Artificial Intelligence and its Impacts on the Society

Saksham Mahajan*

With the advancement of technology, previous benchmarks that defined artificial intelligence are fast becoming outdated in 21ˢᵗ century. For instance, devices that perform simple calculations or use optical character recognition to identify text are no longer regarded as examples of artificial intelligence, since this function is now taken for granted as an inherent computer function. This paper is an attempt to analyze the impact, both positive and negative, of artificial intelligence on society. It has been shown that while the positive impacts are significant, it's crucial to address challenges such as ethical considerations, job displacement, and the potential misuse of artificial intelligence technologies. This is the reason that many politicians, scientists, technologists and all others concerned with the welfare of society have started fearing about the extensive use of advanced artificial intelligence leading to its negative impact on society. It has been concluded that striking a balance and implementing responsible artificial intelligence practices is essential to maximize the social benefits of this

* Student, Birla Institute of Technology & Science, Vidya Vihar, Pilani Campus, Pilani-333031, Rajasthan (India) E-mail: <sakshammahajansm@gmail.com>

transformative technology globally in all types of countries. The future impact of AI hinges on our ability to harness its potential responsibly, striking a balance between innovations and safeguarding the principles that define a fair, just, and equitable society.

[**Keywords :** Artificial intelligence, Technology, Innovations, Computers, Machines, Productivity, Society]

1.   Introduction

Alan Mathison Turing (June 23, 1912- June 7, 1954), English mathematician, computer scientist, logician, cryptanalyst, philosopher, theoretical biologist and often referred to as the "Father of Computer Science and Artificial Intelligence" has done earliest substantial work in the field of Artificial Intelligence (AI) in the mid-20th century. He asked the the question to himself in 1950, "Can machines think?"[1] He claimed that an answer to the question can be found by subjecting machines to what he calls the "imitation game."[2]

Turing is famous for his work developing the first modern computers, decoding the encryption of German Enigma machines during the Second World War. He detailed a procedure known as the Turing Test, forming the basis for artificial intelligence, where a human interrogator would try to distinguish between a computer and human text response. Even though this test has been scrutinized extensively since then, it continues to be a significant aspect of the history of artificial intelligence and a current philosophical issue since it makes use of language concepts. He argued that a program must be written in such a way that it directs a computer to learn. His ideas seem to have come true with the increased use of artificial intelligence in different fields.

2.   Meaning of Artificial Intelligence

Artificial intelligence is the imitation of human intellect in computers that have been designed to have human-like thought and learning processes. In other words, it simply means the approximation of human intelligence in machines. The foundation of AI is the idea that human intellect can be described in a way that makes it simple for a computer to replicate and carry out activities, from the most basic to the most complex. The applications for artificial intelligence are endless. It is evident from its goals which include computer-enhanced learning, reasoning, and perception as it involves the development of algorithms and models that enable

computers to perform tasks that typically require human intelligence. These include figuring out problems, comprehending spoken language, identifying patterns, picking up knowledge from past experiences, and adjusting to new information. This is also the reason that AI technology is being used currently across diverse sectors and businesses from finance to healthcare.

Artificial Intelligence has been defined as the capacity of a digital computer or computer-controlled robot to carry out actions often associated with human intellect. According to McCarthy, "It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."[3]

In its most basic form, artificial intelligence is a subject that combines computer science and large datasets to solve problems. It also includes the machine learning and deep learning sub-fields, which are often referenced when discussing artificial intelligence. It is associated with the concept that intelligence is supposed to be manifested by the computer systems and is not a sole property of humans any more. Scholars like Chatterjee[4], Chopra and White[5] among many others have considered AI as an accurate tool in the context of problem solving without human help. According to Chatterjee and Bhattacharya[6], AI is usually considered as a computer-centric technology capable of easily solving various problems in the complex situations in a flawless, cost-effective and quick manner without slightest assistance of humans which was previously deemed to be unique treasure of humans.

3. Types of Artificial Intelligence

There are two main types of artificial intelligence :

1. **Weak Artificial Intelligence :** It is also called 'Narrow AI' or 'Artificial Narrow Intelligence' (ANI). This type of artificial intelligence is designed to perform a specific task or a narrow range of tasks. It operates within a predefined set of parameters and does not possess the broad cognitive abilities of a human. Examples include virtual personal assistants like Apple's Siri and Amazon's Alexa, IBM watson, and autonomous vehicles as well as image recognition software.

2. **Strong Artificial Intelligence :** It is made up of 'Artificial General Intelligence' (AGI) and 'Artificial Super Intelligence' (ASI). Artificial General Intelligence (AGI), commonly referred to as general AI, envisions a hypothetical state of artificial intelligence in which a machine possesses intelligence comparable to that of humans. In this scenario, the machine would exhibit self-awareness, the capacity to solve problems, learn autonomously, and strategize for the future. Going beyond this, Artificial Super Intelligence (ASI), or superintelligence, would exceed the cognitive capabilities and skills of the human brain. Strong AI is a more advanced form of artificial intelligence that can understand, learn, and apply knowledge across a wide range of tasks, similar to human intelligence. It is still largely theoretical and is not yet fully realized.

Artificial intelligence can also be categorized on the basis of its functionality into following four types :

1. **Reactive Machines :** This type of artificial intelligence system is designed to react to specific inputs or stimuli without the ability to learn or adapt over time. These systems operate based on predefined rules. They do not have the ability to learn from experience. Reactive machines don't possess the capability to change their behaviour or adapt to new situations.

2. **Limited Memory :** These artificial intelligence systems can learn from historical data or past observations to make informed decisions. However, they have a limited ability to adapt to new situations. This limitation can be beneficial in scenarios where storing and processing large amounts of historical data is impractical or computationally expensive. Models with limited memory are often categorized as online or incremental learning algorithms.

3. **Theory of Mind :** This is a hypothetical level of artificial intelligence that would have the ability to understand human emotions, beliefs, intentions, and thoughts. This includes recognizing and comprehending beliefs, intentions, desires, and emotions in order to interact more effectively in social settings. This is related to creating machines that not only process and respond to explicit commands or inputs but also understand the implicit and nuanced aspects of human communication.

4. **Self-aware Artificial Intelligence :** It refers to the hypothetical capability of an artificial intelligence system to possess a level of consciousness, self-recognition, and awareness akin to human self-awareness. In other words, this is an even more advanced concept where artificial intelligence systems have self-awareness and consciousness, similar to human beings.

The applications of the types of artificial intelligence systems described above are widespread and include areas such as natural language processing, image and speech recognition, expert systems, robotics, and machine learning. As technology continues to advance, artificial intelligence is playing an increasingly significant role in various aspects of our daily lives and industries.

4. Impact of Artificial Intelligence on Society

The anticipated arrival of Artificial Intelligence technology has brought short, medium and long-term changes in all societies globally. Many scholars like Chatterjee[7] and Bostrom[8] hold that the integration of AI into society has significant consequences for professionals accustomed to engaging with modern technologies. This extends to legal practitioners who grapple with the influential effects of AI and its regulatory implications, as well as technocrats who regularly rely on this advanced technology to make precise decisions in complex technological matters.

Nobody can probably deny the fact that every technological innovation like artificial intelligence invites effective potential for advancement as well as for damages to the society. The impacts of artificial intelligence on society can be divided into following two categories:

4·1 Positive Impacts of Artificial Intelligence on Society

Artificial intelligence has the potential to bring about numerous positive impacts across various domains. Some of the key positive aspects include :

1. **Increased Efficiency and Productivity :** Artificial intelligence systems can automate repetitive and mundane tasks, allowing human workers to focus on more creative, complex, and strategic activities. This leads not only to time savings and increased productivity, but also can quickly analyze vast amounts of data to extract meaningful insights. Streamlining

processes through artificial intelligence can lead to increased efficiency and productivity in various industries. It can also optimize supply chain operations by predicting demand, managing inventory, and improving logistics.

2. **Advancements in Healthcare :** Artificial intelligence is being used to analyze medical data, assist in diagnostics, and identify patterns in patient records. Artificial intelligence algorithms have demonstrated remarkable accuracy in diagnosing medical conditions by analyzing medical imaging data such as X-rays, MRIs, and CT scans. This can lead to earlier detection of diseases and more personalized treatment plans. This enables proactive interventions and personalized care plans for at-risk individuals. Artificial intelligence-powered robotic surgery systems enable more precise and less invasive procedures. With the help of AI, instruments are there for image recognition.[9] This is helping the diseased people who are visually impaired.[10] There are other examples where AI can help the Healthcare industry.[11]

3. **Enhancement of Education :** Artificial intelligence has the potential to significantly enhance education by introducing innovative tools and technologies that support teaching, learning, and administrative processes. It can provide personalized learning experiences, adapting to individual student needs and learning styles. Educational software and artificial intelligence-powered tutoring systems can assist students in their studies and help educators in tailoring teaching methods. Artificial intelligence also enables the creation of virtual classrooms with interactive features, facilitating engaging online learning experiences. Virtual tutors, simulations, and collaborative tools enhance the effectiveness of remote education. This aspect of AI has been studied by scholars like Slimi[12], Zhang and Aslan[13], Bates et al.[14], Beck et al.[15], Jain and Jain[16], etc. among many others.

4. **Improved Customer Service :** Artificial intelligence plays a crucial role in improving customer service across various industries. Artificial intelligence algorithms can predict potential customer issues based on historical data, enabling proactive customer service. AI--powered chatbots and virtual assistants enhance customer service by providing quick and

accurate responses to inquiries, improving user experience. Natural language processing allows artificial intelligence systems to understand and respond to customer queries in real-time. Artificial intelligence tools are also helpful to analyze customer feedback across various channels, including social media and review platforms, to identify trends, sentiments, and areas for improvement.

5. **Innovation in Business and Advertisements :** Artificial intelligence also plays a significant role in driving innovation in various aspects of business. It enables businesses to gain insights from large datasets, helping in decision-making and strategic planning. Predictive analytics powered by AI can assist companies in forecasting trends, identifying opportunities and outcomes based on historical data. AI optimizes supply chain processes by predicting demand, managing inventory, and improving logistics. Not only this, AI enhances security measures by detecting anomalies and patterns associated with fraudulent activities.

AI into business procedures is becoming crucial. Information, robotics, and smart advertising is becoming more prevalent in today's marketing. When marketers get into such a contact, the possibilities for consumer value creation are huge.[17] Vladimirovich's[18] study has proved economic efficiency of the integration of artificial intelligence in business which solves many problems. According to Chintalapati and Pandey[19], AI-powered market strategies that are smart and inventive can quickly respond to different company demands and provide connections and service bundles that are vital and profitable to relevant stakeholders.

Malviya et al.[20] have shown that artificial intelligence is transforming business operations, particularly in the field of digital marketing. Because of the rise of large data and increases in computer power, incorporating AI into business procedures is becoming crucial. Information, robotics, and smart advertising is becoming more prevalent in today's marketing. When marketers get into such a contact, the possibilities for consumer value creation are huge.

Shah et al.[21] Advertisement is now done with the help of not so newfound helping hand that is Artificial Intelligence and

Machine Learning. By implementing advertisements in this manner, we are confident that establishing laws, enforcing them, or even establishing a governing body can guarantee the ethical utilization of this technology. The future of advertising is poised to surpass its current state, with Artificial Intelligence and Machine Learning providing companies with increased control over advertising processes. Advertising with Artificial Intelligence and Machine Learning are here for a noticeable and a significant change.

6. **Environmental Impact :** Artificial intelligence technologies have the potential to contribute to sustainability and efficiency having far-reaching environmental implications. It is used in various environmental applications, such as monitoring and managing energy consumption, optimizing logistics and transportation, and predicting natural disasters. The infra-structure supporting AI applications, including data centers and cloud computing facilities, can have a substantial environmental footprint. Smart grids and energy management systems leverage AI to enhance the efficiency of energy distribution. Thus, AI can be used to monitor and manage environmental resources more efficiently. Ligozat et al.[22] have unravelled the hidden environmental impacts of AI. They assert that the popularity of AI is on the rise, frequently portraying it as a solution to environmental issues through proposals like AI for Green initiatives.

7. **Assistance for People with Disabilities :** Artificial intelligence has vast potential to significantly improve the lives of people with disabilities by providing solutions that enhance their accessibility, communication, and independence. AI-powered assistive technologies, which include tools for communication, Voice recognition, gesture control, mobility, and daily tasks, can change the life of individuals with disabilities. AI-driven chatbots can provide emotional support and companionship, particularly beneficial for individuals with mental health challenges or social anxiety. By addressing specific needs and challenges, AI has the potential to empower people with disabilities, fostering greater independence and inclusion in various aspects of life.

8. **Scientific Research and Discovery :** Artificial intelligence plays a crucial role in scientific research and discovery, accelerating

the pace of exploration and expanding our understanding of the world. AI accelerates scientific research by analyzing vast amounts of data, identifying patterns, and suggesting hypotheses. Drug discovery and genomic research benefit from AI's ability to process and analyze complex biological data. AI can create and maintain knowledge graphs, connecting information from diverse sources and providing a comprehensive overview of a particular scientific field. It has been proven that the integration of AI into scientific research not only expedites processes but also opens up new possibilities for discovery by revealing hidden patterns and insights within the vast amounts of data generated in various scientific disciplines.

9. **Improved Safety and Security :** Artificial intelligence has the potential to significantly enhance safety and security across various domains by providing advanced tools for threat detection, response, and prevention. AI can also be used in fraud prevention and cyber-security. Autonomous vehicles leverage AI for navigation, collision avoidance, and traffic management, potentially reducing accidents. AI can also optimize law enforcement resources by predicting when and where misconducts are expected to transpire. AI can monitor critical infrastructure, such as power plants and water treatment facilities, for anomalies that may indicate a security threat or malfunction.

It is evident from the above contribution of artificial intelligence about the positive impact of AI on society that it is proving a boon. Its impact on society has been multifaceted and transformative, contributing to advancements across various domains. We can safely say that the positive impact of AI on society is far-reaching and it has started transforming the way we live, work, and interact. While challenges and ethical considerations must be addressed, the potential for AI to drive positive societal change is substantial, with ongoing research and responsible deployment ensuring that the benefits continue to outweigh the drawbacks.

Chatterjee[23] has rightly shown that artificial intelligence is significantly impacting the general populace by offering substantial assistance in a cost-effective manner. However, it also presents complex challenges that could potentially jeopardize their fundamental rights, including privacy infringement. In this context, this paper makes a measured, thorough, and holistic effort to briefly

analyze the implications of the advent of this technology. AI technology is effectively contributing to the societal changes by providing advantages as well as disadvantages to the humans.

4·2 Negative Impacts of Artificial Intelligence on Society

Inspite of positive impact of artificial intelligence on society, there is its other side also. AI brings about various challenges and potential negative impacts that need to be carefully addressed. Some of the key concerns about negative impact include the following :

1. **Job Displacement :** Artificial intelligence has the potential to lead to job displacement through automation, a process where tasks traditionally performed by humans are taken over by machines or algorithms. Automation through AI can replace certain jobs, particularly those involving repetitive and routine tasks. AI-powered robots are increasingly capable of performing tasks that were traditionally done by humans in fields like manufacturing, logistics, and even customer service. This can result in job displacement for workers whose tasks are taken over by robots. Not only this, AI systems, including virtual assistants, can automate administrative tasks such as scheduling, email filtering, and document management. This may reduce the need for administrative support roles in certain contexts. It's imperative to note that while AI can lead to job displacement in certain sectors, it can also create new opportunities and transform industries. New roles emerge in AI development, maintenance, and oversight, as well as in areas that leverage the unique skills and creativity of humans.

2. **Bias and Discriminatory Outcomes :** Artificial intelligence systems can lead to bias and discriminatory outcomes for various reasons, reflecting the biases present in the data they are trained on, the algorithms themselves, and the contexts in which they are deployed. If certain groups are underrepresented or misrepresented in the training data, the AI system may not adequately learn to recognize patterns within those groups. Not only this, the biases of the developers involved in creating and training AI models can influence the outcomes. AI systems may not account for the specific context in which they are applied. Biases present in one context may not be applicable or may even be harmful in a different context, leading to unfair or discriminatory outcomes. If not addressed, these biases can be

perpetuated or even amplified by AI algorithms, leading to unfair or discriminatory outcomes, especially in areas like hiring, lending, and law enforcement. Addressing bias in AI requires a multi-faceted approach, involving careful consideration of data quality, algorithmic design, ongoing monitoring, and diversity in development teams.

3. **Ethical Concerns :** Artificial intelligence raises ethical questions regarding privacy, consent, and the responsible use of data. Privacy issues arise as AI systems process vast amounts of personal data, leading to concerns about surveillance and unauthorized access. Ethical concerns surrounding AI center on the potential risks and consequences associated with its development and deployment. Issues such as surveillance, facial and voice recognition, and the collection of personal information without proper consent can lead to privacy violations. One major ethical concern of AI is the manifestation of biases in AI systems, perpetuating and amplifying societal prejudices present in training data. Ethical considerations, transparency, and fairness must be prioritized to ensure that AI technologies contribute positively to society

4. **Lack of Transparency :** The lack of transparency in AI systems is a significant concern that raises ethical, legal, and societal issues. Many AI algorithms, especially in deep learning, operate as complex "black boxes", making it challenging to understand their decision-making processes. Lack of transparency can raise concerns not only about accountability and trust in AI systems, but also pose several challenges like compliance with legal and regulatory frameworks, fairness and accountability of AI systems, hidden biases and discriminatory practices, undermining consumer rights, limiting human understanding and control, raising ethical questions about the autonomy of AI systems, etc. All these can lead to unforeseen negative impacts on individuals, communities and societies. It must be stressed that striking a balance between safeguarding proprietary information and providing sufficient transparency is crucial for fostering trust, accountability, and ethical use of AI technologies.

5. **Security Risks :** Though artificial intelligence has the potential to significantly enhance safety and security across various

domains, still AI systems can be vulnerable to adversarial attacks, where malicious actors manipulate input data to deceive AI models. The proliferation of AI technologies has introduced significant security risks that demand careful consideration. The interconnectedness of AI in critical domains like healthcare, finance, and infrastructure creates a broad attack surface, making these systems attractive targets for cyber threats. Additionally, the increasing reliance on AI in critical systems poses cyber-security risks if these systems are compromised. Safeguarding AI against security risks necessitates robust cybersecurity measures, ongoing vulnerability assessments, and a concerted effort to address the unique challenges presented by the intersection of artificial intelligence and cybersecurity.

6. **Social Inequality :** Artificial intelligence has the potential to exacerbate social inequality through various mechanisms. One primary concern is the unequal distribution of benefits and opportunities stemming from AI adoption. Access to and benefits from AI technologies may not be distributed evenly, contributing to social inequality. Those with better resources and access to technology may disproportionately benefit, while others may be left behind. Hence, it may lead to a digital divide that disproportionately affects marginalized communities. To mitigate these risks, there is a pressing need for ethical AI development, inclusive policies, and efforts to address the broader socio-economic implications of AI deployment.

7. **Loss of Human Touch :** The widespread adoption of artificial intelligence technologies raises concerns about the loss of the human touch in various aspects of life. As AI systems automate tasks and interactions traditionally handled by humans, there is a risk of diminishing the personal and empathetic elements inherent in human interactions. In certain fields like healthcare and customer services etc., the introduction of AI may lead to a reduction in human interactions, potentially diminishing the quality of personal relationships and customer service experiences. For example, in healthcare sector, the reliance on AI for diagnostics and patient care may compromise the empathetic connection between healthcare providers and patients. This underlines the need for carefully balancing technological advancements with the preservation of the

human touch to ensure that essential qualities like empathy, understanding, and intuition remain integral in areas where human connection is paramount.

8. **Misuse of Autonomous Weapons :** The ethical concerns surrounding AI are particularly pronounced in the context of autonomous weapons. The ability of autonomous weapons to identify and engage targets without direct human control introduces the risk of unintended consequences, civilian casualties, and the escalation of conflicts. Ethical considerations encompass issues such as compliance with international humanitarian law, the potential for misuse, and the lack of a moral framework guiding the actions of autonomous weapons. This has sparked discussions about the need for regulations and ethical guidelines in the use of such technologies in military applications and to prevent the ethical pitfalls associated with autonomous weapons.

9. **Unemployment and Economic Disruption :** Beyond job displacement, the widespread adoption of AI could lead to economic disruption and structural changes in industries, potentially affecting entire sectors and local economies. It has been shown that the integration of AI technologies into various industries has prompted concerns about unemployment and economic disruption. While AI has the potential to create new job opportunities, the pace at which it transforms industries may outstrip the ability of the workforce to adapt. Economic disruption may result from the displacement of existing jobs, necessitating a shift in skills and roles.

10. **Dependency and Reliability :** The increasing dependence on AI systems raises significant concerns about dependency and reliability. As critical functions in various sectors such as healthcare, finance, and transportation become heavily reliant on AI, the vulnerability of these systems to technical failures, cyber threats, or adversarial attacks becomes a pressing issue. Many scholars hold that overreliance on AI systems without proper fallback mechanisms can lead to catastrophic consequences if the technology fails or makes incorrect decisions. Moreover, overreliance on AI may diminish human expertise and critical thinking skills, leading to a potential erosion of individual and collective problem-solving capabilities.

Addressing these negative impacts of artificial intelligence requires a multidisciplinary approach involving policymakers, technologists, ethicists, and society as a whole. Implementing ethical AI practices, promoting transparency, and developing policies that address the social and economic implications of AI are essential steps in mitigating potential harm.

Many studies have revealed that the development of AI for the societal benefits will be hampered if the concerns covering privacy and security protection for personal data are not properly addressed by formulating appropriate policy, laws and regulations. Those are required to be consistently implemented with good governance. The authority should be cautious to stick to the ethical norms in structuring AI-program.

5.   Conclusion

Throughout the world people are depending on use of artificial intelligence and it is expected this trend will increase with passage of time. It may be concluded that the impact of artificial intelligence on society is profound and multifaceted, ushering in transformative changes across various domains. While offering unprecedented opportunities for efficiency, innovation, and improved quality of life, AI also poses challenges that demand careful consideration. The ethical implications, potential biases, and societal inequalities arising from AI applications require ongoing scrutiny and thoughtful regulation. Moreover, concerns about job dis- placement, loss of privacy, and the need for transparent, accountable AI systems underscore the importance of responsible development and deployment. A number of studies have highlighted the potential misuse of AI on socirth. This misuse is related both to ensuring that such AI do not harm humans and other morally relevant beings, and to the moral status of the machines using AI themselves. As we navigate this era of technological advancement, it is crucial to prioritize ethical considerations, inclusivity, and the preservation of human values to ensure that AI contributes positively to society, empowering individuals, fostering equity, and enhancing overall well-being. The future impact of AI hinges on our ability to harness its potential responsibly, striking a balance between innovations and safeguarding the principles that define a fair, just, and equitable society.

It is worth mentioning here that there is no comprehensive AI-policy in India. Without a clear regulatory framework, there is a risk of unchecked development and deployment of AI technologies, potentially leading to ethical lapses, biases, and privacy concerns. The absence of guidelines could impede the responsible and transparent use of AI across industries, hindering the nation's ability to harness the full potential of artificial intelligence for economic growth, innovation, and societal benefit. The same has been shown by many scholars (like Lawless and Sofge[24], Chatterjee[25], Chopra and White[26], Garner[27] among many others), who hold that the absence of AI-policy in India might impede progress because the society wants to take the help of AI and at the same time expects to keep data privacy duly protected. This balance will be ensured by strict adherence to the policy of AI which should be, of course, consistent, reasonable and executable.

References

1. A. M. Turing, "Computing Machinery and Intelligence", *Mind : A Quarterly Review of Psychology and Philosophy*, 59, October 1950, 433-460.

2. Ibid. note 1, 433.

3. John McCarthy, "WHAT IS ARTIFICIAL INTELLIGENCE?", Nov 12, 2007.Available at https://www-formal.stanford.edu/jmc/whatisai.pdf.

4. S. Chatterjee, "ERP System and Business Transformation : An investigative Analysis of Success and Failure for Organizations", *International Journal of Science Technology & Management*, 4(2), 2015. 197-206.

5. S. Chopra and L. White, "Artificial Agents-Personhood in Law and Philosophy", R. L. De Mántaras and L. Saitta (eds.), *The 16th European Conference on Artificial Intelligence*, Valencia, 2004, 22-27.

6. S. Chatterjee and K. Bhattacharya, "Adoption of artificial intelligence in higher education: a quantitative analysis using structural equation modelling", *Education and Information Technologies*, 25, 2020, 3443-3463.

7. S. Chatterjee, "Artificial Intelligence and Personal Data: From Legal and Policy Perspective", *International Conference on Digital Transformation : A Cognitive learning towards artificial intelligence* [ICDT 2019], Rajiv Gandhi National University of Law, Patiala, Punjab, India, 2019, 409-417; S. Chatterjee, "Critical issues with Artificial Intelligence, Blockchain and Personal Data : From Social, legal and Policy perspective", *Blockchain Technology : Adoption, Regulation & Security*, Bhopal, India : National Law Institute University, 2019, 18-19; and S.

Chatterjee, "Influence of IoT policy on Quality of Life: From Government and Citizens' perspective", *International Journal of Electronic Government Research*, 15(2), 2019, 19-38.

8. N. Bostrom, *Uperintelligence : Paths, Dangers, Strategies*, Oxford : Oxford University Press, , 2016.

9. S. Chatterjee, "AI strategy of India: policy framework, adoption challenges and actions for government", *Transforming Government : People, Process and Policy*, 14(5), 2020, 757-775.

10. S. Chatterjee, "E-Commerce in India : A review on culture and challenges", l*EEE International Conference on Soft Computing Techniques and Implementations* (ICSCTI), 08-10 October, 2015, 105-109.

11. S. Chatterjee, "Antecedents of phubbing : from technological and psychological perspectives", *Journal of Systems and Information Technology*, 2, 2020, 161-178.

12. Zouhaier Slimi, "The Impact of Artificial Intelligence on Higher Education : An Empirical Study", *European Journal of Educational Sciences*, 10(1), March 2023, 1857- 6036.

13. Ke Zhang and Ayse Begum Aslan, "AI technologies for education: Recent research & future directions", **Computers and Education : Artificial Intelligence**, 2, 2021, 100025.

14. T. Bates, C. Cobo, O. Mariño and S. Wheeler, "Can artificial intelligence transform higher education?", *International Journal of Educational Technology in Higher Education*, 17(42), 2020. https://doi.org/10.1186/s41239-020-00218-x

15. J. Beck, M. Stern, E. Haugsjaa, "Applications of AI in education", *Crossroads*, 3(1), 1996, 11-15.

16. Suvrat Jain and Roshita Jain, "Role of Artificial Intelligence in Higher Education- An Empirical Investigation", *IJRAR - International Journal of Research and Analytical Reviews*, 6(2), April- June 2019, 144-150.

17. Malviya, Bindoo, Bestoon Othman, Komal Saxena, Shailmadhur, Vikas, and Hashem Ali Almashaqbeh, "An Empirical Analysis in Measuring the Impact of Artificial Intelligence for Better Marketing Communication to the End-Users Effectively in the Digital Era", Paper presented in *2nd International Conference on Advance Computing and Innovative Technologies in Engineering* (ICACITE), Greater Noida, 28-29 April, 2022.

18. K. M. Vladimirovich, "Future marketing in B2B segment: Integrating Artificial Intelligence into sales management", *International Journal of Innovative Technologies in Economy*, 4(31), 2020. https://education altec hnologyjournal.springeropen.com/articles/10.1186/s41239-020-00218-x

19. S. Chintalapati and S. K. Pandey, "Artificial intelligence in marketing : A systematic literature review", *International Journal of Market Research*, 64(1), 2021, 38-68.

20. Malviya, Bindoo, Bestoon Othman, Komal Saxena, Shailmadhur, Vikas, and Hashem Ali Almashaqbeh, "An Empirical Analysis in Measuring the Impact of Artificial Intelligence for Better Marketing Communication to the End-Users Effectively in the Digital Era", Paper presented in *2nd International Conference on Advance Computing and Innovative Technologies in Engineering* (ICACITE), Greater Noida, 28-29 April, 2022.

21. N. Shah, S. Engineer, N. Bhagat, H. Chauhan and M. Shah, "Research trends on the usage of machine learning and artificial intelligence in advertising", *Augmented Human Research*, 5(1), 2020, 1-15.

22. Anne-Laure Ligozat, Julien Lefèvre, Aurélie Bugeau and Jacques Combaz, "Unraveling the Hidden Environmental Impacts of AI Solutions for Environment", *Sustainability*, 14(9), 2022, 51-72.

23. Ibid., note 7.

24. W. F. Lawless and D. A. Sofge, "Evaluations : autonomy and artificial intelligence : a threat or savior?", W. F. Lawless, R. Mittu, D. Sofge and S. Russell (eds.), *Autonomy and Artificial Intelligence : A Threat or Savior?*, Springer, Cham, 2017.

25. S. Chatterjee, "The Safety of IoT enabled system in Smart Cities of India : Do ethics matter?", *International Journal of Ethics and System*, 36(4), 2020, 601-618

26. S. Chopra and L. White, *A Legal Theory for Autonomous Artificial Agents*, Ann Arbor : The University of Michigan Press, 2011.

27. R. Garner, *The Political Theory of Animal Rights*, Manchester : Manchester University Press, 2005. ★