ADOPTION AND TRENDS OF ARTIFICIAL INTELLIGENCE (AI) IN ENTREPRENEURIAL BUSINESS DOMAINS IN INDIA: A REVIEW STUDY

Dr. Bageshree P. Bangera Bandekar[1] and Mrs. Arpita Atibudhi[2]
[1]Research Guide, Cosmopolitan's Valia College of Arts & Commerce, D.N. Nagar, Andheri (West)
[2]Research Scholar, D.T.S.S. College of Commerce, Malad (East)

ABSTRACT
Artificial Intelligence (AI) is the newest buzzword in the digital world today. AI refers to a broad term for all applications, technologies and digital processes that simulate human efforts, processes, and thoughts to make informed decisions and solve problems. Over the few years of its existence, it has found extensive use in many sectors of the businesses across the globe; namely – manufacturing, tertiary and primary sectors. The future of entrepreneurs and entrepreneurship is going to be deeply impacted by AI technologies. Even though the concept of AI is in its teething stage in India, many start-ups and businesses have started adopting AI as a major catalyst of business processes in India. Several sectors are exploring and adopting AI applications actively in various areas of businesses like product design, delivery systems, logistics, quality control and even human resource management. This adoption of AI in several sectors will have lasting implications on the growth of entrepreneurship. It may have positive and negative influences on sectors in areas of technological innovation, service delivery, risks, and costs. Considering these pertinent observations, the current study traces the adoption and trends of AI in various domains of the business sectors in India. The study uses several literatures to track the same. Further, the study puts forth several deliberations and suggestions for a smooth transition towards AI enabled businesses. The study finally aims to provide a future direction for deeper research into different areas of AI implementation and its effect on entrepreneurs and enterprises.

Keywords: *Artificial Intelligence, Entrepreneurs, Entrepreneurship, Start-ups, Business Sectors, AI Implementations, AI Applications*

1. INTRODUCTION – CONCEPT OF ARTIFICIAL INTELLIGENCE:
Artificial Intelligence is a created phenomenon where specific aspects of human intelligence consisting of logic and reasoning, problem solving and machine–human interaction are incorporated through devices. Over the past decade, AI has been developed gradually to simulate human effort through an action process using applications like natural processing of languages, speech recognition and machine vision. Usually, a generic AI system focusses on the following aspects:

a) Learning- Learning and machine learning are sub systems of AI where, algorithms are created to enable information and data to be analyzed and thus enabling the devices to use that information and data to complete the assigned tasks.

b) Logic and reasoning- Further, information and data is used to arrive at an expected outcome. This is done through correlation and patterns that can be identified amongst the data.

c) Calculations and innovations- AI focusses on using algorithms, neural networks and even statistical methods to find out results and create text, images, ideas and even music.

Using advanced concepts of machine and deep learning and such other technologies, AI is replicating human actions and processes at workplaces. One of the significant examples of this is ChatGPT and self- driving cars. An article by Tech target states that AI finds application in businesses in areas like innovations in product designs, service deliveries, augmenting employee efforts, mobilizing knowledge and information across business sectors, optimizing strategies and enhancing productivity and operations, to name a few.

2. BACKGROUND OF THE STUDY – AI AS A CATALYST IN THE GROWTH OF ENTREPRENEURSHIP:
Post 2016, the growth of entrepreneurship can be accredited to several policy measures (NITI Aayog scheme and Make in India). Further, the MSME ministry swung into full force to support start- ups. Currently, several start-ups are operating in the market using the B2C model. The intervening factor has been technology. The dynamics of entrepreneurship are no longer limited to social media marketing or digital marketing. Several studies have suggested that AI is going to have a long lasting and a powerful impact on enterprises. The impact is multifold.

Few amongst the many economic impacts include higher productivity through automation, and fulfilled consumer demands through AI driven high quality products and services. With the latest phenomenon of

Industry 4.0, entrepreneurs involved in manufacturing start-ups and businesses are looking to adopt AI enabled manufacturing processes and shopfloor automation. Tertiary sector is also looking forward to AI led delivery of services, customer management automations and brand management. Various literatures have suggested that entrepreneurship and innovation is a pertinent way towards sustainable growth for a labour dense and developing country like India. Hence, to foster strong entrepreneurship in the country, adoption of AI is inevitable as it is the need of the hour. Moreover, the pillars of robust entrepreneurship- innovation, customer relationship management, data analytics, strong product development, market mapping and funding; each one of them will be impacted intensely by AI technologies in the future.

3. OBJECTIVES OF THE STUDY:

1. To review various literatures related to artificial intelligence (AI) and its application in business processes.

2. To examine the trends of AI adoption in India by entrepreneurial domains.

3. To provide suitable suggestions to optimize the application of AI in enterprises with respect to India

4. RESEARCH METHODOLOGY:

The current study is a secondary study based on exploratory research design. The researcher strives to achieve the objectives of the study using several literatures like research papers, articles, reports, blogs, and such other authentic literary material. The researcher has also surveyed online databases that comprise of information on artificial intelligence and its use in business. After collating the findings from secondary data, the researcher presents an overview of AI trends in businesses in India and deliberations with regards to the same.

5. SIGNIFICANCE AND SCOPE OF THE STUDY:

The study has used several literatures and databases to assemble the findings, information and data to trace the adoption and use of AI by different entrepreneurial sectors in India. The research aims to bring forth certain deliberations and suggestions for use of AI in businesses. The current study aims to provide a further trajectory for future research in the areas of AI and its use in business.

6. TRENDS OF AI IN ENTREPRENEURIAL DOMAINS IN INDIA:

Despite the prediction that AI will double the economic growth for India by 2035, it presents several opportunities and challenges to every nation. It requires a planned strategy and preparation for the potential impact that AI might have on vital areas like the job market, regulatory aspects and infrastructure. AI will definitely have long standing and unique effects on Indian trade, commerce and business. Considering the unique demography of India having the maximum share of the world's youngest population, there is a movement towards entrepreneurial activities. Further, the encouragement of the entrepreneurial ethos in India has led to a large number of enterprises being established. According to GEM (Global Entrepreneurship Monitor), India stands fourth in world's highest number of tech start- ups, world's highest number of unicorns start- ups and in providing quality entrepreneurship ecosystem. Several studies have indicated that enterprises have utilized various aspects and applications of AI. In this regard, India has seen disruptive transformations in augmenting labour and production capabilities. It can also be said that India is already on the way to adopting AI as an indispensable tool for business processes. The predominant sectors which have already initiated the use of AI are BFSI, healthcare, education, and E- Commerce. There is a considerable debate as to whether AI presents positive changes or negative implications. While, it may present job opportunities in certain areas, it also has the potentiality to displace jobs (Sahane et al., 2023). Considering the potentiality of AI, it is important to highlight the sectors and areas most impacted by it.

A report by Niti Aayog in 2018 has identified certain domains within the economy where AI could have long standing effects. Further, the report connected the growth of entrepreneurship in India and success of the new start-ups to quick adoption of AI. The report further envisages AI to be the newest factor of production, where it enhances the use of other factors of production like capital and labour. Every entrepreneur will have to factorize the use, cost and effect of AI in the seed stage itself. An overview of entrepreneurial sectors vis-à-vis AI adoption is presented below:

1) IT Sector- The future of Indian IT companies and start-ups are dependent on cloud infrastructure and technologies which are AI driven. This sector was the dominant sector to explore and adopt AI. Established companies like Wipro, TCS, Infosys and others have begun to make significant strides in this respect. The aim is to provide modern solutions to clients which focus on higher data privacy, data security, end to end solutions, seamless management of applications and data across platforms.

2) Healthcare- Diversity of the country has led to disparity in provision of health care services to rural areas and a few states. AI solutions like predictive smart diagnostics, customized treatments through online mediums,

forecasting pandemics and even imaging solutions will solve the problem of access to healthcare facilities in far-off areas. Remote patient monitoring tools and applications are all set to enter the healthcare sector in India in a big way. Pharmeasy, the Mumbai based start-up uses AI to get real time data and communicate with the consumers. Several other healthcare pharmacies and start-ups in India like Qure.ai (which uses AI for virtual radiology scans) and Healthify me uses AI tools to provide services in real time and in regional languages. The healthcare sector uses machine learning tools like Hadoop, Tensorflow, Hbase, Kafka and Hive to upgrade their services.

3) Manufacturing and construction- AI is set to transform the secondary sector; namely, construction through AI powered research and development, machine maintenance through smart asset utilization and use, production efficiency through machine-based demand forecasting and supply chain logistics through smart mobility and tracking. Currently, AI is applied to areas of quality control for defects identification and standardisation solutions in India. When leveraged rightly, AI impacted systems can be used in core sectors like power, energy and infrastructure too for better use of resources, lesser gestation periods and lesser breakdowns. Further, Use of AI is beyond the nascent stage in the automotive sector where AI can be used in testing automobile performances, identify defects and create modern designs and features.

4) Education- Currently, this sector is witnessing disruptions in the form of several edutech start-ups. Byjus and Unacademy were the frontrunners followed by several others. Use of AI in education sector is leading to learning and teaching disruptions. The use of AI in education sector is to predominantly provide enhanced learning solutions, interactive tests and experiential vocational training. A relevant example here would be the adoption of AI technologies by the edutech giant Courseera. The start-up runs several courses across the world and in India. They have successfully used machine learning technologies to translate courses in several languages. Further, AI can provide technologies to serve the students better and faster in real time. This will lead to improved skill-based education and training focused on higher employability and better human capital.

5) Agriculture- India started off as an agrarian economy. Even though its contribution to the country's economy may not be as substantial as the tertiary sector, it is integral to the rural economy of India. Agritech is a phenomenon which is here to stay. There are several agriculture-based start-ups like Aibono, Apna Godam, Big Haat, Agrostar and such others. This sector is looking towards a potential $24 Billion market by 2025. Each of these entrepreneurs have used tools of AI and machine learning to launch innovative services. Thus, the application of AI can be two-fold here; one in the actual fields with farmers and other with the growing agritech sector. AI finds potential use in the rural agriculture farmlands through smart solutions to predicting crop productivity, evaluating agricultural challenges like irrigation problems, innovative solutions for pesticide and fertilizer application and even improvement in output through real time advisory for the farmers.

6) E- Commerce and service sectors- The use of AI in service is three pronged; namely, to scrutinize consumer behavioural patterns, augment customer's shopping experience and integrate all business processes. For example, several food delivery platforms are using chatbots for ordering food, provide recommendations of products to be purchased and also relationship management. Application of AI is noteworthy in the service sector areas like travel and tourism, BFSI and E-commerce. Each of these domains have started using AI for creating user experiences and client satisfaction.

An article by Indiaai (National AI portal of India) reveals that Nasscom collaborated with Microsoft to launch the AI adoption index. The methodology for this comprises of tracking the journey of adoption of AI by several sectors. Accordingly, the sectors were assigned categories like explorers, enthusiasts, experts, and evangelists depending on their intensity and prowess to use AI. Further every sector is given a score based on the category of maturity in adopting AI. This score is calculated based on parameters like AI strategy, talent and use, investments, technology, ethics and governance. Accordingly, sectors like manufacturing and industrial acquired the highest score followed by retail, BFSI and healthcare sector.

Similarly, according to a study by PwC India, AI presents forth several opportunities amidst the post- covid crisis. The firm conducted a survey of top CXOs of new enterprises and entrepreneurs in India and have put forth findings which suggest that 62% of the newly started companies that were surveyed have started exploring AI in some form or the other. They belong to different stages of AI implementations and adoptions. 16% of the companies reported initial progress in adoption of AI while more than 19% of the companies reported successful adoption of AI and a 360 degree transformation in digital processes. A pertinent revelation by the report is that 38% of the companies do not plan to implement AI even in the future.

7. CONCLUSIONS AND DELIBERATIONS OF THE STUDY:

Despite the advantages and positive implications that application of AI provides, there are several deliberations with regards to challenges with its adoption and implementation. For successful implementation of AI across business domains and processes, it requires committed leadership, skilled employees, and a clear roadmap. The following points of contention can be put forth through this study:

- Entrepreneurs desirous of adopting end to end AI solutions must transform their vision, mission and business strategies in alignment with the overall AI roadmap of the company.

- In order to implement long term AI solutions, enterprises need to have a strong design and architecture of its IT infrastructure and digital capabilities to handle data, processes and contingencies.

- Entrepreneurs should consider phased out implementation of AI in digital roll outs and conduct a cost benefit analysis at every phase to avoid possible failures

- The application of AI is nuanced and has several dimensions. Hence, it will affect several areas in organizations like people, processes, and policies. Thus, organizations should prepare a change management plan.

- The success of any digital application depends on vendor strategy. Enterprises should have a well thought vendor strategy considering all aspects of quality, cost and benefits.

- The use of AI and its application should be evaluated vis-à-vis its impact on various stakeholders like customers, clients, distributors, intermediaries, and the society. This will have long standing effect on brands and their reputation.

- It is challenging to exactly measure the economic benefit of AI application. Hence it is necessary to formulate ways to measure the return on investment of AI applications in business.

- Currently, the use of AI is predominantly by the large start-ups and firms. AI is yet to take off as a tangible mass market application. The smaller firms should work towards a suitable value proposition by combining traditional business ethos powered by AI platforms in order to break barriers.

- AI should be used to supplement creativity and innovation rather than replacing human thinking and effort in order to avoid product and service homogenization.

To conclude, there should be an initiation and enhancement of an overall AI powered entrepreneurial ecosystem in India. Governments, higher education institutes and industry experts should collaborate and work towards systematic spread of AI knowledge, tools and their adoption. Government policies would encourage responsible application of AI through comprehensive security and data privacy measures. Education institutions can aid in creating AI enabled innovation hubs and entrepreneurs can foster world class sophisticated work environment and enterprises. Given below is the suggested framework for augmenting AI based entrepreneurial ecosystem represented by four concentric circles:

Figure 1: AI Based entrepreneurial ecosystem
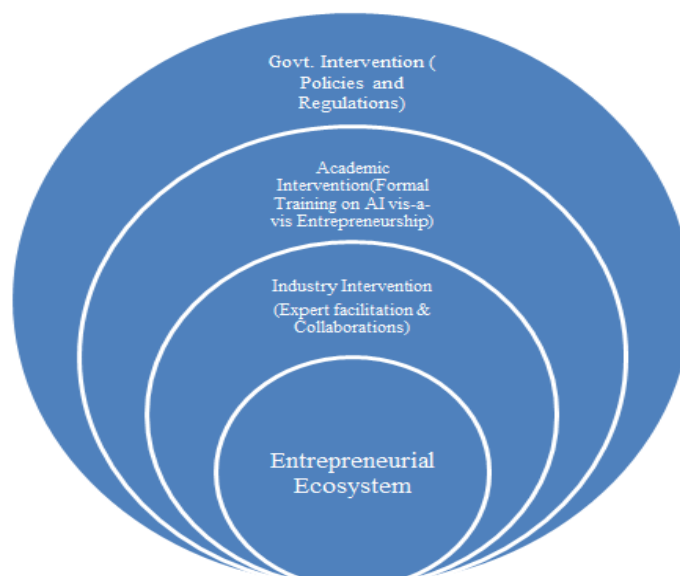
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