# A Critical Review of AI-Enabled Marketing Technologies

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*Abstract*— **Techno-centricism, or the integration of technology into business domains, is a century-old phenomena. However, the defining technologies of different decades vary in terms of incorporated advances, prevailing concepts, processes, and specified nomenclatures. Within these technologies is the potential of future company plans and performance enhancements of inherent systems and procedures. The modern marketing function offers an extra benefit for brand promotion and integrates significant technology into routine activities. This study attempts to document the insights of Artificial Intelligence (AI) ecosystem and embedded technologies in supporting marketing process and organisations. Additionally, it aims to clarify the relationship between AI and marketing and provide a fundamental knowledge of how their combination will shape prosperous businesses in the future.**

***Keywords***— **Artificial Intelligence Ecosystem, Artificial Intelligence Marketing, Big Data, Deep learning, Machine learning.**

## I. INTRODUCTION

Technology is defined as the integration of systems with concrete computational abilities, functioning through a web of hardware and software alignments towards achieving desired solutions. Further technology can be stated as the application of science in promoting ease of performance at organizations level and dominance at competitive platforms (Freeman, 1989). As technology gets more decentralized and inhabited by organizations and societies (Bijker, Hughes, & Pinch, 1987) the pace of technological innovation and incorporation into core process (Parton, 2018) is fast paced. Intelligence is the inbuilt and learned computational abilities existing with varying degrees in man, mammals and machines (McCarthy, 2007). It can be referred to as the natural predispositions, genetic inheritance or learned skillsets forming the core of individual personalities. These bilogical intelligence attributes of humans when stated in intelligence of machines is refererred to as Artificial Intelligence. Artificial Intelligence (AI) is the integration of technology into business operations , processes and organizations. When technology gets streamlined into functions of sales , marketing, finance and into critical niche points of problem solving, decision making and innovation modelling , the benefits organization can drive from stated AI associations into core enterprse solutions are immensely profound.

Artificial Intelligence (AI) as defined by experts is the intelligence as demonstrated by machines in perceiving their work environment and interactions in discharge of their functions. It is an architecture of software's and high-end- technology systems (McCarthy, 2007) enhancing improved environment simulation and work performance. AI or Machine Learning Infrastructure is a sequence of algorithm's enabling deep learning and data processing like humans and acting more as business consoles and choreographers. Artificial Intelligence aims at incorporating intelligent and error free decision making processes and work schedules guided by state-of-the-art technology and information systems thereby minimizing every inch of repetitive problems at one hand and maximizing accuracy and legitimacy at other. Technology Devices/Process shows no signs of emotional decision making syndrome affecting the problem area; alternatively decision are based purely on analysis of factsheet and statistics (Kask, 2014).

Artificial Intelligence & automation are poised to reshape the marketing function (Mölsä, 2017). Intelligent work processes management, intelligent information management, intelligent system and technology integration and intelligent human resource management as suggested by (Russell,Dewey,& Tegmark, 2015) when used in complete synchrony with machines will boost organizations goals and environment. Enabling required process and system automations and managing the technology disruption (Sallomi, 2015) can lead to a new wave of enhanced productivity and improved performance.

Associating AI' technology and tools to the core processes, data governance models (Brunet, 2018) and environmental ecosystem will not only activate organizational core competencies but also enable

organizations to prosper as it will form the heart of future marketing initiatives and technological innovations. This can work through timely integration of technological infrastructure with organizations key result area's thereby enabling interconnectedness of human resource, financial resource and machine resource (man-machine synchrony). Man- Machines coexisting in synchrony and working in harmony at the workplace is the new critical success factor of modern era enterprises.

## II. AI & Embedded Technologies

Artificial Intelligence as a technology is the integration of a host of applications and tools and its real time benefit comes from its interactions with associated or partner technologies like:

## III. Machine Learning

Learning is the incorporation of instructions, guidelines or reinforcement into thought processes, actions and can be reflected as natural or guided behaviour. The ability to learn is being possessed by humans, animals, machines and even in some proven cases plants (Karban, 2015).

Machine learning as defined by (Samuel, 1959) is the ability of systems to learn without being explicitly programmed and is modeled around the paradigm of human and animal learning associations.Machine learning platforms as learning systems evolved without any natural predispositions (Goldberg & Holland, 1988) and later vitalities of genetic learning are infused into machine learning (Booker & Holland, 1989).Machine learning as the application of AI is the inbuilt capacity of modern era machines to learn from algorithms and statistical analysis tools (Rouse, 2018) by accessing large reporsitory of databases and providing marketers with actionable insight to enable intelligent automation and decision making .By 2020 "10% of organization enabling task-application investment criterion on software tools , algorithms and big data and 60% enterprises using analytics enabled content and solutions mining benefits to the tune of $43 billions" (inside bigdata, 2018). The application of machine learning can be tracked to identification of market trends or common occurrences from data sets and effectively predict common insights (Bluma, 1995) responses and reactions so marketers can understand the root cause and likelihood of repeating actions and customize timely solutions. Given the business applications of machine learning machine learning algorithms are in abundant supply (Ray, 2017) ranging from K-means clustering, Neural Networks, Decision trees, Reinforcement learning etc.

## IV. Deep Learning

Deep learning is a specific machine learning technique and is defined as the mechanism of feeding machines with huge sets of data so as to enable them to work on self-learn-solve paradigm (Kutton, 2018). Through a standardized process machines learn from these data sets over a period of time analysing it and getting fruitful insights and associations. Deep learning discovers ingrained structures, sequencing and bring forth innovative/unique data associations (Yann LeCun, 2015) from available data sets using a series of complex algorithms which are then utilized for managerial problem solving and decision making. Though deep learning is the subset of machine learning which is an application of artificial intelligence and it had yielded eye opening research results in the domains of speech recognition, computer vision and natural language processing (Najafabadi, et al., 2015). The application of Deep Learning in public domain is its extensive use to solve the compexities of cyer security and warfare , smart city dimensions and management, transportation and signal processing , medical informatics and weather phenomenon (Hof, 2018). Deep learning is based on the artificial neural networks much alike the biological neural connections (Holland, 1992) and is highly synchronized with human brain in terms of problem solving and decision making attributes. As technology companies like google , facebook , twitter and youtube having billions of users, constantly generating large quantity of data and invests hugely in these disruptive technologies , data

analytics tools , data monitoring and analysis techniques and associated business models for creating lifetime value (Allen, 1985).

## V. Big Data

Contemporary business ecosystems are centred around technology resource, data resource and human resource. Accordingly organization departments and processes presently are generating huge volumes of data which is referred to as Big Data. As business processes are growing more wide and complex and organizational-friendly technology becoming ingrained into the mainstream operations (Hurwitz, Nugent, & Halper, 2013) data collection tools are almost conquering every domain of industrial concerns. This volume of data that organizations are collecting (Zikopoulos,2011) and committing to (Hu,Wen,Chua&Li,2014) through key-access points is termed as big data. Generally big data is also defined in reference of 3V's namely volume, variety and velocity (Laney, 2001) and refers to a marketer's ability to aggregate and segment large volume of data (Amir Gandomi, 2014) with minimal manual work utilizing technology. Marketing departments thus use this smart data for customizing their product offering in tune to customer-centric requirements. State-of-the-art IT infrastructure enabled organizations by incorporating a blend of analytic tools , statistical techniques , data interfaces , visualization approaches and software analysis (Roski, Bo-Linn, & Andrews, 2014) this big data gets transformed to smart data (Farell, 2002) which is then used for making value creating business decisions.

## VI. Marketing

Marketing is both art and science i.e. art of selling goods profitably and science of initiating a transaction or exchange through a predetermined series of actions.

Marketing from organizational perspective can be defined as an activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large. (American Marketing Association, 2013).Marketing from customers perspective be defined as a series of steps directed towards achieveing desired objective of value addition to associated stakeholders at a predetermined price/cost (Investopedia).Marketing from societal perspective as defined by (kotler & Keller,2009) is a societal process by which individuals and groups obtain what they need and want through creating, offering and freely exchanging products and services of value with others.Key consumer markets in existence are consumers marketing , business marketing (Industrial Marketing ), Global marketing and Non-profit marketing (NGO's) (kotler & Keller,2009) . As per (kotler & Keller, 2009) goods, services , events, experiences, persons , places, properties, organizations, information and ideas are the possible entities that can be mareted and the way they are marketed will take a make shift change from marketplace model (physical place of selling goods and services) to marketspace model (Online selling platforms) (Kotler, Keller, Koshy, & Jha, 2009).

The seller-centric elements of marketing mix (4P's) as postulated by McCarthy (Day, 1964) can be classified namely Product, Price, Place,Promotion but as marketing scenario tranformed more towards customer as a king approaches, more customer-centric (Londhe, 2014) models were framed . One of such models was proposed by (Lauterborn, 1990) wherein consumer replacing product , cost replacing price , convenience replacing place and communication replacing promotion .Another cutomer-focussed model SIVA (Solution, Information,Value & Access ) as propounded by (Dev & Schultz, 2005) equated seller oriented product with customer orineted solution, price with customer value, place with customer access and promotion with customer information.

## VII. MARKETING MIX EVOLUTION

| Seller-centric Approach | Customer-centric approaches | |
|---|---|---|
| Product | Solution | Consumer |
| Price | Value | Cost |
| Place | Access | Convenience |
| Promotion | Information | Communication |

Post globalisation as the markets gets integrated (Coviello, Milley & Marcolin, 2001) with their international counterparts , the emergence of digital marketing tools completely transformed the way business processes were streamilned . The traditional technologies were benchmarked with state-of-the-art technology keepers and marketing operations were being benchmarked with best in class competitors. As the information available to customers gets quadrupled improving their base of comparision and instilling the dataset for product selection (Goldsmith,1999) customization have taken a centrestage as never before and is mandatory incorporated into business and product portfolio's . The availability of diverse information sets about consumer buying behaviour and decision making process , the STP (segmentation,targeting and positioning) goals of organizations are becoming more customer-centric and demand synchronised. Alternatively customer are becoming more demanding in terms of convenience , quality , product features and value for money as definning variables of their loyality quotients . Loyality in this digital era is not limited to placing your products in the minds of customers but in the heart and soul of customers. In this product ecosystems with million of product and brand options they can easlity get fascinated and diverted by alternative brands , lifestyles and trend changes. The key touch points wherein marketers can influence customer buying behavious are also getting multiplied in tune to technological innvations and surge in digital platforms (Pagani, 2013). Technology as core competence (Powell & Micallef, 1999) is enabling marketers with huge bundles of information about consumers buiyng behaviour , buying cycle , key target attributes , technology and product preferences, payment modes , consumption patterns , favourable digital platforms , delivery modes etc. These huge subsets of consumer data can be transformed to meaningfull information for decision making through analysis by AI powered tools.

Traditional marketing practices of promoting host of products through newspaper , radio and television are also taking backstage because of reduced customer attention and giving way to online and digital marketing promotion platforms (Mahadevan, 2000) in the like of content marketing, search engine optimization , search engine marketing , social media optimization , social media marketing .Social media marketing channels are only augmenting consumer buying powers as more and more consumers are voicing their opinions about company and brands and related product attributes. Marketer's inability to deliver products in tune with customer requirements can take a toll on company's brand image and values through customer disengagement with said products and brands through online communities and word of mouth.

## VIII. INTELLIGENT INFORMATION SYSTEMS: KEY DRIVER OF MARKETING

Traditionally marketing is all but product-centred , then came a makeshift change and it became more people/customer-centred but presently going by the nomenclature of industry working patterns it seems more technology-centred . The traditional concept of marketing directly or through Intermediaries or by e-mail, m-phones (digital) to customers will take a shift change to intelligent customer data management (search engine optimization & marketing and social media optimization) (Connolly, Olsen, & Moore, 1998) and smart interaction tools. In the aftermath of installation of Artificial Intelligence systems , information about the customers buying habits and consumption patterns will be readily available to all therefore the real fight or competition in that scenario will depend on the quality of incorporated AI' systems and their data

analysis and processing capabilities. The more upgraded and state-of-the-art your machine-resource is, the better decisiveness your business displays.

There is a paradigm shifts as traditional asset-centric management philosophy giving way to contemporary AI powered solutions (Beck, 2018) with a trend of change in financial investments of deep pocketed investors, loyality attributes of customers and talent skilling of organizational human capital and finally in the pattern of stakeholders rewarding companies with their hard earned savings and incomes. AI-centric platforms with augmented digital capabilities are powered with business model lenses of proactive adaptation and timely implementation rewarding the associated stakeholders with improved bottom line, profits and future growth prospects.

## IX. Recent Innovations & Real World Applications

The recent work and trends in field of AI varies from Apple Siri enabled smart mobile searches and catch of keywords to Google Duplex managing hair-cut appointment and restaurant reservations (CNBC, 2018). Google Duplex voice enabled platform speaking to the hotel manager in human like voice and precision requesting a dinner reservation. The tonality and linguistics patterns of Google Duplex are hardly differentiable with human voice. Additionally Amazon recently entered into a partnership with Mariott International Inc. wherein Amazon Flywheel (Dignan, 2018) and Amazon Alexa Voice enabled platforms performing the task of assisting hotel guests from room servicing to house-keeping (BBC News, 2018) . Another context of AI application can be quoted with IBM AI powered project debater (a robot) arguing with subject experts on the topic of "subsidizing space exploration" in a 4 minute comprehensive dialogue (Krishna, 2018) and left associated participants stunned with its logical reasoning and argument accuracy. Another application of AI can be quoted in context of Automobile giant Mercedes MBUX (Mercedes-Benz User Experience) enhancing driving experience through AI enabled voice assistant and safety (Etherington, 2018). Another automobile giant Tesla stores on cloud all data generated from cars running on the road and later used it to customize driving suggestions and vital improvement in their subsequent models. In one of the instance hugely quoted Tesla cars are facing this problem of overheating. Tesla by using AI tool integrated all recorded data and fixed the bug in all the running cars through cloud enabled solution. The advantages that AI offers are so profound that Indian banking giant PNB initiated using AI-centric tools (Sharma, 2018) for accounts reconciliation and fraud detection. The applications of AI can also be tracked to identification and prevention of oil spills through satellite imagery (Kubat,1998) .From the above value additions that AI offers and recent pace of technological innovation in AI centric technologies makes it a highly researched domain. This can be attributed to the fact that the users and brand ambassadors of AI are some for the world most powerful people and words best organizations.

## X. AI Enabled Marketing Solutions

According to a recent PWC study 72% CEO's view AI as a "competitive advantage" (Moritz, 2017) to sustain in this digital era. AI along with subsets of machine learning and deep learning are simplifying the way businesses are conducted around the world. The pace of creativity and innovation centric powerful solutions is the trademark of this defining technology of the 21st century. Integration of AI enabled technologies can enhance organizations data processing capabilities and make decision making process more inclusive and representative (Brooks, 1991). This means that the platforms can identify insightful concepts and themes across huge data sets, incredibly fast and provide some best answers to aid organizational problem solving and real time decision making process.AI solutions also interpret emotion and communication like a human, which makes these platforms able to understand open source content like social media, natural language processing, and email responses. AI solutions can dive deep into keyword searches, social profiles, and related online data for outstanding patterns and outcomes.

Customers: AI can play a huge role in customer servicing and retention through providing 24 hour service managing 85% of customer engagements by 2020 (Fowler, 2018). As direct-to-consumer engagement avenues will be run by AI bots (chat-bots & call-bots) leaving aside ample time for strategic decision making to skilled managers. AI enabled customer interactions will enhance timely query management and disbursal without any time constraints (24*7) and waiting process. On-call queue and home-visit waiting of the company's service-personnel not only adds frustration in customers but also negative impact on the brand image and value of multinationals.

Business organizations: How convenient it is for business organizations having being managed by automated processes assisting in routine decision making and day to day operations. In addition to time and money savings by minimizing resource wastage, organizations can also gain in terms of expertise and specialization in work-place and competitive advantage at market-place. AI platforms also have access to an entire internet's worth of customer data (Henderson & Venkatraman,1999) information and search histories, key touch points, point of sales and point of purchase making them proficient in the art of data segmentation and analysis than their human counterparts. AI marketing will assist organizations in the strategic tasks of customer engagement beginning from lead generation, nurturing and follow up to segmentation, salesmanship to customer service and satisfaction (Fowler, 2018).The integration of AI, big data, machine learning solutions can actually analyze these search patterns and help marketers identify key areas to target.

Stakeholders: It is far more effective to complement social models and government initiatives by AI powered mechanisms promoting fairness, transparency and accountability in delivery of social schemes and tracking social developments. Also by encouraging deployment of AI enabled computing in key facets of the government organizations like tax fraud detection, cyber security , cyber crime and cyber warfare (Bhatia,Gautam, &Tripathi,2018), geographic tracking of disease outbreaks and the Census bureau for studying population trends (Bryant, Katz, & Lazowska, 2008) would be of immense help.

## XI. CONCLUSION

The century old consequences based reactive technologies are being transformed to innovation powered proactive business models. The fusion of customer-centricity and data-centricity is the new future-centricity of successful business conglomerates. Marketing processes has also undergone a sea of change from production based (standardization) to customer focussed principles (customization). The traditional practices of marketing directly to customers are being replaced by digital tools of search engine optimization and social media marketing. The marketplace platforms of physical store selling giving way to marketspace centred e-commerce selling. Organizations are presently incorporating defining technologies and resourceful online communities into their marketing-mix strategies. The AI-Marketing fusion certainly is growing in stature and functionality as the new paradigm for successful business organizations. The evolution of AI from simply technological alignment to supplementing organization performance & thereby generating core competence suggest not only the growing vitality of incorporating technology into mainstream operations but urgent need of required interconnections and interaction between technology and domains of marketing .

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