drug development process costs have also risen in the pharmaceutical industry (Munos, 2009; Pammolli et al., 2011). Therefore, to take advantage of cost savings, AI and machine learning systems should be introduced.

To apply AI and machine learning to firms' innovation processes, ways should be developed in the interest of innovation managers. On the one hand, this has the potential to create better ways for firms to respond to their increasingly competitive environment and manage the growing amounts of information around them. On the other hand, supporting the innovation process with AI could generate real value for firms by reducing both the riskiness and the costliness of innovation processes.

Today, human-organized innovation management plays a key role in companies capacity to reinvent themselves through exploratory initiatives. However, AI can provide instrumental assistance to

innovation management to manage the scope of humans (Groves et al., 2013; Wamba et al., 2017). Both academics and practitioners have agreed that AI will have a substantial impact on firms' innovation processes in the future (Bughin et al., 2018; von Krogh, 2018). AI could potentially be applied in innovation settings and development in the future (Lu, 2019; Varian, 2018; Ward et al., 2014). AI's limitations in the context of innovation are still quite sparse. The use of AI and machine learning for creativity and innovation is very different from the established areas where AI has replaced traditional management (Chui et al., 2018).

Following on from the above discussion, the objective of this article is to fill the gap in our knowledge by reviewing the literature and offering a framework to examine management challenges associated with promoting innovation through AI. While AI has only recently started to gain momentum in the management literature (e.g., Adner et al., 2019; Bettis and Hu, 2018; Furman and Teodoridis, 2020; Goldfarb et al., 2020; Krakowski et al., 2019; Puranam et al., 2018; Raisch and Krakowski, Inpress), the phenomenon is, of course, not new. When the idea of artificially intelligent computer systems was first discussed by experts in that field in the mid-1950s, the potential impact of computer processing on organizations was already of interest to management scholars intimately linked to AI (Augier and Prietula, 2007). Simon argued that "if computers are organized somewhat in the image of man, then the computer [is] an obvious device for exploring the consequences of alternative organizational assumptions for human behavior" (Simon, 1996, p. 21). Our research offers a framework for explaining how AI can be used for innovative purposes and addresses calls to move beyond human involvement in the innovation process. In doing so, we build upon the central assumptions of the behavioural theory of the firm and its key implications.

The objective of the study is to study the

scope and limitations of AI; in other words, it is a descriptive study to determine whether AI is a substitute for human intelligence or whether AI and human intelligence are complementary.

Database and Methodology: The entire study is based on the views of bank officials on credit disbursement before and after computerization in some selected public sector banks operating in West Bengal. The study is done on the application of AI to loanees by the bankers, and the study period is 2020–21. The averaging technique is applied here.

The behavioural theory of the firm and information processing

Information processing is a key component of innovation in organisations. A central activity in innovation management is the process of decision-making, which requires information. The role of management in information processing is to decide upon inputs into the process in terms of data, knowledge, and other information. Then, information must be processed by gathering and analysing. Finally, once information has been processed, management has the responsibility to take decisions.

The way information processing occurs in organisations is changing rapidly. All the information processing can be supported or, in some cases, taken over by AI systems.

Information processing in the digitised organisation

In a digitised organisation, an increased amount of information and knowledge is stored electronically and without human involvement. Many managers may have quantitatively and qualitatively less information than they had prior to the computerised organisation and the technological changes in the workplace.

These background realities call for a model where innovation-oriented AI and machine learning of computerized information and

processes are integrated into innovation management. As AI advances further, it can be said that the role of innovation management will change in step with the progress made by AI and machine learning. Thus, human innovation management will be expected to work side by side with AI and machine learning algorithms in identifying and selecting opportunities as well as investigating what could be the organization's next competitive advantage.

Information processing in the innovation process

To better understand how AI augments organizational innovation, we need to examine how information is processed for innovation. The innovation process, which is at the core of innovation management's attention, is commonly understood to comprise a series of stages, including: (1) the recognition, discovery, creation, and generation of innovative ideas, opportunities, and solutions; (2) the development or exploitation of various ideas, opportunities, and solutions; and finally (3) the evaluation and selection of one or several of the most promising ideas, opportunities, and solutions.

We believe that the increased implementation of electronic services and automation, coupled with the general transformation to digitised organisations, will change the role of innovation management. As in the past, when innovation managers attempt to recognise or develop new opportunities and ideas, they face two specific barriers: first, they must overcome *information processing constraints* that limit the amount of information on either new opportunities or possible solutions the firm may pursue.

The second barrier encountered by managers is the result of *ineffective or local search routines*; this barrier specifies that managers generally search for solutions in knowledge domains that are related to the firm's and their own existing knowledge bases. This suggests that most solutions will be comparatively incremental in their innovative thrust since

they rely very closely on existing knowledge. However, to generate a more creative and innovative idea or opportunity, managers will have to extend their search beyond existing knowledge domains to new fields that are more exploratory in nature.

Critical Analysis of Artificial Intelligence and Management Science:

AI is very effective in competitive situations to deal with voluminous information and take innovative decisions, but computers have no intelligence to take any decision among various alternatives. It can process a large volume of information without any fatigue. AI cannot take any tactical decisions; instead, it takes strategic decisions only with the help of man-made programming. AI has been extended in various sophisticated work fields based on some specific terms and conditions, but if the terms and conditions change, AI will fail.

Conclusion: Therefore, even though access may be more limited in increasingly digitised organisations, the more managers are able to process a large amount of information on possible solution approaches and opportunities, the more they should be able to whittle down the set of possible solutions to the most promising ones and recognise truly exciting opportunities. Furthermore, since managers are able to go beyond their current knowledge base with the assistance of AI, they should be able to develop more innovative solutions and recognise more creative opportunities. The AI solutions that could be employed are not straightforward, however, and it may be challenging to involve AI in the innovation process. It will also be difficult to replace human involvement. Any artificial intelligence-based system that seeks to support management in these endeavours must be capable of overcoming the same barriers encountered by human managers in the innovation process.

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 - Krakowski et al., 2019;
 - Furman and Teodoridis, 2020;
 - Goldfarb et al., 2020;



AI and Internal Management of Educational Institutions: A Post-Pandemic Perspective

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Since the COVID-19 days, the field of artificial intelligence (AI) has taken a huge leap in transforming the education system—both in academic and administrative ways. In the current study, different internal areas of administration of the educational organisations were identified. These include planning and organising, admission and enrollment, record keeping and data management, resource management, staffing and recruitment, regulation and supervision, leadership and decision-making, coordinating and communicating, curriculum framing, guidance and counselling, management of the teaching-learning process, and feedback. The benefits and drawbacks of applying AI were also discussed, along with future research directions.

Since the COVID-19 pandemic, the future of the educational system has been inextricably tied to the development of technology, and artificial intelligence (AI) has undoubtedly opened up new opportunities for the educational system (Mangal & Gore, 2020). AI simply imitates aspects of human intelligence in machine form. AI refers to a type of algorithm or computerised system that is programmed to behave and function like people and imitate their actions. AI also refers to the ability to explore meaning, reason, solve problems, and learn from past experiences

(Castelvecchi, 2016). It can also be used to describe any machine that has the capacity to think like the human mind. The field of AI has made rapid strides (Russell, 2019) in automating and digitalizing processes. Although AI has its roots in computer science and engineering, every industry, from e-commerce to healthcare, and every field of study, from philosophy, cognitive science, neurology, economics, and educational technology, has seen a significant surge in the use of AI, especially after pandemic days. It is evident that machines have advanced past

humans and given rise to a smarter society (Bisht & Sharma, 2021).

Applications of AI in the education sector have drawn a lot of attention in recent times because of the significant investment by private businesses in it. Also, the necessity for distance and digital services for advice has expanded greatly due to the pandemic (Ananiadou et al., 2020). Although the Horizon Report 2019 Higher Education Edition (Alexander et al., 2019) forecasted that AI applications in teaching and learning will expand more significantly than this, The 2018 Horizon report (Becker et al., 2018) estimated that AI in education will rise by 43 percent in the period between 2018 and 2022 (Zawacki-Richter et al., 2019). The COVID-19 pandemic, in particular, has brought a new wave of automation to the traditional academic and administrative systems and compelled educational organisations to think about strategizing a digital transformation to incorporate the right AI applications.

The pandemic affected daily activities, and the face-to-face teaching and learning programme was disrupted. Also, the whole organisation of the schooling system was temporarily halted (Toro et al., 2021). It became very challenging for the teachers to manage both administrative work along with the job of teaching and learning as educational institutions shifted to an online mode of operation (Ahmad et al., 2022). And in this period of crisis, AI applications not only supported the instructional activity but also automated different action areas of educational administration (Villanueva, 2003), including admissions, timetabling, attendance and homework monitoring, and supervision and inspections. Thus, AI has gradually merged with educational administration as a result of its ongoing growth, making it more futuristic (Luo, 2019; Miao et al., 2021).

AI-Driven Areas of Educational Administration

AI may help in the management of both academic and administrative responsibilities,

which together make up the administration of educational institutions. There are two types of administration in educational institutions. The government's departments and organisations are in charge of administering external education. They create strategies, assign funds, and manage educational programmes. The second is internal administration, which is concerned with how administrators oversee the operations of educational institutions (Jacob et al., 2020).

The internal educational administration is a complicated matter that doesn't relate to a single procedure but rather to a variety of activities or elements. An educational institution's internal administrative duties include the following areas: staffing, managing resources, evaluating, planning, organising, leading, coordinating, and regulating (Jacob et al., 2020).

Planning and Organising

AI planning is a branch of AI that focuses on the use of autonomous methods to resolve planning and scheduling issues. There are several advantages to using AI-enabled software. Automatic generation of fair and balanced scheduling is feasible every time with AI-driven scheduling software. AI can help in the successful planning and coordination of extracurricular activities in educational institutes. It also automates the preparation of timetables and the scheduling of various activities. AI can periodically plan, organise, and schedule events or meetings. After the COVID-19 pandemic, AI is also being used to assign duties and responsibilities to the staff members in an automated process. AI is also helping in conducting periodic reviews of the institution's progress, successes, and failures. It also helps in conducting various staff development activities in virtual mode (Jacob et al., 2020). AI also helps in planning and implementing improvements to the institutional and educational experience for students (such as building renovations, new student policies, or new courses).

Admission/Enrollment

One of the duties that come under the

management of educational organisations is the enrollment of students in various courses or sessions, the handling of admission applications and processes, and the filtering of appropriate and promising individuals. In the post-pandemic situation, the admissions procedure for any educational institution is being aided by AI technologies and software. AI is efficiently managing online application before the admissions. Besides, the entrance forms are accompanied by repeated questions from candidates and their parents, which are quite challenging to respond to in a short amount of time. However, educational institutions are adopting AI technologies, such as chat boxes and other chat features, to handle the influx of questions during the application process or admission. The use of AI apps like chatbots and other similar tools not only facilitates admission but also lessens the workload of the department and admissions employees. It offers services around-the-clock without human intervention (Ahmad et al., 2022).

The impartiality and effectiveness of the admissions process are both enhanced by AI technologies. AI systems are substantially reducing human bias and carrying out a fair and impartial admissions process (Mangal & Gore, 2020).

Record-keeping and data management

AI may also help with data management. With the ever-increasing population of India, more kids are enrolling in both private and public institutes. Therefore, educational organisations require a reliable system of data collection and maintenance of student records in order to execute and supervise administrative tasks smoothly. These include admission and enrolment, student registration, course placement, fee collecting, dorm and hostel allotment and administration, staff recruitment, and many others. AI-driven systems are best to rely upon for storing and updating such huge amounts of data. This is because AI-based applications require extremely little, or even no, human input to complete desired tasks (Bisht & Sharma, 2021).

Resource Management

Human resources play a crucial and essential role in any educational organisation. The greatest possible use of their skills is essential for the development of both the employees and the institute. Integrating AI technologies into human resource management is making jobs simpler and easier. AI is helping in a number of human resource management services, such as comprehending the demands of the organisation and employing the best applicant accordingly without any bias; selecting the best candidate with the necessary potential and skills for the job; providing appropriate training to improve employees' knowledge and skills about their jobs so that they can perform as expected; paying employees fairly for their work; and building teams that work effectively to the best of their abilities, not just for themselves but also for the expansion of the organisation. Thus, AI can effectively manage people within an organisation (Rani, 2019).

Additionally, AI has emerged as a crucial instrument for budget allocation globally (Valle-Cruz et al., 2022). It cuts institutional running expenses. It also ensures adequate utilisation of all resources, from managing budgets to allocating funds to managing materials (Jacob et al., 2020). AI helps in the systematic organisation of educational resources, including human and material resources such as instructional materials, equipment, and financial resources (Jacob et al., 2020).

Staffing and Recruitment

Educational institutions are also increasingly using AI technologies in dealing with the hiring of appropriate human resources. The AI-based technologies are being used to analyse job applications. These technologies automatically establish the requirements for the targeted applicants and gather data that establishes recommendations for interviews and other processes (Ahmad et al., 2022).

Regulation and Supervision

Any organization's ability to successfully manage its staff will determine its level of

success. At present, AI is also assisting in upholding order and discipline in educational organisations. It also helps in adhering to and maintaining the ethical standards of the organisation. (Jacob et al., 2020). The human-like intelligence of AI can resolve many disputes and other difficulties within the institution. AI monitors whether the employees and students are adhering to the rules and regulations. AI is also useful in transport management and facility management. Collaborating with colleagues and maintaining interpersonal relations within the organisation can also be done through the reflective capacities of AI based on analysis of previous similar scenarios.

Leadership and decision-making

The COVID-19 pandemic has also taught us that AI can also be used to develop leaders in educational organisations by giving them immediate feedback on their decision-making abilities. AI can gather pertinent information about how previous leaders have reached analogous judgements about various educational matters, such as fund allocation, selection of staff, resolving disputes, etc. (Wang, 2021), and can forecast the direction of the decisions of the educational administrators. The administrator can then decide whether he wants to accept the prediction or put up a strong case to overturn it.

Coordinating and Communicating

AI helps with routine tasks of external correspondence and communication with the public, authorities, and parents. Thus, it can ensure community involvement. (Jacob et al., 2020).

Attendance

In the post-pandemic era, absenteeism among students became a major issue in educational institutes (Nathwani et al., 2021). Absenteeism rates are relatively higher than in the pre-pandemic days, and they are showing detrimental effects on overall student achievement. In fact, chronic absenteeism was also seen among employees (Durmuşolu & Durmuşolu, 2021).

While good attendance is still stressed in all institutes, some are still struggling to meet the mandated average attendance (Moodley et al., 2020). A well-organized AI framework is allowing the institutions to make good progress with the attendance of both employees and students. It also saves time and effort for the teachers and other employees who calculate attendance. In the post-pandemic days, AI is replacing the customary procedure of calling out the students' names and recording their presence or absence in real classrooms. AI can also track attendance using face recognition technology. This approach is intended to increase student involvement in class, prevent the use of proxy attendees, and produce thorough records for future use (Rajamanogaran et al., 2021).

Curriculum Framing

In outcome-based education, the curriculum must precisely fulfil the knowledge, abilities, and traits required by job sectors. AI is a fantastic answer in this regard. With AI, it is possible to model the curriculum design process such that it sequences the courses and the associated knowledge, skills, and competencies (Somasundaram et al., 2020). AI can also work to identify areas of strength and weakness of the curriculum which helps in modification of the curriculum.

Guidance and Counselling

The COVID-19 pandemic left an immense impact on the academic and emotional well-being of the students. While the world started to use the term "post-COVID," the pandemic's effects are still very real for many students. Therefore, educational institutes must prioritise support for students to address their short- and long-term emotional, psychological, educational, career, and health-related needs. Digital technologies have the potential to extend the breadth of services available and provide students with new ways to get help at any time. Improved accessibility, expanded access to information, evaluation, and networks, as well as reduced total expenses and enhanced cost-effectiveness, are

some of the possible advantages of employing AI technology in guidance and counselling (Luxton, 2014, 2016; Sampson et al., 2020).

Numerous thinkers and academics believe AI will influence how occupations and vocations will be structured in the future (Ross, 2017). AI can assist career counselling by analysing job market demands based on current circumstances, facilitating decision-making about a career through competence mapping, inferring competence gaps based on profile data, and recognising generic competences from work experience. It can match students and counsellors.

Educational institutes serve a critical role in meeting the mental health needs of their students, a task amplified by the COVID-19 pandemic (Naff 2020). Guidance professionals can also benefit from the use of intelligent technology in mental health and educational counselling. By compiling student data, AI tools can anticipate guidance requirements (Westman et al., 2021).

AI as a complement to conventional therapy may be advantageous for both clients and practitioners. Chatbots like Eliza have been imitating counselling techniques to some extent (Fulmer, 2019). AI can also help in counselling employees.

Management of the Teaching-Learning Process

At present times, analytics are significant and vital in the education and learning sector at several levels, i.e., in classrooms, departments, universities, and at regional, national, and international levels. For instance, it can record and gather data when students use social media, a learning management system, etc. Their button presses, navigation, and time spent on a search may all be monitored. It provides details about the student's interests, social networks, IQ level, grades, and many other things and AI based analytics utilises this data to assess and improve the learning environment. It provides statistics about risk factors, the need for intervention, and support services, and provides recommendations

on what to do and what not to do. Thus, it regulates academic activities most efficiently (Ahmad et al., 2022). AI-based analytics also help in monitoring student progress (Wang, 2021).

Feedback

The online interactive interface of AI systems enables students to provide feedback to their teachers for the purposes of follow-up and feedback in areas where they may be having difficulty or have not yet completely understood. Teachers will have more time to focus on tasks that call for a one-on-one engagement with kids by using AI systems. AI tools can even function to contact parents and guardians and provide feedback as needed for regular issues (Mangal & Gore, 2020). AI will also work to give immediate classroom feedback. For example, AI will identify when groups of students miss certain questions, letting the teacher know when material needs to be retaught.

Benefits of Using AI Technologies in Administration

Effective planning and management of educational organisations are essential for boosting the overall performance of the educational system (Jacob et al., 2020). Therefore, educational institutions can benefit from AI by implementing intelligent assistants to assist with a variety of administrative tasks, such as budgeting, student enrollment, course management, human resource-related issues, student attendance, feedback, purchasing and procurement activities, expense management, transport management, and facility management (Mangal & Gore, 2020).

AI is also boosting educational management's evolution in the direction of data openness and rationalisation through time (Luo, 2019). One of the major worries for educational organisations is the risk of a data breach. Many sensitive pieces of information on students, admissions, enrolments, attendance, professors, and other topics are kept at educational institutions, including schools, colleges, universities, and training facilities.

By using a secure AI, the risk of data loss and hacks is eliminated (Bisht & Sharma, 2021).

The use of AI technologies may significantly increase the efficiency of many educational institutions, reduce operational costs, provide more visibility into revenue and spending, and enhance the educational institutions' overall responsiveness (Mangal & Gore, 2020). At least 40% of the duties that instructors currently carry out are anticipated to be automated over the course of the next ten years by AI, particularly non-instructional jobs. According to a recent study, AI might free up almost one-third of instructors' workdays (Bryant et al., 2020; Wang, 2021).

Teachers, policymakers, other support personnel, and educational institutions all profit from the use of AI in administration (Ahmad et al., 2022). It is important to remember that AI tools and apps support existing educational institution workers rather than replacing them (Ahmad et al., 2022).

Problems in the Application of AI

As the use of AI in educational administration increases day by day, a number of issues arise, including breaches in security and privacy, unethical behaviour, and so on. These issues have posed significant obstacles to education management (Bisht & Sharma, 2021).

Besides, in an AI-dominated world, the least developed nations face the possibility of experiencing new technical, economic, and societal gaps. The key challenge for them is developing the technology infrastructure and fundamental conditions needed to adopt AI and get benefits from it. Another barrier to using AI in education is teachers' unwillingness to adopt new digital skills. Additionally, there hasn't been enough research done in the area of the use of AI in management, which is also causing the reluctance of the teachers to apply AI technologies. Moreover, not all institutions can afford to implement AI, especially in India, where the majority of students find it difficult to even afford the tuition cost (Bisht & Sharma, 2021).

Also, due to a lack of funding or scepticism about these tools' efficacy, universities have been hesitant to adopt AI technologies (Sarni, 2018). In other words, using AI technology in educational administration has both benefits and drawbacks (Luo, 2019).

Conclusion, suggestions and future research directions

After the COVID-19 pandemic, one might anticipate that AI will soon become a crucial component of every educational experience. The hope is that AI will significantly improve overall learning outcomes as it begins to demonstrate its benefits and applications across a wide range of educational needs (Mangal & Gore, 2020).

The efforts and skills of both humans and machines must be merged in the guiding process. Students will succeed if human and AI help are combined in a synergistic way. An integrated strategy will increase advantages while minimising dangers associated with technology adoption (Westman et al., 2021).

Future research may be done on different application areas of AI, including online learning, tutoring, personalised education, etc. More quantitative research is required to draw a more general conclusion about AI's application in administration. Future research can be done on the potential problems that AI in education may bring up, such as ethical issues (Ahmad et al., 2022).

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The Scope of Roboethics in Business Ethics

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Abstract

This paper attempts to highlight the need to include Roboethics in the study of Business Ethics. With the increasing dependence on Machine Learning (ML)/Artificial Intelligence (AI) in management decision-making and the ethical risks around privacy, explainability and bias, the subject of AI Ethics is becoming an integral part of modern-day Business Ethics. However, Roboethics has not yet been an actively discussed subject in the field of Business Ethics. We have highlighted the commonality of topics between AI Ethics and Roboethics, the problems unique to Roboethics due to the anthropomorphization of robots which may be of remarkable importance in Business Ethics. We feel that the inclusion of Roboethics in the study of Business Ethics would help in making Roboethics actionable and compatible with real-world business necessities of the near future when the human-robot symbiotic environment in the business workplace and boardroom discussions become a reality.

Key words: Roboethics, Anthropomorphization, Machine Learning (ML), Artificial Intelligence (AI).

Introduction - Robots, Roboethics and Managerial Robotics

“A **robot** is an *autonomous* machine capable of *sensing* its environment, carrying out computations to *make decisions*, and performing *actions* in the real world” (Guizzo, 2020b). For humans, “autonomy is the capacity to be one’s own person to live one’s life according to

reasons and motives taken as one’s own and not the product of external forces” (Christian, J., 2003). For robots, however, autonomy is not defined in the absolute sense but in the context of the task to be executed.

So in essence, a robot can *autonomously sense, compute and act*.

The act of sensing could involve sensing the physical environment, using multiple actuators and sensors (light, sound, temperature, contact, proximity, pressure, tilt, distance, acceleration), cameras, gyroscopes etc. It may also include sensing subtler environments like social, political, business, cultural, creative etc., based on data received through the internet/LAN environment in combination with the sensory information received. Thus the sensing part may be based on a simple threshold-driven presence-absence test, or may itself involve detailed inferencing based on large streaming datasets.

The 'compute' stage encapsulates the core functioning of the robot and results in formulating its course of action. This involves computation using its understanding of the environment and factoring a large dataset of past actions and outcomes.

The 'act' stage is the process where the robot takes up a set from its range of permissible actions. This may range from motion, manipulating objects using robotic arms to making complex decisions involving expressing feeling (verbal and non-verbal), and giving instructions to other entities (humans, robots, computers) to implement the decision taken.

This sense-compute-act process continues through the lifecycle of the robot, and it continually enriches itself by learning from past experiences, based on how its course of action has affected its external environment. Most importantly, this entire process is carried out without the recourse to human control, thereby making it act autonomously in its designated scope of action.

The sense-compute-act of robots capable of collaboration is actually governed by a large collection of computer algorithms, some of which may be deterministic while the others are Machine Learning (ML) algorithms. Deterministic algorithms are a set of well-defined rules which takes the input data to generate the output course of action for the robot. ML algorithms, on the other hand, are

generated as the output of a training process, which takes as input the data and the known outcome for that data. This process is carried out for a large set of data, referred to as training data.

A large class of these robots have a variety of capabilities where this sense-compute-act process is embodied in a human form (anthropomorphization) to mimic human expression, speech and modes of interaction in the social dimension. These capabilities are governed by ML algorithms which require a very careful training process. This anthropomorphization has resulted in a remarkable increase in complexity, broadened the scope of a robot's autonomy even further, and raised questions about the ethical risks involved.

Robotics covers the entire process of a robot's lifetime, namely conceptualization, design, development, testing, training and deployment of robots. Thus, it requires the participation of several fields, including not only computer scientists, Artificial Intelligence specialists, and electrical & mechanical engineers, but also artists, ethicists, neurobiologists, philosophers, psychologists and sociologists. This has resulted in making robotics a rapidly growing field of study and has also given rise to new interdisciplinary fields like **Roboethics**.

The term Roboethics for "robot ethics" was coined by Verrugio in 2002 (Veruzzio, G. & Operto, 2006), and is the amalgamation of one of the most ancient fields with one of the most modern fields of study. While ethics advocates models of life of the human where humankind is the primary value, robotics advocates models of life of the robot where humankind is the primary value.

"The fundamental issues addressed by Roboethics are - the dual-use of robots (robots can be used or misused), the anthropomorphization of robots, the humanization of human-robot symbiosis, the reduction of the socio-technological gap, and the effect of robotics on the fair distribution of wealth and power" (Tzafestas, 2016).

Objectives

With the rapid advancement of AI and Machine Learning (ML) technologies, robots are becoming cognitive. “A key feature of cognitive robotics is its focus on predictive capabilities to augment immediate sensory-motor experience. Being able to view the world from someone else’s perspective, a cognitive robot can anticipate that person’s intended actions and needs” (“Cognitive Robotics - IEEE Robotics and Automation Society - IEEE Robotics and Automation Society”).

To be able to anticipate the other person’s actions and needs (human or robot), the cognitive robot learns from past data, from human teachers, and on their own - by learning from the collective experience of robots, thereby equipping it with an ability to interact with their environment, make human-like decisions.

This ability to interact “intelligently”, make decisions and provide direction has the potential of robots entrusted with management functions in the future, which would involve leading, planning, organising and directing the work of human beings/robots. This gave rise to a new branch of Robotics, coined “Managerial Robotics” by Gladden in 2015. However, “significant attention has not yet been given to this question of ‘Managerial Robotics’; we do not yet possess a robust set of models or principles designed to help identify or develop robots that are uniquely qualified to perform particular management roles.” (Gladden, 2015)

In the sections that follow, we present the need to build the foundation of ‘Managerial Roboethics’ as a new field of applied ethics, that would be fostered by the symbiotic coevolution of Managerial Robotics and Business Ethics. The paper also identifies three fundamental areas around which ‘Managerial Roboethics’ needs to evolve in order to foster a human-robot symbiotic environment in the business world of the future.

Symbiotic coevolution: AI in Robotics and AI Ethics in Roboethics

In the general sense, AI may refer to two interconnected objectives

- research on “a cross-disciplinary approach to understanding, modelling, and replicating intelligence and cognitive processes by invoking various computational, mathematical, logical, mechanical, and even biological principles and devices” (Frankish & Ramsey, 2014).
- building machines that embody some form of ‘intelligence’, that can ‘think’ or solve problems in a way similar to human thinking.

On the surface, it may seem that Robotics is merely an applied field culled out of general AI research. The connection between AI and Robotics is far deeper. Robotics has contributed to the rapid development of all the major areas of AI, which include Knowledge Representation, Natural Language Processing (NLP), Learning Systems, Inferencing, and Machine Vision. According to Murphy, “Robotics has played a pivotal role in advancing AI” (R. R. Murphy, 2019).

The actual relationship between AI and Robotics is that of symbiotic coevolution. In a similar vein, the relationship between AI Ethics and Roboethics is that of symbiotic coevolution.

The three main problems of AI Ethics, namely privacy, explainability and bias (Blackman, 2022), are relevant in Roboethics as well. Methodologies for addressing these issues in the field of Roboethics have the potential of enriching the field of AI Ethics in a significant way.

Privacy

The ethical issues around privacy are under active consideration in the domain of AI Ethics. Regulatory acts like California Consumer Privacy Act (CCPA) and General Data Protection Regulation (GDPR) have served to reduce some of the ethical risks of AI, however many unaddressed areas remain. Privacy issues generated from data collection

for robots add another dimension to privacy. Major “regulatory dilemmas” exist (Leenes et al., 2017) which need to be resolved to make way for data privacy-related regulatory acts to encompass the Robotics-related issues.

Bias

Bias, in the context of AI Ethics, deals with the prejudices that may surface in the AI-generated outcome which may result in “discrimination, inequality, digital divides, exclusion and a threat to cultural, social and biological diversity and social or economic divides” (*Recommendation on the Ethics of Artificial Intelligence*, n.d.). The inclusion of the checks that detect such biases in the regulatory acts has served to provide a baseline for companies to adopt self-regulatory steps that may help mitigate some of the inherent biases. The issue of bias in Roboethics presents an even bigger challenge, primarily because of the autonomous nature of the functioning of collaborative robots and their ability to continuously learn from the environment. However, “these techniques that typically aim to mimic human behaviour do not guarantee fair behaviour. As a consequence, social navigation models can replicate, promote, and amplify societal unfairness, such as discrimination and segregation” (Hurtado et al., 2021). The unmoderated inflow of training data coupled with the autonomous behaviour of the robot present complex problems in the field of bias, which have relevance in AI Ethics.

Explainability

One of the main problems of many ML applications is that the logical steps of the solution process are not available for post facto analysis. In some cases, machine-generated explanations, even if available, are not understandable to humans. Explainability, rather, the lack of it heightens the “perception of bias” in a big way. In AI Ethics, the problem of perceiving the AI/ML solution as a “black box” has been identified as the main reason for the lack of trust in the solution.

Anthropomorphism in Robotics has

generated the need for the collaborative robot to be able to provide a human understandable and ethically compliant explanation of its decisions. This has led to the creation of “Explainable Robotics” as a new field (Setchi et al., 2020) and the implied ethical considerations are being actively researched in Roboethics.

Importance of Roboethics in Business Ethics

The concerns around privacy, bias and lack of proper explainability raised in AI Ethics have begun to find a place in mainstream Business Ethics (Daza & Ilozumba, 2022). However, it is to be noted that the business ethical issues around AI became an active topic of discussion only *after* several glaring incidents around privacy and bias surfaced in the last decade, e.g.,

- Facebook Cambridge Analytics Data Privacy Breach (Boldyreva et al.)
- Amazon AI Recruitment tool Bias (*Incident 37: Female Applicants Down-Ranked by Amazon Recruiting Tool*).

On the Robotics front, the adoption of worker robots in the industry is picking up, and the related ethical issues raised in Roboethics have begun to find a place in Business Ethics literature. In this section, we argue that business ethicists need to be adequately prepared *well before* the age of “Posthuman Management” (Gladden, 2016) where the adoption of cognitive robots as decision-takers and Managerial Robotics becomes a reality.

Managerial Roboethics would require research that is interdisciplinary in nature, requiring joint work involving business ethicists, AI ethicists, roboethicists, management researchers and psychologists. This presents a challenge because a common language must be forged between varied fields for effective research.

Fundamental Research Areas

A survey, in the form of a thought experiment, was conducted on a team of eighteen software engineers, where the team was asked to list top

concerns around four scenarios in a software development project led by a Robot Manager. The primary features of the Robot Manager were described as follows:

- integrated with ChatGPT, trained with the entire data of the organization
- capable of comprehending the entire range of human expressions
- having the ability to express the entire range of human expressions

The scenarios considered:

Scenario 1 – Conducting a team review meeting

Scenario 2 – Assigning a task to a human/non-human employee

Scenario 3 – Reporting the overall status of a project to the Robot Manager’s reporting authority

Scenario 4 – Conducting a performance review for a human/non-human employee

Based on the outcome of the survey, this paper identifies three fundamental areas around which Managerial Roboethics needs to evolve, in order to be prepared for a “Posthuman Management” (Gladden, 2016) scenario. The areas identified are

- Ethical Decision Making
- Code of Ethics for all participants
- Accountability

Ethical Decision Making

Ethical decision-making in a company by a cognitive robot would require that the decision complies with its underlying code of ethics. The code of ethics is based on professional ethical values, company policies, laws and regulatory requirements that a company wants all employees to adhere to. “The professional ethical values include

- Impartiality (objectivity)
- Openness (full disclosure)
- Confidentiality
- Due diligence (duty of care)

- Fidelity to professional responsibilities
- Avoiding potential or apparent conflict of interest” (“A Framework for Universal Principles of Ethics”)

The professional ethical values may be treated as universally acceptable, and it may be expected that the cognitive robot would generally not need to go through a detailed company-specific training process to tune itself to comply with most of these values. However, the issue of Impartiality (Bias) would need careful consideration and proper guidelines for the training data preparation. As in AI Ethics, the issue of Bias may be amplified by training data that has instances of discrimination and segregation hidden. Managerial Roboethics needs to come up with proper guidelines “on broad challenges for mitigating bias - datasets, testing and evaluation, and human factors” (Schwartz et al.), factoring in the work already achieved in AI Ethics as the starting point, e.g., “Towards a Standard for Identifying and Managing Bias in Artificial Intelligence” from National Institute of Standards and Technology (NIST), U.S Department of Commerce.

Code of Ethics for all Participants

The birth of the field of Roboethics may be traced back to 1942 when writer Isaac Asimov in his fictional work “Runaround” stated his three laws of Robotics, referred to as Asimov’s Laws:

“Law 1: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Law 2: A robot must obey orders it receives from human beings, except when such orders conflict with the first law.

Law 3: A robot must protect its own existence as long as such protection does not conflict with the first or second laws.” (Asimov, 1991)

The laws are anthropocentric in that it is human-centric. It considered robots to have acquired sufficient “intelligence” to make correct moral decisions, and possess a level of

autonomy that is near-human. While several shortcomings of Asimov's Laws have been extensively discussed, it has served as a basis over which several Ethical Codes for the robot have been delivered.

WPI Code of Ethics for Robotics Engineers (Ingram et al.) provides an initial ethical framework for the Robotics Engineer. However, as specified in the WPI Code of Ethics "this code was written to address the current state of robotics engineering and cannot be expected to account for all possible future developments in such a rapidly developing field. It will be necessary to review and revise this code as situations not anticipated by this code need to be addressed".

Similar ethical codes would be required for all participating fields, including ethical codes which serve to save robots from harm and unfair treatment. The purpose of this paper is not to highlight the code of ethics best suited for the "Manager Robot", but to highlight the importance of having ethical codes for all participants involved in the conceptualization, design, development, configuration and training, training-data preparation for the Manager Robot.

Accountability

For a human decision-maker in a company, taking responsibility is a universal phenomenon, and there may be the same expectation from a robot manager. However, robots cannot be moral agents, so at best they may be trained to generate a form of expression equivalent to that of owning responsibility, and they can be made to carry out their roles to generate a belief that the status of moral agent may be ascribed to it. "Robot moral agency requires the robot to behave in a way that shows an understanding of responsibility to some other moral agent. Robots with all of these criteria will have moral rights as well as responsibilities regardless of their status as persons." (Sullins, 2011) However, it may be argued that this has the possibility of violating Business Ethics. Also, accountability would remain unaddressed even if the robot behaves in a way that displays a sense of responsibility.

In Roboethics, the topic of accountability is a matter of big debate and there is no standard guideline even for present-day robots. "In all cases of using robots for industrial, medical and service tasks the responsibility assignment in case of failure is unclear and needs to consider both ethical and legislation issues" (Tzafestas, 2016).

So it is crucial to include the study of Managerial Roboethics in Business Ethics to prepare for an accountability framework, compliant from an ethical, legal and chain-of-responsibility perspective for cognitive robots when they are entrusted with decision-making responsibility in the future.

Conclusion

We are in the midst of a Robotics revolution where robots have stepped in for 4-D tasks (Dull, Dirty, Dangerous and Dear), and it is expected that robots, combined with AI will help create situations where the human workforce may need to work alongside collaborative robots very soon.

This paper intended to give a broad brush overview of Robotics, Roboethics, AI Ethics and the symbiotic evolution of AI Ethics and Roboethics. The need for symbiotic coevolution of Business Ethics and Roboethics has been discussed, with the possibility of the evolution of a new field of Managerial Roboethics. The three fundamental areas - Ethical Decision Making, Code of Ethics for all participants and Accountability - have been briefly introduced. They merit far deeper study and analysis, which is likely to take place once the involvement of business ethicists happens in a bigger way.

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Return on Equity or Wealth Maximization of Enterprise – Which is Preferable to Shareholders?

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Abstract

Return on equity (ROE) is an important parameter which reflects the performance of a company. The growth of ROE indicates that the shareholders are getting higher return on their equity content. This is profit after tax (PAT) divided by equity content (equity capital plus general reserve) which was invested by shareholders to earn current year's PAT.

If ROE gets energized and provides return greater than opportunity cost of investors plus inflation factor plus some extra return for growth of fund then the situation is quite comfortable. However, different investors have different opportunity costs, depending on their expectation level.

One thing is to be noted regarding ROE that reserve creation is not solely dependent on profit earned from normal business operation. The reserve may grow, barring profit, from investment of reserve fund in profitable avenues and the valuation of reserve content can grow appreciably if investment is magnified in a robust way and consequently the book value of share can increase significantly and subsequently stock price may grow also. Here, in such situation ROE is bound to decrease by definition as PAT cannot include the growth of valuation of reserve till it is not realized in cash.

From this standpoint, the wealth maximization is preferable to shareholders than mere growth of ROE. The growth of stock price may provide lucrative return to investors rather than growth of ROE.

However, the entire process could be better controlled and monitored with the help of artificial intelligence and computerisation of accounting as well as production process of any industry.

Keywords: ROE, wealth maximization, profit, reserve, stock price.

Introduction:

Any business enterprise tries to achieve maximization of its wealth by deriving income from business operation. No income-No survival, hence no maximization of wealth either for enterprise or for share holders’.

Actually this profit can be earned from normal business operation as well as from non-regular process such as earning from investment of reserve in potentially profitable avenues or sale of assets such as excess land, unused machinery, etc.

The question then arises how much of the profit should be distributed as dividend and how much should be retained as reserve to enable shareholders to keep the return on equity (ROE) at desired level. Even under declining profit, reserve can grow on transfer of even paltry amount of profit (profit retained after payment of dividend) and in such situation ROE falls as per its definition which says ROE is obtained by dividing the profit by equity content (both equity and reserve).

Literature Survey:

J.H.v.H. De Wet and E. Du Toit, published an article online on 1 March 2007 aimed at analysing the impact of popular financial performance measures on shareholders wealth. In this article they tests the strength of the linear relationships between performance measures and shareholders’ returns, which consist of dividends and changes in the share price. The return on equity (ROE) is weighed up against the economic value added (EVA) and discussed in details the merits and flaws of each approach.

Andrew Keay A.R.Keay in their article (October, 2010) tries to determine the objective of a large public company. Two dominant theories are prevalent around the world. They are the shareholder value theory (also known as ‘shareholder primacy’ or ‘shareholder wealth maximization’) on the one hand, and the stakeholder theory on the other. Anglo-American corporate law embraces the former, and in countries such as the UK, USA, Canada, Australia and Ireland public companies apply shareholder value as their guiding light.

Konečný, Zinecker, in his article,(2017) stated that the returns to shareholders should outperform the cost of capital. The higher the spread is, the better the position of shareholders. It is also found in the article that return on equity is significantly dependent on the corporate life cycle and also tries to develop an innovative model identifying stages of the corporate life cycle, using two variables: the rate of economic profit and the share of operational and financial risk.

It appears from the above discussion that no such papers / article has been found, so far, where authors directly considered the issue i.e., Return on equity or wealth maximization of enterprise – which is preferable to shareholders?

Research Framework

Research Design

The research is based upon the data for the last 5 FYs from the money control website of the government which shows the Balance Sheet and Profit and Loss a/c of two company viz., Tata Investment Corporation and Hero Motocorp Ltd.

Methodology

This study is quantitative in nature which means that it primarily deals with financial statement of two company for past 5 FYs 2020-21, 2019-20, 2018-19, 2017-18 and 2016-17. This study is based on secondary data which is taken from website viz., moneycontrol.com, nseindia.com, bseindia.com. The data is analysed for some performance ratio and conclusion arrived at the end of analysis.

Limitations of the Study

- The study is restricted only 5 FYs.
- The study is completely based on secondary data.
- The accuracy of the analysis depends on the data, how much accurate itself which are taken from the published external source.

Objective and Study Concept

Which aspect should be given due importance — ROE or Book value of a share or stock?

Data: Data have been collected from secondary reliable sources like moneycontrol.com.

Concept: The increase of book value indicates increase of wealth of the enterprise and, in turn, that of investors. On the other hand ROE simply indicates the rate of return of the equity base of shareholders (capital and general reserve) on the basis of PAT.

ROE growth focuses the growth of return on equity base of the enterprise or shareholders. The fundamental difference lies in the fact one exposes return per rupee invested and the other reflects net wealth per share.

Non realized income is not shown in PAT, however, reserve can show the valuation of assets not realized in cash. This factor is a decisive issue and efforts are being made to put up a clear picture of the two aspects.

As the equation of ROE is expressed as

$ROE = \text{Profit} / \text{Shareholders Fund (capital plus general reserve) or Net Worth}$

However, if a company retains more fund as reserve and distribute less as dividend, the

ROE of the enterprise decreases and book value of share increases.

Increase of shareholders fund may cause decline of ROE.

To explain it more precisely, the following concept can be used.

As profit is associated with earning per share (EPS), which is expressed as

$EPS = \text{Net profit or Profit after tax (PAT)} / \text{number of shares} \dots\dots\text{equation 1}$

Therefore, $EPS \times \text{number of shares} = PAT \dots\dots\text{equation 2}$

$\text{Net worth} = (\text{equity capital} + \text{free reserves}) \dots\dots\text{equation 3}$

(Free reserves are tangible assets)

$ROE = \{\text{Net Profit (PAT)} / \text{Net Worth}\} \times 100 \dots\dots\text{equation 4}$

$ROE \text{ (in percentage)} \times \text{net worth} = PAT \dots\dots \text{equation 5}$

Now equating 2 & 5, we get, $EPS \times \text{no. of shares} = ROE \times \text{Net Worth} \dots\dots\text{equation 6}$

Assuming, as long as number of shares remains fixed, equation 6 becomes

$EPS \times K_1 = ROE \times (\text{Net Worth}),$
[here, $K_1 = \text{no of shares (constant)}$]

$= ROE \times (\text{Equity} + \text{Reserves})$

$= ROE \times (K_2 + \text{Reserves}),$ if number of shares fixed, equity capital (K_2) remains fixed

Or, $ROE = EPS \times K_1 / (K_2 + \text{Reserve}) \dots\dots\text{equation 7}$

From equation 7 it is evident that ROE is directly related to EPS, if all other factors remain same.

It is, however, inversely (not direct inverse relation) related to reserve content of the enterprise, if others remain constant.

Again,

$ROE_1 = (EPS_1 \times K_1) / (K_2 + \text{Reserve}_1)$ for year 1, $\dots\dots\text{equation 8}$

and

$ROE_2 = (EPS_2 \times K_1) / (K_2 + Reserve_2)$ for year 2,equation 9

In real life situation both EPS and Reserve are not static but dynamic in nature. Under dynamic situation following two situations can happen within the limitations.

- ROE will decline with respect to previous year if the ratio decreases with respect to previous year or denominator > numerator. Even if EPS declines, the reserve may grow. EPS_2 may be lower than EPS_1 but on transfer of profit to reserve, $Reserve_2$ will be higher than $Reserve_1$.
- ROE will increase when numerator for year 2 is greater than denominator. In other words growth rate of EPS > growth rate of reserve.

This equation 7 helps us to highlight an important point on distribution of dividend and transfer of retained profit to reserve also. Before distribution of dividend a company should consider how much should be transferred to reserve from profit. Here enterprise should keep in mind the fact that by transferring the profit it does not hurt the return on net worth or ROE of shareholders.

The retained earning in the form of reserve is also shareholders' capital and the reserve is required for future growth of the enterprise.

Apparently, it is free of cost to the enterprise but from the stand point of shareholders it is not so. If the firm would have distributed the fund to shareholders they would have invested the fund in similar projects with similar risk at market price to earn a return, say, k.

Thus, the cost of retained earning must be at least equal to shareholders rate of return on re-investment of dividend paid by the company in similar project.

If, D is expected dividend, P is current stock price, "g" is the expected growth rate of dividend, then

Cost of retained earnings k = Cost of equity
 $(k_e) = (D/P) + g$

Thus, if ROE exceeds cost of retained earning plus inflation plus some extra return the situation is comfortable. Usually return above 20% is desirable.

Here it should be kept in mind to increase the ROE the firm should not sacrifice the book value of stock by distributing most of the profit. Future requirement of fund should not be ignored.

ROE does not indicate about maximisation of wealth of enterprise or in other words the same of shareholders.

The more the company retains as reserve the book value of the company grows. This is reflected in stock price of share of the enterprise. If a company maintains steady dividend and generates much more reserve either by transferring profit or by investing the reserve in more profitable avenues the reserve may grow significantly thereby causing the ROE to decline. But does it indicate poor performance of the company? The answer may not be "No".

The example of Tata Investment Corporation Ltd (Tatainvest) is a good one. Yearly increase of massive reserve content was responsible for the gradual decline of ROE. But the stock price increased significantly because of majestic increase of book value.

The wealth maximisation from the standpoint of shareholders here in Tatainvest is absolutely a fine example. Decline of ROE over years has been offset by increase of valuation of stock.

Investors are rewarded by the company in the form of valuation of stock price.

Year wise financial parameters of Tata Investment Corporation

Table1

Tata invest Rs10.00	Mar-21	Mar-20	Mar-19	Mar-18	Mar-17
Basic EPS (Rs.)	30.44	17.89	24.48	23.79	36.37
EPS per unit face value	3.04	1.79	2.45	2.38	3.64
Book Value [Excluding Revaluation Reserve] / Share (Rs.)	2,814.66	1,592.70	1,566.45	1,507.09	457.23
Book value per unit face value (Rs)	281.47	159.27	156.65	150.71	45.72
Return on Net Worth/Equity (%)	1.08	1.12	1.68	1.57	7.95
Price/BV (X)	0.37	0.42	0.53	0.49	1.38
Price/BV of Sensex	2.92	2.95	3.03	3.05	2.84
Profit/loss for the period	129.91	95.61	142.72	122.74	198.82
Total share capital	50.6	50.6	50.6	55.1	55.1
Reserves and Surplus	14,188.37	8,006.53	7,873.59	8,246.85	2,463.42
Yearly growth	77.21	1.69	-4.53	234.77	
Reserve/equity	280.40	158.23	155.60	149.67	44.71
Stock price in March in BSE	1035.75	663.05	837.30	739.75	633.05
Annual growth rate	56.21	-20.81	13.19	16.85	
Stock price on unit face value (Rs)	103.57	66.30	83.73	73.97	63.30
Dividend	240	180	200	200	180

Source: moneycontrol.com, nseindia.com, bseindia.com

* stock price at 31st March 2022 was Rs 1356.5, a growth of 30.96% over previous year. During the same time ROE decreased. Value of share capital declined because of buy back of share in 2019.

Another example may be considered

Year wise financial parameters of Hero Motocorp Ltd (Heromotoco)

Table 2

Heromotoco (Face value Rs. 2.00)	2021	2020	2019	2018	2017
EPS in Rs	146.07	182.15	172.45	186.30	179.49
EPS on unit face value (Rs)	73.03	91.08	86.22	93.15	89.75
ROE %	18.92	25.25	26.24	31.07	34.74
Reserve in Cr	15357.42	14350.90	13070.87	11931.52	10275.57
Book Value (Rs)	760.68	707.70	643.66	589.33	506.32
Stock price (March)	2915.15	1594.20*	2555.25	3545.5	3223.85

Source: moneycontrol.com, nseindia.com, bseindia.com

* Corona pandemic caused havoc in stock prices in 2020.

Stock price bounced back in 2021 significantly, though ROE declined significantly.

EPS increased from 2017 to 2018, ROE declined book value increased, stock price increased.

In 2019 EPS declined with respect to that of 2018 but reserve increased on transfer of profit, book value increased but price declined because of both micro and macroeconomic factors.

In 2021 when EPS declined significantly, ROE declined sharply, as book value increased significantly stock price also increased significantly.

It is clear from the above discussion that lot of data are to be processed properly every time with the help of computer to have the clear picture of an industry and management of the unit to declare the corrective action promptly so that the wealth of shareholders get increased / maximized and management can do easily with the help of artificial intelligence (AI) which is becoming very popular day by day in the world and this AI will rule in the world in near future.

Conclusion:

Both, concept and aforesaid example, clearly indicates wealth maximisation aspect from the standpoint of shareholders is preferable over mere return on equity.

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Application of Artificial Intelligence in the Management Field

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Abstract

The word “AI” was first used in 1956 at Dartmouth College. Marvin Minsky, a cognitive scientist, was upbeat about the potential of the technology. Government funding in the field decreased during the “AI winter” years of 1974–1980, when many criticised the pace of advancement. Businesses can use artificial intelligence in a number of ways, such as to gather data and streamline processes. A branch of computer science called artificial intelligence is concerned with creating technological devices that can perform activities that humans can. It is crucial to comprehend the dynamics of artificial intelligence and incorporate it into daily operations as the world becomes more technologically aware. AI can be used for making decisions, business process automation, marketing and sales management, improving customer service, financial management, personalized online shopping, intelligent assistants, fraud avoidance, applications in education, administrative tasks to support teachers, making intelligent content, assistants with voice, personalized education, lifestyle uses, unmanned vehicles, spam detectors, facial identification, systems of recommendations, navigational uses for artificial intelligence, robotics uses for artificial intelligence, and many more. To encourage adoption, adopt new key performance metrics. AI will provide new standards for success, including the capacity for cooperation, information sharing, experimentation, effective learning and decision-making, and the capacity to look beyond the organization for ideas.

Key words: Artificial intelligence, Computer Science, New standards for success

Artificial intelligence (AI) is the theory and development of computer systems that can carry out tasks that would typically require human intelligence, such as speech recognition, decision-making, language translation, and visual perception.

As opposed to this, management science, often known as managerial science, is a multidisciplinary field that studies how people solve problems and make decisions in organisations. It has close ties to management, economics, business, engineering, management consulting, and other disciplines.

The scope of management science techniques is broad. These techniques include:

1. Mathematical programming
2. Linear programming
3. Simplex method
4. Dynamic programming
5. Goal programming
6. Integer programming
7. Nonlinear programming
8. Stochastic programming
9. Markov processes
10. Queuing theory /waiting-line theory
11. Transportation method
12. Simulation

Christopher Strachey, who later served as the director of the Programming Research Group at the University of Oxford, created the first effective AI software in 1951. The University of Manchester in England used the Ferranti Mark I computer to run Strachey's checkers (draughts) software.

The word "AI" was first used in 1956 at Dartmouth College. Marvin Minsky, a cognitive scientist, was upbeat about the potential of the technology. Government funding in the field decreased during the "AI winter" years of 1974–1980, when many criticised the pace of advancement.

One of the first attempts at evolutionary computing, Samuel's checkers programme was noteworthy for this reason. (His programme "developed" by competing against the best version currently available, with the winner becoming the new standard.) When using evolutionary computing, several "generations" of a programme are often generated and evaluated automatically until a highly effective solution emerges.

Businesses can use artificial intelligence in a number of ways, such as to gather data and streamline processes. A branch of computer science called artificial intelligence is concerned with creating technological devices that can perform activities that humans can. It is crucial to comprehend the dynamics of artificial intelligence and incorporate it into daily operations as the world becomes more technologically aware.

AI for Making Decisions

Artificial intelligence helps you make better decisions by providing deeper insight. In order to quantify data and make more precise predictions and judgements, it helps to evaluate trends and recommend courses of action. This is done in part or totally by an AI platform rather than a human. This considerably speeds up the process of making judgements. AI makes decisions based on data. AI develops models that are quite adept at producing forecasts and classifications based on this data by training itself and gathering data.

AI in Business Process Automation

AI aids in the automation of activities ranging from customer service to human resources. It is obvious that automating that administration will save you time when you consider how many of a manager's responsibilities involve it.

AI in Marketing and Sales Management

In the division of sales and marketing management, AI is essential. Propensity models created by machine learning are taught to rank prospects according to predetermined

standards. It enables the sales team to decide whether a prospect is worth their time and how “hot” it is. Artificial intelligence is used to evaluate vast quantities of historical data. Additionally, it is used to determine which forms of advertising are most effective for different demographics and at what points in the purchasing cycle. Using this information, they can provide them with the best marketing at the ideal time. Numerous universities in India that provide an MBA in Business Analytics educate their students on the potential benefits of AI for sales and marketing processes.

Using AI to Improve Customer Service

A significant portion of the purchasing process now involves contactless payments and online research. Many organisations have adopted AI to offer a more streamlined customer care experience in response to other e-commerce consumer trends, including hyper-personalization, comparison shopping, and ease of purchase. From chatbots to multi-channel encounters, AI is regularly employed to enhance the customer experience.

Financial Management Using AI

Since AI can precisely identify and assess loan risks, it is very helpful in the finance industry. By enhancing loan underwriting and reducing financial risk, AI technologies like machine learning can assist firms in increasing their value. AI can help businesses achieve long-term prosperity by improving fraud detection, uncovering anomalous behaviour, and reducing financial crime as their accountants, analysts, treasurers, and investors work towards long-term success.

In the not-too-distant future, artificial intelligence will permeate all corporate endeavours. As technology develops, new enterprises, consumer applications, job displacement, and the creation of whole new jobs will all be seen around the world. In the brief time that it has become more economically viable, AI has already benefited businesses significantly.

AI Application in Personalised Online Shopping

Recommendation engines are made possible by artificial intelligence technology, allowing you to interact with your consumers more effectively. Their browsing history, preferences, and interests are taken into consideration while making these recommendations. It helps you build stronger bonds with your clients and increases brand loyalty.

Intelligent Assistants

Chatbots and virtual shopping assistants enhance the user experience for online shoppers. The dialogue uses Natural Language Processing to sound as natural and intimate as possible. These assistants can also interact with your consumers in real time. Did you know that chatbots will soon be able to manage customer care on Amazon.com?

Fraud Avoidance

Two of the biggest problems faced by e-commerce businesses are credit card fraud and bogus reviews. AI can assist in lowering the likelihood of credit card fraud by taking usage trends into account. Many consumers choose to purchase a good or service after reading customer reviews. Artificial intelligence (AI) can assist in spotting and handling false reviews.

Artificial Intelligence Applications in Education

The education sector is the one that is most influenced by humans, but artificial intelligence has also started to make inroads there. Even in the field of education, this gradual adoption of AI has increased faculty productivity and allowed them to focus more on students than on administrative or office labour.

A few of these uses are found in this industry.

Automated Administrative Tasks to Support Teachers

Artificial intelligence can assist educators with non-educational tasks like managing enrolment, courses, and HR-related matters,

as well as task-related responsibilities like facilitating and automating personalised messages to students, back-office duties like grading paperwork, planning and facilitating parent and guardian interactions, and facilitation of routine issue feedback.

Making Intelligent Content

Artificial intelligence can be used to digitise information such as video lectures, conferences, and text book guides. For pupils in various grades, we can customise learning content and use various interfaces, such as animations.

By producing and supplying audio and video summaries and comprehensive lesson plans, artificial intelligence contributes to the creation of a rich learning experience.

Assistants with Voices

A student can receive additional learning resources or assistance with voice assistants even without the lecturer's or teacher's direct engagement. This lowers the expense of producing temporary handbooks and makes it simple to provide answers to frequently asked topics.

Personalised Education

Hyper-personalization strategies can be used to carefully monitor students' data using AI technology, and it is simple to create habits, lesson plans, reminders, study aids, flash cards, the frequency of review, etc.

Lifestyle Uses for Artificial Intelligence

Our way of life has been greatly influenced by artificial intelligence. Let's talk about a couple of them.

Unmanned Vehicles

When it comes to driving in any environment and object detection to prevent accidents, automakers like Toyota, Audi, Volvo, and Tesla use machine learning to train computers to think and evolve like people.

Spam Detectors

The email that we regularly use features artificial intelligence (AI) that separates out junk

emails and sends them to spam or trash folders, allowing us to see only the filtered material. Gmail, a well-known email service, has achieved a filtration capacity of roughly 99.9%.

Facial Identification

Facial recognition algorithms are used by our favourite devices, including phones, laptops, and PCs, to detect and identify users in order to grant safe access. Facial recognition is a popular application of artificial intelligence outside of personal use, even in highly secure settings in many businesses.

System of Recommendations

The recommendation system is used by many platforms we use every day, including e-commerce, entertainment websites, social networking, video sharing platforms like YouTube, etc., to collect user data and offer personalised recommendations to users to boost engagement. Almost all industries employ this artificial intelligence technology, which is highly widespread.

Navigational uses for Artificial Intelligence

According to MIT research, GPS technology can give consumers precise, timely, and in-depth information to increase safety. The system makes life easier for users by automatically determining the number of lanes and road types behind impediments on the roadways by combining a graph neural network and a convolutional neural network. Uber and several logistics firms significantly rely on AI to enhance operational effectiveness, assess traffic, and plan routes.

Robotics uses for Artificial Intelligence

Another area where applications of artificial intelligence are frequently used is robotics. AI-powered robots employ real-time updates to detect obstructions in their path and instantly design their routes.

It can be applied to

1. Carrying goods in hospitals, factories, and warehouses
2. Cleaning offices and large equipment
3. Inventory management

Artificial Intelligence Applications in Human Resources

Did you know that businesses employ sophisticated tools to streamline the hiring process?

With blind hiring, artificial intelligence is helpful. Applications can be evaluated using machine learning algorithms based on particular criteria. In order to give recruiters a better grasp of the talent pool they must choose from, AI-driven systems can scan the profiles and resumes of job hopefuls.

Uses for Artificial Intelligence in Healthcare

Numerous uses of artificial intelligence are found in the healthcare industry. Building advanced devices that can detect diseases and identify cancer cells using AI applications. In order to ensure early diagnosis, artificial intelligence can assist in analysing chronic illnesses with lab and other medical data. AI employs a combination of medical knowledge and historical data to find new medications.

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Agricultural Applications of Artificial Intelligence

Defects and nutrient shortages in the soil are found using artificial intelligence. AI can determine where weeds are growing by using computer vision, robotics, and machine learning technologies. AI bots can pick crops more quickly and in greater quantities than human employees.

Using Artificial Intelligence in Gaming

The gaming industry is another area where AI technologies have gained popularity. AI can be used to develop intelligent, human-like NPCs that communicate with players.

In order to improve game design and testing, it can also be used to forecast human behaviour. The 2014 Alien Isolation video games employ AI to follow the player around at all times.

Two artificial intelligence systems are used in the game: the "Director AI," who frequently knows where you are, and the "Alien AI," which is controlled by sensors and behaviours and persistently pursues the player.

Autonomous Vehicle Applications of Artificial Intelligence

Autonomous vehicle development is based on artificial intelligence. AI can be used to control the car in addition to its camera, radar, cloud services, GPS, and control signals. AI has the potential to enhance the in-car experience and provide new features like emergency braking, blind-spot detection, and driver assistance steering.

Instagram is one of the Applications of Artificial Intelligence in Social Media

On Instagram, artificial intelligence (AI) takes into consideration your likes and the accounts you follow to decide which posts to display in your Explore tab.

Along with Deep Text, Facebook's artificial intelligence is also utilised. Facebook can better interpret discussions with the help of this tool. It can be used to automatically translate postings from multiple languages.

Twitter uses AI for content removal, fraud detection, and propaganda removal. Twitter also makes use of AI to suggest tweets to users based on the kinds of tweets they interact with.

Artificial Intelligence Applications in Marketing

Applications of artificial intelligence (AI) are widely used in the marketing industry.

With the use of behavioural analysis, pattern recognition, and other AI technologies, marketers are able to deliver highly targeted and personalised ads.

AI may assist with content marketing in a way that suits the brand's style and voice.

It also helps with retargeting viewers at the appropriate moment to ensure better results and decrease emotions of distrust and

frustration. It can be used to manage normal duties like campaign reports, performance, and many other things.

Artificial intelligence (AI), natural language processing (NLP), natural language generation (NLG), and natural language understanding (NLU)-powered chatbots may analyse the user's words and answer in a manner similar to that of a human. AI can adjust and optimise marketing efforts to meet the needs of a local market and offer users real-time personalization depending on their activity.

Chatbots that Use Artificial Intelligence

AI chatbots can answer users of the "live chat" option that many businesses offer for customer support online and understand natural language. AI chatbots can be implemented into a variety of websites and applications and are efficient thanks to machine learning. In the future, AI chatbots will be able to create their own database of responses in addition to obtaining information from pre-existing integrated answers.

These chatbots can efficiently handle client issues, react to straightforward questions, enhance customer care, and offer round-the-clock assistance as AI advances. Overall, these AI chatbots can aid in raising client happiness.

Financial Applications of Artificial Intelligence

According to research, 80% of banks are aware of the advantages AI may offer. The very advanced technology provided by AI may considerably enhance a wide range of financial services, whether they are provided for personal, business, or consumer use. Customers seeking assistance with wealth management products, for instance, can simply obtain the information they require via online chat or SMS text messaging, both of which are AI-powered. Artificial intelligence can also see changes in transaction patterns and other potential fraud red flags that people could easily overlook, sparing both individuals and corporations from severe losses. AI can

more accurately predict and evaluate loan risks in addition to fraud detection and task automation.

With its applications, artificial intelligence is reshaping sectors and assisting in the solution of challenging issues. Do you concur with our list of applications for artificial intelligence? Do you think we overlooked anything crucial? You may also ask us any queries. Please feel free to share them with us in the article's comments area. We would love to hear from you!

Check out our Post Graduate Programme in AI and Machine Learning if you want to learn more about applications of artificial intelligence and develop your career in this fascinating topic. This extensive online bootcamp equips students with all the information, resources, and skills they need to further their careers and is provided in association with Purdue University and in partnership with IBM.

There have been several warnings about how artificial intelligence (AI) technology could change the workforce, particularly for tasks that are simple to automate. However, managers at all levels will need to change in the age of intelligent machines. The truth is that in the not-too-distant future, artificial intelligence will be able to perform the administrative duties that take up a large portion of managers' time faster, better, and cheaper.

How can managers succeed in the age of AI, from the shop floor to the C-suite? We polled 1,770 managers from 14 different nations and 37 leaders in charge of digital transformation at their companies to find out. We identified five practises that successful managers will need to grasp using this data.

Transfer Administration to AI

The poll found that administrative coordination and control chores take up more than half of the time managers at all levels spend on them. (For instance, due to staff members' illnesses, vacations, or unexpected

departures, a normal store manager or the lead nurse at a nursing home must continuously juggle shift schedules.) The same managers predict that AI will have the greatest impact on these particular tasks. And they are right: A lot of these duties will be automated by AI.

Writing a report is another appropriate illustration. With the use of software robots powered by AI, The Associated Press increased its quarterly earnings reporting from roughly 300 stories to 4,400. Technology enabled journalists to produce more interpretive and investigative reporting as a result. Imagine using technology like this to create your next management report; in fact, several analytical management reports currently allow for this. A cooperation between Chicago-based provider of natural language production tools Narrative Science and the data analytics business Tableau was recently revealed.

Narratives for Tableau, a free Chrome add-on that automatically generates textual descriptions for Tableau visuals, is the end result of the partnership.

The managers we polled view such change favourably. Eighty-six percent of respondents stated they would appreciate AI assistance with reporting and monitoring.

Emphasise Judgement at Work

Beyond what artificial intelligence can deduce from data alone, many decisions call for understanding. Managers apply empathy and ethical thought, as well as their understanding of the history and culture of the organisation. The use of experience and knowledge in important business decisions and practises is the essence of human judgement. The managers we surveyed see a move in this direction and list strategy formulation, data analysis and interpretation, and creative thinking and experimentation as three of the four most important new talents needed to succeed in the future.

Insight Centre: The Age of Automation

How machine learning and robotics are transforming business

Layne Thompson, director of ERP Services for a U.S. Navy IT unit, explained to us that managers frequently view their work as requiring discretion, judgement, expertise, and the ability to improvise rather than just following procedures. And if one of machine learning's potential benefits is its ability to aid in decision-making, then we should consider technology as something that is meant to support rather than replace [managers]."

Treat intelligent machines as "colleagues" as your third practise.

There is no need to "race against a computer," according to managers who see AI as a kind of partner. Intelligent robots can greatly enhance this kind of job, helping with decision support, data-driven simulations, as well as search and discovery activities, even though human judgement is unlikely to be automated. In fact, 78% of the managers who responded to the study think that, in the future, they will rely on the advice of intelligent systems when making business decisions.

Kensho Technologies, a company that offers next-generation investment analytics, is one business that is attempting to take advantage of this potential. With the help of this system, investment managers can quickly receive answers to inquiries about investments in plain English, such as "What sectors and industries perform best three months before and after a rate hike?" Imagine how such tools could assist managers working alone or in groups in evaluating the effects of their decisions and analysing potential outcomes.

Not only will AI augment managers' work, but it will also enable managers to interact with intelligent machines in collegial ways, through conversation or other intuitive interfaces. AI will be their always-available assistant and adviser.

AI will not only make managers' jobs easier, but it will also make it possible for managers to collaborate with intelligent computers through conversation or other user-friendly interfaces. AI will serve as their advisor and assistant at all times.

Work like a Designer in Practise

While having creative qualities of one's own is important, managing others' creativity may be even more crucial. Manager-designers combine several concepts to create cohesive, practical, and appealing solutions. They incorporate design thinking into their teams' and organisations' routines. As AI progressively replaces administrative work, a third of the managers in our poll highlighted creative thinking and experimentation as critical skill areas they needed to develop to stay successful.

According to Peter Harmer, CEO of Insurance Australia Group, "We need people who can genuinely layer ideas on ideas," while discussing the need for managers who nurture collaborative innovation in the digital enterprise. Not someone who must prevail in a contest of ideas, but rather someone who may exclaim, "Crikey! We get something very, very different if we combine these two, three, or four things. That is the kind of imagination and curiosity we need in management.

Create Social Networks and Social Skills

The value of judgement work was acknowledged by the managers we polled. However, they underappreciated the deep social skills that are essential for networking, coaching, and teamwork and will help them stand out in a world where AI does many of the administrative and analytical jobs they currently conduct.

They will employ digital technology to access the expertise and judgement of their partners, clients, and communities, but they also need to be able to elicit and synthesise a variety of viewpoints, insights, and experiences.

Success Strategies

In the end, AI will prove to be more affordable, effective, and perhaps even more unbiased in its activities than humans. However, managers shouldn't be alarmed by such a scenario. It simply implies that the focus of their work will shift to activities that only people can perform.

Writing earnings reports is one thing, but coming up with messages that can motivate employees and give them a sense of purpose is fundamentally human. Although scheduling and resource management may someday be handled by machines, crafting strategy is still distinctly human. In a nutshell, our advice is to use AI to automate administration and supplement, not replace, human judgement.

If the existing shortage of analytical expertise is any indicator, organisations cannot afford to wait to see if their managers are prepared to work with AI. Leaders must take the following actions to get their teams and organisations ready for the kind of human-led work that will become more prevalent as technology takes over more commonplace tasks:

Discover early. Managers must experiment with AI to navigate an unpredictable future and then apply their findings to the subsequent cycle of experiments.

To encourage adoption, adopt new key performance metrics. AI will provide new standards for success, including the capacity for cooperation, information sharing, experimentation, effective learning and decision-making, and the capacity to look beyond the organisation for ideas.

Create strategies for hiring and developing people with creativity, teamwork, empathy, and judgement. In order to foster solid collective judgement, leaders should build a diverse workforce and management team that balances experience with creative and social intelligence.

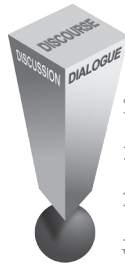
Although the impending disruptions won't happen all at once, most CEOs and managers are unaware of how quickly things are changing and how far-reaching the effects are. Managers that have the ability to predict how the future workforce will look can get ready for AI's arrival. They ought to see it as a chance to grow.

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Digitalization in Healthcare - A Road Map of AI, ML for Enabling Innovative Healthcare Services

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Abstract

Digitalization in healthcare is a new concept in India, and if we look into the applications of it, it is observed that most of the healthcare industries are trying to adopt these new techniques for their operational processes. In recent times, it is needless to say that digital transformation is one of the key aspects of business success, and most businesses are on their way to adopting it. Healthcare, as an emerging sector, is trying to adopt the application of modern technology from disease detection to the billing system of healthcare. The new health information technology improves patient safety by reducing medication errors, reducing adverse drug reactions, and improving compliance with practise guidelines. That is why health information technology is an important tool for improving healthcare quality and safety. It is noted that healthcare, which is a more promising industry, is also adopting artificial intelligence, machine learning, and cognitive technologies in their way of operating, proving the best services to their clients, and trying to make their services more user-friendly and easily accessible for service providers. In view of that, the present research will try to examine the adaptation of these technologies and their performance by the healthcare sectors. The study will also try to analyse the benefits sought by customers using these new techniques. The study is based on secondary data. It will assess how the mentioned technologies help healthcare sectors provide more promising ways to enhance education and communication regarding public health for severe diseases like cancer, heart disease, and

neuro disorders, which can help minimise global medical emergencies and be most helpful for local citizens to get medical treatment as soon as possible to have a healthy life. The study will be beneficial for the healthcare firms that operate through traditional processes and make them more aware of the new age of technological operations.

Keywords: *digitalization*, healthcare business, artificial intelligence, machine learning, cognitive technologies, digitalization, and the internet of things.

Introduction

In today's world, there are huge changes in each sector in terms of resource collection and mobilisation. It is noted that industry is changing their operational processes with modest technology, starting from manufacturing to service sectors as well as other allied industries. We are also observing huge changes in the healthcare sector; it is an emerging sector where day-by-day development is needed. Covid 19 makes its presence more visible and acts as an inner force to change and adopt new technology in their way of operating, from patient entry to releasing from a diagnosis. In this regard, artificial intelligence, machine learning, and some other modern technologies play a major role in this process. From disease detection to solution finding and giving the right direction of treatment, which is a major backbone to meeting the demand. Technology is changing everything, including how the world lives, works, and can also stay healthy (Chute and French, 2019). Soon everybody can access world-class health care facilities by staying anywhere in the world (Pillai et al., 2020). Specialists are performing robotic surgery in a hospital around the world from 1,000 miles away. Experts' surgeons are using fully immersive virtual reality and augmented reality to train 100s of freshly graduated doctors remotely, all in real time, with the Internet of Things. The portable IOT devices can gather patient data, allowing doctors to analyse and diagnose quickly regardless of location (Rehman et al., 2019). Sensors can continuously monitor patients' internal blood pressure when there is an emergency, and doctors can make a virtual house call to truly access the patient's weekly data so the patients can recover comfortably at home (Hathaliya

et al. 2019). Augmented reality and virtual reality solutions are revolutionising healthcare application while contributing to the fight against COVID-19, used for health training, education, and pre-operations (Javaid et al., 2020). AR and VR are considered very reliable, cost-effective tools for high-value use cases in healthcare.

A shift to more patient-centric and predictive healthcare monitoring approaches will drive the growth and adoption of digital solutions. Mixed reality headsets will play an essential role in digital twin concept visualisation, such as hospital planning concepts or drug development and examination scenarios (Paul et al., 2021). This application will also allow patients to enrich their knowledge about medical issues and can assist them with drug intake processes by overlaying information on them.

Virtual reality therapies are also a growing area with encouraging metrics proven to help patients overcome mental wellness issues such as phobias and chronic pain. The healthcare sector has drastically changed due to COVID-19 and ongoing digitalization. Pressures have accelerated plans while barriers like high investment capital and strict regulation for health and safety slow them down. The value of AR is simply promising improved safety, accuracy, and efficiency for patients (Vaishya et al., 2020). In a study, Mabiyan (2018) discussed the importance of AI and ML in the healthcare sector in an Indian context. In the present paper, we are trying to critically examine the role of AI, ML, and cognitive technologies in healthcare, and we will try to give some cases where we could be able to define the advantages of these technologies from both sides.

Literature Review

Tobore et al. (2019) explained that artificial intelligence offers the potential for a huge improvement in patient care and a reduction in healthcare costs. The increasing population is expected to encourage the demand for health services. The health services sector needs innovative solutions to find out how to be more effective and efficient without excessive expenditure. Pee (2019) described how technology comes in for the solutions. Rapid developments in technology, especially in the fields of AI and robotics, can assist the healthcare industry. AI and robotics in health care using artificial intelligence develop quickly, especially for early detection and diagnostic applications. Coeckelbergh (2010) mentioned that AI enables them to do what humans do—often more efficiently, easily, and at a reduced cost. The important thing for public health is that AI preventative care can assist people in staying healthy. AI is highly needed for early detection and diagnostics. It is used in various ways to detect diseases more accurately, reliably, and quickly, like cancer and liver soreness.

If we talked about the application of artificial intelligence in healthcare, we could find a lot of applications like Hamid (2016) discussed Google's DeepMind Health Technology, which integrates machine learning with a neuroscience system to model the human brain using AI and provides diagnostic and decision-making support to healthcare professionals. Reddy et al. (2020) explained that deep learning in AI helps in the analysis of medical images and clinical risk prediction, which is an important part of clinical decision-making and helps the physician to take the correct decision. Le et al. (2020) mentioned in their paper the diversification of the application of AI in clinical as well as administrative capacities. As with telemedicine, which distributes health-related services and information by utilising communication technology, assuming the implementation of telemedicine will greatly affect the business model in hospitals,

Sun's (2018) description of the other part of AI's application in healthcare reflects some benefits such as improving patient management choices and outcomes, as well as potential secondary benefits such as fewer referrals, reducing costs, and saving time.

Peng et al. (2010), Dahal et al. (2011), and Dhamani et al. (2011) explained that in biomedical science, AI makes a significant contribution to analysis, treatment outcomes, and disease detection, which increases overall healthcare industry performance.

Rabhi et al. (2018) described how neural networks can be trained with specific image-processing steps to recognise human facial expressions as commands. Furthermore, human-machine interfaces (HMIs) based on facial expression analysis allow people with disabilities to control wheelchairs and robot assistance vehicles without a joystick or sensors attached to the body.

Tran et al. (2019) explained a diversified AI application in healthcare, like how it detects a lot of human inner problems by using signal and image processing. That helps to predict functional changes such as urinary bladder control (Tantin et al., 2020), epileptic seizures (Bou et al., 2019), and stroke predictions (Sakai, 2018).

Artificial intelligence (AI) reduces the need for human intervention to execute intelligence work in the industry. It transforms service processes into automated processes with the help of intelligent computer systems or computer-controlled robots (Copeland, 2019).

Digital technology in health care is a process to transform manual processes into technologically enabled services that provide secure, safe, and high-quality care (Haggerty, 2017). Belliger and Krieger (2018) It adds all aspects of "new developments as self-tracking, big data and predictive analytics, e-health, mobile health, participatory medical research, e-patient communities, and shared decision making in diagnosis and e-therapy". Such connotations make digital technology in

health care a concept that overlaps with digital health, which refers to the “use of information and communications technologies to improve human health, healthcare services, and wellness for individuals and across populations.”(Kostkova, 2015).

IOT helps in the healthcare sector, with its regular monitoring activities for ordinary people and patients, enhance the improvement of healthcare ground and identify and prevent disease (Bandhopadhyay, 2011; Helal et al., 2009; Haller et al., 2009). By providing the best services to the patients, you increase the operational flow of the business, which turns into profit and an innovative market. Helal et al. (2009) mentioned that it improves the patient’s social problems, people’s concerns about health, and the quality of their lives. Through the IOT platform, healthcare firms provide smart and innovative services to patients and people in need of medical attention. It enhances the prosperity of health services (Haller et al., 2009). There are various applications of IOT for proving better healthcare protection to customers, like fall detection, medical fridges, patient surveillance, chronic disease management, ultraviolet radiation, sleep control, dental health, and a few others (Bandhopadhyay, 2011). Alansari et al. (2017) described that fuzzy analytic hierarchical processes are an important model of IOT for prioritisation and weighting of healthcare. Economic prosperity, quality of life, and environmental protection are the major fields of operation of the IOT.

Machine learning has a lot of applications in healthcare operations and disease diagnosis. There are various ways of operating in healthcare through ML; it is used to extract medical knowledge and help practitioners and specialists get an idea about the latest operational procedures in healthcare and give better services to patients (Johnson et al. 2018). Few researchers explain the role of predictive models in patient care in their research. This model helps with the autonomous diagnosis of different diseases under clinical regulation (Buch et al., 2018, Kotsiantis et al., 2015, Peek et

al., 2015, Battineni et al., 2019). Lo et al. (2018) explained how the incorporation of these models in drug prescription can save doctors time and create new medical opportunities in pathology identification.

Liang et al. (2019) described the outcome of machine learning-assisted diagnosis as promising to revolutionise healthcare by leveraging abundant patient data to provide precise and personalised diagnoses. Pearl (2018) explained the role and function of different models of machine learning. The author described that Bayesian model-based and deep learning approaches rely on associative inference—they identify diseases based on how well they correlate with a patient’s symptoms and medical history. This is in contrast to how doctors perform diagnosis, selecting the diseases that offer the best causal explanations for the patients’ symptoms (Gigerenzer & Marewski, 2015).

Objectives of the Paper:

In the present paper, we are trying to review the progress of different technologies like artificial intelligence, machine learning, and cognitive technologies for the development of healthcare services. Looking into this, the article consists of the following objectives:

1. To review the impact of the health industry with the help of the Industry 4.0 paradigm. IOT, block chain, AI, and cloud computing in Healthcare 4.0, to evaluate the mechanism of development of these technologies by the manufacturer.
2. To analyse the impact of deployments of these technologies in healthcare sectors for the cure of cancer treatments, neurological diseases, and infectious diseases, COVID-19 by showing the example of a top healthcare facility.
3. To understand the application of new technologies in detecting various diseases and proving customer services

Methodology:

In the present article, we are reviewing the impact of artificial intelligence, machine

learning, and other technology on the development of the healthcare sector. To examine this impact, we have gone through the latest research articles published by the renowned publishers, and to verify these, we have considered a few healthcare sectors like Apollo Hospital and Fortis Hospital and also taken the names of the organisations that are associated with the manufacturing of this technology-based machinery.

Discussion and Conclusion:

The Application of Artificial Intelligence in Healthcare:

AI is a great tool to build the future of imaging. AI-powered digital solutions are the key to precision medicine (Javaid and Haleem, 2019). Despite advances in machine learning and AI, the practise of medicine is still more expert-based than evidence-based or data-driven (Chute & French, 2019). It can generate a data-driven decision machine by impacting sustainable solutions through diagnosis and therapy. The AI-based method has already started providing positive results for image-based diagnosis.

There should be a meaningful impact after applying AI to healthcare (Kumari et al., 2018).

Detecting Skin Cancer

AI has the ability to diagnose skin cancer more accurately than experts. This has been trained using images of different kinds of skin cancer and their corresponding diagnoses. According to the Annals of Oncology report, doctors got 87% of the diagnosis correct, while their machine counterpart achieved a 95% detection rate.

Drug Development

AI can scan through data at a rapid rate that is impossible for humans to match for any accurate time (Wang and Li, 2018). The technology can analyse the data driven by patients' health records and genetic records and help predict how a drug might affect a patient's tissues and cells. Furthermore, AI can predict and trace all kinds of brain activity that is truly invisible to the human eye, for

example, the small changes in blood flow in the skin (Wang and Li, 2018).

Blockchain

Blockchain is defined as a decentralised data ledger but can also be described as a shared database. This technology is enabled for creating digital records of patients, whether their health record or transaction record, which are securely saved on a network.

Advantages of Blockchain in Healthcare

Digital identities can be created and can also track all kinds of physical objects, with the capability to support data exchange while providing security, control, transparency, and the ability to control the data by its owner. Its ability to enable sharing between parties and accept complex health data between patients, doctors, payers, and family members

Drug supply chains can also be maintained in a very integrated manner. The sales are estimated to be between \$163 billion and \$217 billion a year.

Virtual Reality and Augmented Reality

Augmented reality can help medical professionals get better at drawing blood by using a hand-held scanner that projects over the skin and shows nurses and doctors where the veins are in patients' bodies. Today, there are thousands of AR applications supporting a broad array of industry sectors, including gaming, military and defence real estate, advertising and marketing, retail, and education (Haleem & Javaid, 2019; da Silveira et al., 2019).

Analysis: In the healthcare industry, analysts predict the global AR markets to grow at a sizable 23 percent compound annual rate from 2017 to 2023. Already, AR is used in areas such as patient and doctor education, surgical visualisation, and disease simulation to enhance patients' treatment and outcomes. For example, one AR application maps a patient's body, showing the exact location of veins, so medical staff can hit the mark the first time when drawing blood or starting to reconstruct tumours in 3D so surgeons can

view X-rays in real-time without radiation exposure. One function constructs 3D visuals of organs from different angles for greater precision in stitches.

A controlled environment is the best way to create content, test it, get feedback, and make refinements. Once we have the AR applications carefully programmed, introduce them in a few test kitchens. For instance, the AR application could be placed in the hands of just a few sales reps or deployed to a handful of HCPs for use with patients (Javaid and Haleem, 2019). As AR matures and becomes more affordable and user-friendly, more life sciences companies should consider its use as an essential tool to communicate, educate, and engage HCPs and patients on innovations that ultimately will improve brand preference and the patient's outcome.

A Leap in Cancer Care

Today Cancer rates are increasing globally, and to provide care, new cancer cases are expected to go from approximately 67% to 30 million by 2040. Manufactures and the pharmaceutical industry are uniting with world-class teams, bringing together the sharpest and most intellectual minds to develop the most cutting-edge technologies (Coeckelbergh, 2010). The latest proton therapy treatment can redefine the patient's experience along the entire cancer journey, from diagnostics and best-in-class imaging, which can enable early detection, to therapy that is more personalised and precise, which is required for every patient's unique needs. post the treatment survivorship where the patients feel more helpful over a long period of time when the cancer treatment is going on (Javaid et al., 2020).

Siemens has shared that every hour, 240 thousand patients get in touch with a Siemens health system. Every year, the variant reaches over 4 million patients. Together, we will accelerate the path from diagnosis to therapy and shape the future of healthcare. (<https://www.siemens-healthineers.com/en-uk/services/research-development>)

Proton Therapy;

The world's first hyperscan proton therapy system is the most efficient one as it is painless, precise, and has fewer side effects. One of the disadvantages is that there is less damage to healthy tissues. It allows doctors to treat patients in a way where conventional radiation therapy may not be even possible with a charged particle, and at high energy, the proton can destroy cancer cells (Tian et al., 2018).

A machine called a cyclotron, which speeds up protons at 23 the speed of light. The high-energy protons are delivered as an invisible beam to eradicate the tumour, and proton therapy allows for the delivery of a higher dose of radiation with less damage to the surrounding tissue (Weber et al., 2020). The photons in cognitive X-ray therapy radiate everything in their path, including structures behind the tumour (Prayongrat et al., 2017). With proton therapy, it is possible to deliver a high dose of radiation to the target and minimise the radiation to adjacent areas. The Hyper-scan technology is the real improvement over other proton therapy systems, as Hyper-scan allows additional shaping of the proton beam for very precise and accurate detection throughout different layers of the tumour. This can be very important when the tumour is adjacent to a critical organ. (Tian et al., 2018).

Paediatric Cancer Care

Proton therapy for paediatric patients will decrease their risk of second cancer, which is the cancer that forms as a result of exposure to radiation therapy. The tissue of young children is more susceptible to developing secondary malignancies, but proton therapy provides a passive tool where a higher dose can be given to normal surrounding growing and developing tissue (Finch et al., 2020). The patients have their support network in place. All the multiple specialties that go into cancer treatment are in one location.

Result in Cancer Treatment

Significantly, this can improve the patient's outcome. With expanded excess to care and

enhanced efficiencies at the point of care and beyond, the complete cancer continuum starts here, where it's gratifying to see that they have a lot fewer side effects than the doctors and healthcare specialties are normally expecting. Patients are able to return to a normal quality of life and get on with work, school, and the rest of their lives. (Cancer.Net editorial board, 2018).

Siemens's Vision for the Cure of Cancer Disease

Siemens has introduced the world's first photon counting CT called NAETOM Alpha. It is nothing less than a total reinvention of computed tomography, and recently the US Food and Drug Administration stated in a press release that it is the first major imaging device advancement for computed tomography in nearly a decade. We can imagine that the enhanced viewing capabilities of a photon counting CT will clearly offer a radical new way to generate clinical relevance with CT (Lee and Yoon, 2021).

In lung diseases, an organ may appear healthy on standard imaging but actually have impaired functions. With the NAETOM Alpha, organ imaging can be moved beyond more morphology image quality, but they combined it with functional information and made this routinely available, generating more meaningful insights that now focus on impaired function in addition to appearance. This undoubtedly will unfold a new era in pulmonology (Liu and Fisher, 2021). In oncology, subtle changes in disease pattern can seriously influence treatment decisions and have a significant impact on patients' lives. With NAETOM Alpha, doctors can eliminate the imprecision in imaging that is so often seen in follow-up CT scanning and achieve the optimised consistency and accuracy needed for precision medicine (Bezbaruah and Parikh, 2020). This will clearly usher in a new era in oncology. In cardiovascular diseases, many patients are excluded from a decisive CT diagnosis because vessel and artery visualisation is impaired by calcifications, which mask the assessment of the disease.

With the NAETOM Alpha, it is possible to reveal the stenosis in calcified vessels. If the machine can scan patients previously excluded from cardiac CT, this will obviously unfold a new era in cardiology and oncology (Liu and Fisher, 2021).

Components

Mostly The MRI machine contains three kinds of magnets. The outer layer is a superconductive magnet, then come the gradient coils. It has the ability to produce additional magnetic fields in different planes, and on the inside core are the body coils that produce the magnetic impulses that deflect the water molecule. At last, antennas are needed to record the signal, and those are placed on the patient's body.

These machines are extremely heavy, weighing between 4 and 7 tonnes, so that's the only reason they are usually located on the ground floor of healthcare facilities. They weigh too much, not only because of the magnetic coils but also due to the cooling system. Many hundred litres of liquid helium are used to cool the main magnet to an incredible -269 degrees Celsius.

Medtronic Sure Scan MRI Technology

An implantable pacemaker system relieves symptoms of heart rhythm disturbances; it does this by restoring normal heart rates. A normal heart rate provides the body with a proper amount of blood circulation; thus, the pacemaker system is intended for patients who need rate-adaptive pacing or chronic pacing, or for patients who may benefit from synchronising the pumping of the heart chambers. The risks associated with a pacemaker system implant include, but are not limited to, infection at the surgical site or sensitivity to the device material, failure to deliver therapy when it is needed, or receiving extra therapy when it is not needed. After receiving an implantable pacemaker system, the patients will have limitations with magnetic and electromagnetic radiation, electric or gas-powered appliances, and tools with which they are allowed to be in contact.

A complete Revo MRI Sure Scan pacing system, including a Revo MRI Sure Scan pacemaker and two Capsure Fix MRI Sure Scan leads, is required for use in the MRI environment. Any other pacing system combination may result in a hazard to the patients during an MRI scan. When programmed to the MRI Sure Scan feature, it allows the patient to be safely scanned while the device continues to provide appropriate pacing (Medtronic 2016, Integrated Performance Report).

Healthcare performance using AL and ML: A Case of Apollo and Fortis

Technologies used by Fortis

Fortis Healthcare Ltd. has its own IT infrastructure and engages with IBM Technology Support Services by providing a help desk solution that helps users address hardware, software, and network issues. These infrastructures are the hospital's backbone, providing different functions related to patients hospitalised details, billing, and discharge summaries. IT infrastructure also included picture archiving, and today IBM provides Fortis with all the resources for monitoring the critical servers, multiprotocol label switching (MPLS) links, and business application systems. IBM has implemented a cost EMS tool that can centralise reordering and reporting of all IT issues and service requirements, and this tool can also provide a way for Fortis to document and approve all kinds of changes that have to be made within the organization's IT infrastructure. Now, with the help of the dashboard, the nature of the problem is easily visible. The team includes approximately 30 IT heads, eight senior IT developers, 100 onboard resources, and 15 Fortis Partner contact points who provide wide-area network support, cloud support, and application support services. (<https://www.ibm.com/case-studies/fortis-healthcare-ltd1>)

Result

Lower cost, higher efficiency

The entire organization's infrastructure will be running smoothly, and the problems that

occur can also be solved quickly; this will lead to increased efficiency, allowing employees to put patients first by centralising support and making it easier to meet the fluctuating needs among different facilities.

Reduce costs by replacing the individually managed IT systems with one streamlined solution. (<https://www.ibm.com/blogs/services/category/industries/healthcare/>)

Clinical and Operational Highlights of Apollo Healthcare

Apollo hospitals in New Delhi perform a surgery for Wilms tumours of the chest that saves the life of a 71-year-old Afgani woman. This was the first ever treatment of Wilms tumours at the hospital with proton therapy. A cardiac tumour was removed through minimally invasive cardiac surgery, which took a few minutes and was successful. A cardiac tumour was removed by minimally invasive cardiac surgery for a 25-year-old patient. Apollo Hospitals has started leading the industry with the digital revolution in healthcare through artificial intelligence, machine learning, and automation (Indraprastha, 2020). The Apollo Proton Cancer Centre has now completed over 200 proton sessions from around the world for patients who have complex cancer.

Conclusion and Future Research:

It is needless to say that modern healthcare systems are going to undergo 180-degree changes in comparison to traditional processes of operations. It is also true that private healthcare systems are adopting this high-end technology in their healthcare services. Using AI, ML, Block Chain, and other technologies helps healthcare from disease detection to diagnostics to final billing in a faster way, which not only develops satisfaction but also saves lives for people who are in critical condition. Therefore, the life expectancy level of the patients increases, which is one of the core objectives of healthcare informatics. In the present study, we are trying to explain the mechanisms of different technologies and their application to various diseases like cancer,

lung disease, and cardiovascular disease. The outcome of healthcare sectors in terms of delivery services to the patients. The papers also established the use of this technology in some healthcare sectors. This study will also help healthcare operators and researchers get an idea about the application of new technology. There is more study required, and it should justify itself if we compare the firms financial performance using this technology. Also, further study is required to calculate the percentage of life expectancy of the patients. Then only we can find out the real impact of this technology on human life.

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Impact of Artificial Intelligence in Domestic & Professional Life

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Abstract

Those born between the sixties and eighties have witnessed tremendous change all walks of life thanks to the Renaissance in the field of artificial intelligence.

Artificial intelligence is no longer confined to commercial and/or professional arenas only, but has brought under its umbrella all aspects of day-to-day life.

Technological advancement is a continuous process, and it always moves forward. In my opinion, artificial intelligence evolves primarily as a result of changes in data as well as the ease with which data bases are managed.

The advancement in information technology has been achieved through the process of collating huge amounts of data, processing the same at lightning speed, and facilitating the right solution for the end consumer, whomever that may be, and whatever customised, complex, marketable ready-mix answer it may be.

Thus, what is most important in the field of information technology is the art and technology of database management systems (DBMS). Popular DBMS, to name a few, are Oracle, MySQL, SQL Server, etc.

Artificial intelligence has managed to shrink geographical distance, especially pertaining to the globalisation of technologies, which has led to advancement in all fields, including medical treatment.

The term 'Third World Country' may no longer apply in the medical world any more. Be it oncology, cardiology, or endocrinology, the best of the treatments are available around the world.

Those born during 'fifties' or 'sixties', have literally witnessed multiple dramatic transitions in the way of life. We have seen telegrams, advent of Telex, Typewriters, computing machines (both manual and electrically operated), piles of files, writing pads, ink pens, Black and white movies so on and so forth. Gone are those days possibly never to return!

Key Words: DBMS, Oracle, MySQL, Oncology, Cardiology, Endocrinology.

There is a debate on whether Albert Einstein said, *"I fear the day when technology overlaps with our humanity. The world will only have a generation of idiots"* At the age of sixty-five, I truly care less to evaluate my personal evolution as to whether I have transformed from an intelligent man to an idiot, but I do fully appreciate that, had the present era of artificial intelligence not blossomed, it would certainly curb my present versatility.

I am not ashamed to admit that my handwriting has become like scratches of chicken legs, the easiest of spellings, when written manually, seem difficult, and I do find it an uphill task to perform mental math at grocery stores. To compensate for my short comings, these days I can prepare, with ease, a sixty-page financial projection in a matter of hours and do not have to tear my hair apart since closing the cash balance in cash flow automatically tally with the one calculated in the projected balance sheet.

In case we are driving out for a weekend, there is no need to stop by to inquire about the direction since we have Google Map to our rescue. Even when we get into a cab these days and mention the destination, the driver does not ask for directions; instead, he feeds the data into Google Map!

Technological advancement is a continuous process, and it always moves forward. In my opinion, artificial intelligence evolves primarily as a result of changes in data as well as the ease with which data bases are managed. Hence, before moving forward, we need to gain a bird's eye view of the exponential

growth in data management systems that we see in the present time.

A database management system (DBMS) allows one to organise, store, and retrieve data from a computer and now includes the cloud as well. It deals with communication or methods of articulating with the computer's "stored memory." At the advent of computers, say until the mid-80s or so, "punch cards" were used for input, output, and data storage. Punch cards, through binary codes, were convenient for data entry and a facilitated medium for data retrieval.

Databases (or DBs) have played a very crucial role in the recent advancement of computers. Initially, computer programmes focused almost completely on coding languages and algorithms. At that time, computers were reckoned to be gigantic calculators and data storage systems as well as information storage and statistical processing systems. Computers were previously restricted to conglomerates and large non-governmental organisations that required massive data processing.

The advent of database management systems, or DBMS, ushered in a renaissance in the field of information technology. A database, as a collection of information, could be structured, or, as I said, typically modulated, to access and draw out specific information.

Instead of treading into technicalities, which are beyond my realms, a few words on database management systems can be interfaced here.

What is a database management system?

Database management systems (DBMS), as

mentioned earlier, are essentially software systems deployed to store, retrieve, and run queries on data to detect the best outcome. A DBMS is an interface between an end-user and a database, enabling the users to create, read, update, and delete data in the database. This ensures security, integrity, concurrency, and uniformity pertaining to data supervision procedures.

DBMS optimises the organisation of data by following a database scheme design technique called normalisation, which splits a large table into smaller tables when any of its attributes have redundant values. DBMS is far superior to traditional file systems, adds flexibility, and invariably accompanies complex backup systems.

Database management systems are classified based on a scale of measures such as the model, the pattern of distribution, or the number of users.

Let us now analyse the types of DBMS available for use:

- **Distributed database management system:** A distributed DBMS is a set of rationally interconnected databases spread over a network that is managed by a consolidated database application. This type of DBMS harmonizes data intermittently and ensures that any change to data is comprehensively updated in the database.
- **Hierarchical database management system:** Hierarchical databases put together model data in a tree-like structure. Data storage is either a top-down or bottom-up format and is represented using a parent-child relationship.
- **Network database management system:** The network database model focuses on the need for more complicated relationships by allowing each child to have multiple parents. Objects are organised in a graph that can be dynamically retrieved through several paths.
- **Relational database management system:** Relational database management systems

(RDBMS) are the most popular data model because of their intuitive interface. It is based on standardising data in the rows and columns of the tables. This is a viable option since the data storage system is ascendable, compliant, and capable of managing huge volumes of information.

- **Object-oriented database management system:** Object-oriented models are based on object-oriented programming (OOP), which allows objects to have members such as fields, properties, and methods.

Examples of DBMS

There is a wide range of database software solutions, including both enterprise and open-source solutions, available for database management.

Here are some of the most popular database management systems:

- **Oracle Database:** Oracle Database is a commercial relational database management system. It utilises enterprise-scale database technology. It can be stored in the cloud or on-premises.
- **MySQL:** MySQL is a relational database management system that is commonly used with open-source content management systems and large platforms like Facebook, Twitter, and YouTube.
- **SQL Server:** Developed by Microsoft, SQL Server is a relational database management system built on top of structured query language (SQL), a regulated software design that permits database managers to deal with databases based on management requirements.

I would like to emphasise the significance of DBMS, RDBMS, or artificial intelligence in our day-to-day lives as well as in the professional arena.

Day-to-day life:

My wife is a stage-four cancer patient. She has been suffering from this disease since 2018, and thanks to her indomitable willpower, she has succeeded in thwarting the inevitable beyond medical projections.

Her entire case history, be it every prescription, discharge memo from hospitals, or test reports (blood test, CT scan test, biopsy, PET CT, bone scan, radiation, etc.) for the last four years, is organised and stored on my laptop as well as in Google Drive.

Whenever and wherever required, all I need to do is email a link to the clinic or oncologist.

Even in hospitals, I see doctors not asking for case histories since they are stored in the database. Every time my wife visits, the doctor adds to her data whatever he notes. The fat, dirty files containing case histories (with pages half eaten by insects and rodents) are extinct!

I go to a pharmacy or a department store, and the cashier no longer searches for the price tag. Instead, he scans the bar code, and that's it! Take out the plastic card, and the purchase is done!

Hungry while returning home? order on Zomato or Swiggy and savour the delicacies as soon as I enter my home.

In Professional Life:

I am an insolvency professional. The Insolvency and Bankruptcy Code was introduced in India in 2016 and applies mainly to corporates. Now insolvency is proven by an act of default in payment of debt, which culminates in a claim in legal language.

For a corporation that could be receiving a facility from a bank or financial institution, the loan documents, correspondences, etc., can run in volumes, and if the same needs to be presented in court, it would be a herculean task for one to study the pile and come to a conclusion about default.

The Government of India has introduced an information utility by the name of National E-Governance Services Limited (NESL) for this purpose. The banks and institutions upload documents to the NESL portal, which is counter-authenticated by the debtor entity. NESL, based on data analysis, certifies the default, which is accepted by the court as authenticated evidence of default.

When a company is admitted to the Corporate Insolvency Resolution Process (CIRP), the Interim Resolution Professional (IRP) publishes an invitation to file claims in newspapers, on the company's website, and in the web portal of the Insolvency and Bankruptcy Board of India.

Thus, the onus of submitting a claim to the IRP shifts to the claimant, who now needs to file its claim within the time frame stipulated in the public announcement as well as the one permitted under the regulations.

The financial creditors are mandated to file claims through electronic means only.

The IRP/RRP (Resolution Professional) verifies all the claims and constitutes a committee of creditors to take forth the CIRP with a two-fold objective: a) to retain the company as a going concern and b) to enable the financially sick company to turn around through a successful resolution.

Successful resolution does not happen automatically. For this, the resolution professional needs to proliferate the proposition of a turn-around possibility as well as a lucrative industrial proposition amongst entrepreneurs, investors, and industrialists.

This is done through a process of publishing an invitation for expressions of interest, which is again published in newspapers, on the website of the company, and in the web portal of the Insolvency and Bankruptcy Board of India.

An information memorandum (IM) and request for resolution plan are circulated among the shortlisted parties who have shown interest. Besides effective due diligence, a data room is facilitated.

Though liquidation is taken to be the last resort, it does take place. Even during the liquidation period, the liquidator, at first, endeavours to reach a compromise or arrangement, under the 2013 Companies Act, with intending investors. The entire process of compromise or arrangement necessitates extensive documentation, which has now

become easier thanks to the development of information technology.

If the compromise or arrangement fails, the next attempt would be to sell the corporate debtor as a going concern through an e-auction process. Sale of blocks of assets also takes place through e-auction, which until a couple of decades ago was an unheard phenomenon. As a matter of fact, thanks to forward thinking on the part of regulators and the augmenting of dynamics, auctions and sales through the “Swiss Challenge” mechanism are gaining importance. The Swiss Challenge method in IBC is a bidding process in which an interested party presents a bid to the auctioneer, who then calls for counterbids. The auctioneer, resolution professional, or liquidator then puts the details of the project out in the public and invites proposals from others interested in executing it. On receipt of these bids, the original contractor gets an opportunity to match the best bid. This method of bidding entails two rounds of bidding for a distressed company or its assets. Most importantly, since transparency is a mandatory requirement, the entire process is usually carried out through an e-bidding process.

My intention is not to elaborate on the insolvency ecosystem but just to give an idea that the entire mechanism evolves around artificial intelligence, or rather an effective database management system.

When I look at the judiciary, the reliance on electronic means is increasing rapidly. Old habits do take time to eradicate, but no one can throttle the advancement in technology. Though in some places I do see hybrid systems still prevailing, the onset of paperless management in the judiciary is bound to happen sooner than we expect.

Though our numerical abilities, vocabulary, or rather person-centric intelligence factor could be on a diminishing scale, the ease of life that

has come about thanks to artificial intelligence cannot be overlooked. Every pound of flesh needs a drop of blood or two! Thus, at the cost of convenience in day-to-day life, there is no harm if we have become slaves of our laptops, desktops, or tablets. It is worth the sacrifice.

Since the prologue was with a controversial quote of Albert Einstein, let the epilogue too be with a quote of the same genius: “*The whole of science is nothing more than a refinement of everyday thinking.*” –

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Workplace Spirituality & Emotional Intelligence – A New Paradigm

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Organisations adopt more than one channel to integrate their employees emotionally with their core values. Workplace spirituality is one such channel that has bloomed and drawn the attention of the organizations. The origin of workplace spirituality could be traced back to the early 1920's. In this article, we propose a framework linking workplace spirituality and emotional intelligence.

Workplace Spirituality:

Workplace spirituality goes beyond the boundaries of religion, caste or community. It is about creating a culture that recognizes the employees' spirit at work. This recognition has benefits for both the employer and the

employees (Devendhiran, & Wesley, 2017). Workplace spirituality is a framework of organizational values evidenced in the culture that promotes employees experience of transcendence through the work process, facilitating their sense of being connected to others in a way that provides the feeling of completeness and joy. Workplace spirituality is about how people perceive themselves spirited beings, whose spirit desires and needs to be energized through work. on the hand people need to have a real experience and real purpose of their work beyond the paychecks and salaries. People who have common interest, attachments and attractions and togetherness with each other within their work

units and the organization as a whole. Work is meaningless without the existence of the human spirit at work. Workplace Spirituality has its own potential relevance with the prosperity of the employees and potential performance towards the organization. The essence of workplace spirituality is that it helps to connect the worker with his activities and task in such a way that the worker is able to spiritually exercise their task to achieve the goals of the organization.” Workplace spirituality has gained vital importance among organizations because of the increase of trust amongst the workers”

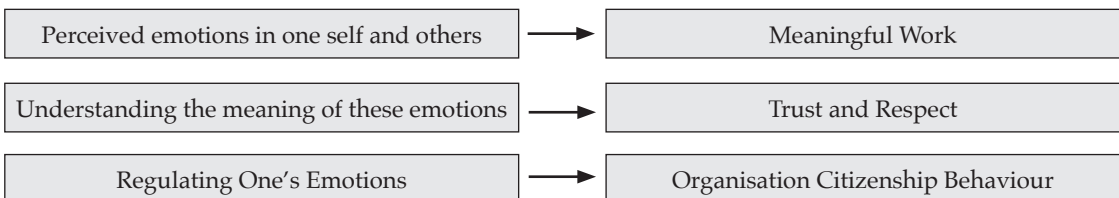
Emotional Intelligence:

In today’s chaotic work environments organization requires it employees to out show their talents along with their roles and commitments that have to be attained with high standards. As a result, employees lack a balance in a state of harmony between their body, mind and spirit. Due to competitive environment, high expectations of the customers and other stake holders, high frequency of inter conflict, sometimes disrespectful behavior of seniors, employees experience very stressful times. As a measure to overcome such problems a new paradigm “work place spirituality and emotional intelligence” can be used in organizations. Spirituality in workplace can be defined as movement in which organization as a whole is trying to find a meaning, purpose and a sense of community. Competitive edge in business can be achieved when it has a spiritually sound workforce and environment. Adopting this definition, the effective demonstration of Emotional intelligence at workplace would require an individual to simultaneously possess

a high capacity of developmental factors along with the potential outcomes. The dimension of employee spirituality and EI represents as to how employees would interact with their day to day work at an individual level as well as the way in which they would interact with others in the work places.. Researchers have found that the meaningfulness at work can be measured through facets like team spirit, Job engagement, Satisfaction , Job turnover and creativity .There is growing evidence that employees spirituality results in positive individual level outcomes of the employees. Work place Spirituality and emotional intelligence has a greater impact on the job attitudes and behaviors of individuals because of its potential to promote and create high levels of employee engagements and in turn lead to better performance of the employees. It contributes to positive, fulfilling work related state of mind that is characterized by vigor, dedication and absorption toward workplace. Organization have a stronger sense of spirituality enables employees to exercise stronger values and ethical beliefs in their workplace and empower them to show more creativity and flexibility at work. Individuals who experience a sense of purpose in their work and Who believe that they have a sound emotional intelligence have the power to influence the system in which they are embedding and are more engaged in their work.

This article takes into consideration the following dimensions of EI in comparison with the dimensions of WPS to emphasis that individuals who are emotionally intelligent would be able to have a strong sense of workplace spirituality in their organizations.

**Workplace Spirituality & Emotional Intelligence:
A Cascading Model of WPS & EI:**



Dimensional Relationship Between WPS & EI:

1. Perceive emotions in one self and others
– Meaningful Work (Strong Sense of Purpose).
2. Understanding the meaning of the emotions – Trust and Respect (Humanistic Work practices).
3. Regulating one's Emotions- Organization Citizenship Behavior.

Dimension - 1 Perceived emotions in oneself and others – Meaningful Work (Strong Sense of Purpose)

Employees in various organizations today are able to understand the emotions of themselves and their co-workers. This aspect helps them to work with a purpose. Organization's mission and objectives are perceived by the employees and they work towards these goals and tend to perform effectively. Employees tend to work towards their individual career goals which helps them to accelerate in their professional life.

Employees are able to analyze their work and interpret them according to situations and handle in the right way. Previously employees at workplace only will come up with IQ but today employees are outstanding the others in the industry through both their IQ and EQ. Organization also keep various aptitude tests and other psychometric tests to hire such candidates into their organizations. They are in need of employees who can well understand the needed emotions, how to handle emotions, how to work and regulate one's emotions. The purpose of this is to mainly have an employee who can compartmentalize the personal and professional emotions. People who can clearly and properly make decisions without interference of any emotions.

In various industries this dimension is being observed in several ways. Companies these days as a first step of their hiring, explain to the candidates who come for the interview about their entire company and the business they do. This gives a clear idea to the candidates for whom they are going to work and what they are going to work.

Organizations ensure that there is a clear and proper communication on what is the Job Description and the roles and responsibilities of the employees are clearly stated. In line with this process, post the hiring of candidates they also give them regular trainings and review employees periodically to assess the employee potential. Talents who pay attention to every detail of work and work with the clear details are the one's organization acknowledges.

Gone are the times when the superiors instruct subordinates on what they must work on, how they must do it etc. These days companies are looking for talents who can be very proactive and highly potential to think out of box. Creativity and innovation have played a huge role in success of employees today. Higher Paychecks and promotions are not underlaid on employee experience rather it is on the probability with which employees will show progress in their work. Figures are what that matters in lot of industry. There are organization which pays higher for employees with single degree rather than ones with the double degree from premium institutions reason being the employees' ability to perceive and understand the need for doing meaningful work.

Employers are looking for employees who will add value to the work, this aspect of value addition is very important because it enhances the work and the purpose of the work. This make a service or a product unique from others in the market. This brings an extra advantage for any brand in front of the customers and helps in business development.

On the other hand, employees of this generation look for purpose in their work. They do not work for the pay that organizations provide. They need differs for everyone. When one works for brands, other works for fresh minds; when one work for exposure, other works for experience; When one works for bank balance, other works for work life balance. The thirst to gain this need has not stopped. Maslow need hierarchy states that primary needs as well as the secondary needs. With the evolving

human thinking and talents, the needs have also raised. Self-esteem, Recognition etc. are the various aspects which is the requirement of working force.

Team work also plays a vital role with regards to this dimension, understanding their co-workers, utmost cooperation and team efforts in every work, helping the co-workers to understand their work better, creating a friendly work environment, better superior-superordinate relationships etc. These factors above immensely help for a cordial work environment; employees are considering such a work place as an ideal organization for them to work with.

Dimension - 2 Understanding the meaning of emotions – Trust and Respect (Humanistic Work Practices)

Empathetic workplace is very important; such is the culture practiced by various organizations. The new gen organization is customized with various cultural factors and values such as Openness, Autonomy, Experimental and Experiential, Team-Work, Respecting each and every one. Organizations are not the traditionally structured ones with the need to respect people by addressing ma'am and sir, rather the corporate and MNC culture seeks an entirely different aspect of linear structure with equal opportunities and fair treatment to all.

Organizations must build trust on their employees and create a positive environment. Management must provide a platform for the employees to openly communicate with each other and help in resolving their grievances better. Employees will build a return trust on their organization if they obtain proper support from the management. Organizations must work on taking care of their significant asset their "**Employees**".

Employees must not bottle up their emotions or issues for a longer period of time which will lead to a great disaster. Thus, organization must ensure that they keep a continuous physical, mental and emotional check on their employees with frequent surveys, company

wide meetings, one to one chat with employees to understand their wellbeing. There are companies which uses such survey checks to understand their potential attrition rates with the employee responses and immediately take required actions to prevent the employees from leaving the organization.

Organizations must recognize the importance of people. They must consider the emotions of people before any decision making is done. They must involve the employees in any important decision making with respect to the individual and their work. This is the ultimate respect that any employees are looking for. Organization must be honest and transparent with their employees, making the trust as a mutual aspect overall.

Organization by taking care of their employees, effectively increase their loyalty towards the organization. "A Happy Workplace is a promising Workplace", yes this goes without saying. Employees who are very much satisfied with their work place will not think of leaving their organizations. They get more attached to the culture and the environment. They are more likeable to even suggest the other known resources of them to join the organization. This greatly helps in attracting best talents of industry. The chances of such loyal employees spreading positive vibes and emotions inside the organization and outside is more. This aspect is called free of cost marketing. Does an organization need anything more than this?

Organization which values their people more are considered to be the best choice for people. We are in an era where organizations don't choose their employees but the employees choose their organization. This is the main reason why employers are running behind creating wonderful work culture, attractive work areas and best work practices. Startups such as Freshworks, Zomato, Ola, Uber etc. are having a welcoming number of employees.

Organization must clearly understand the emotions of their employees. Flexibility in workplace is expected by all the employees.

Employees expect more of such environment where the pay or the hike is not vital rather the comfort at work, flexible work hours, benefits such as work from home, comp offs, leaves when needed etc. are provided without any thoughts. The booming trends of working from anywhere anytime is the expectation of employees from their organizations.

Employees are looking forward to organizations who will recognize every single effort from their side and appreciate them immediately. This will encourage employees to perform better and keep up their success. Employers must never belittle their workers and their performance; this will turn out to be a dangerous weapon against their organizations. There are possibilities where these employees will not just leave the organization but rather join their competitors. Though there are less chances for these employees to care the confidential information to the opponents, the best talents and their ideas are being lost.

Dimension - 3 Regulating One's Emotions – Organization's Citizenship Behavior

Organizations have employees who are very self-driven. While many of the employees are willing to only work for 9 to 10 hours a day and 5 days per week, and will ask for extra pay for extra hours of work; there are some employees who are very much interested in giving their fullest and taking an extra mile to perform. They don't expect anything in return from the company nor the organization forces them to work so.

Yes, these people work relentless in order to finish their jobs with the 100% efforts and do not want to delay any work. Their commitment towards the job and the organization is definitely commendable. These people are also show interest in helping their co-workers, assisting others in case of their emergency leave by replacing them in their work, and some of them care to even take steps in the welfare of the organization by starting some welfare clubs, organize camps etc. which shows their devotion.

These employees are not driven by money

but by motivation. Their enthusiasm is never external but comes from within. They are not dejected if they don't receive any bonus, promotion, rewards or even recognition but continue to spread their positive attitude. Sometimes this acts as a boost to others who work along with such people. Seeing them do such things will make the others also get encouraged to follow them.

These people are self-regulated. They are very much disciplined that they not just finish their work on time but also tend to excel the work by doing add on to it. Such employees are really a great boon to the organization. When most of the people tend to misuse or over utilize the resources of the organization such people make the best use of every opportunity that if provided to them. Organization must retain such employees in order to make themselves extraordinary. They must also tend to reward this people in a very positive way so that they don't feel that their work is misunderstood.

The employee tends to make a brand representative. They speak good about the company, the co-workers, the culture, the work environment and everything with regards to the organization. They may be magnets for many potential clients and future hires of the organization

The chance of conflicts, politics inside the organization is very few in case of such dedicated employees. They are very tolerable and have a great control over their emotions. They don't react to situation rather focus on thinking and analyzing the reason behind every happening. They see the bigger picture and will not fight or create issues on small things that happen.

They have the ability to guide their emotions and channel them in a proper path. They accept the reality and will not imagine about what is impossible. As organization they must work to hold up such employees and ensure they are reinforced in a positive manner and encouraged to do what they are doing at the present better. These constructive employees will be a great benefit to the organization.

There are organization which focuses on such people like Marriott who award their employees on monthly, quarterly and yearly basis not just for their performance but for such desirable behavior towards the organization and also towards their co-workers with “Best Take Care Pillar” awards, “Star of the month” award etc.

Yes, companies have highly recognized their employees in every required way because they feel that employees need to maintain a positive opinion about the organization which makes them not just to retain or attract the best talents but also help them in performing immensely. With the changing demand of the employees and their expectations organization are doing their best to cope up by fulfilling such demands in the best possible way to reach their success.

Organizations have started to focus on employees and treat them also as their clients because once the employees are treated as clients then the organization will work rigorous to provide them all the requirements. Yes, companies huge challenge today is not just customer retention but it’s talent retention. Competitors are waiting to grab the opportunities to get pull the best talents in the market and show success rate. Therefore, the

shift in the focus of the organization seems to be highly noticeable.

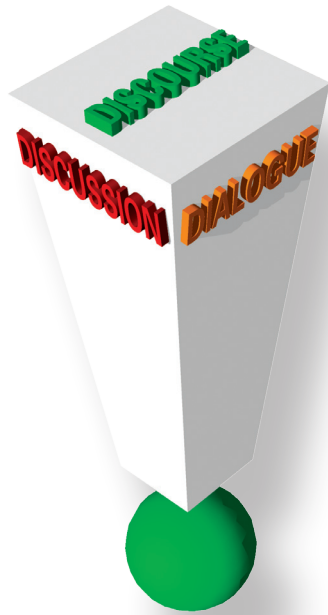
Conclusion:

Competent employees are the greatest assets of any organization. The potential performance of employees plays a vital role in the context of diverse challenges faced by the organization. In order to maintain and develop their competences the employees should have an open mind to have a spiritual work environment and emotional intelligence. This proactive approach can be generated by providing adequate knowledge about spirituality and emotional intelligence as well motivating employees by fostering a supportive and favorable climate for employee engagement and in turn enables employees to have perform better in the organization. Therefore, Workplace Spirituality and emotional Intelligence is necessary for the development of skills and knowledge of potential employees.

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