“THE ROLE OF ARTIFICIAL INTELLIGENCE IN PHARMACEUTICAL SALES AND MARKETING: A RECENT STUDY”

Dr. Dana Bayoun, Swiss School of Business and Management, Geneva, danabayoun@hotmail.com
Dana.bayoun@usj.edu.lb

“Abstract”

The term artificial intelligence (AI) refers to the way professionals recently perceive a computer-controlled robot, whether an intelligent machine, or software. Matching healthcare professionals and placing them on the appropriate channel at the appropriate moment will be the main goals of the sales and marketing teams. AI will help marketing teams with full analysis from brand diagnostics, brand history analysis, and future brand planning and strategy. Furthermore, AI could give sales teams a competitive edge and enhance sales results by assisting them with guided sales, pre-call planning, e-detailing, and Customer Relationship Management (CRM). This will help Pharma businesses produce better results using less time and resources. Additionally, it can be helpful for patients to follow their treatment plans and adherence. The aim and purpose of this paper is to seek new ways using AI to boost sales and marketing efforts in the pharmaceutical market which can help new entrepreneurs and better strategic approach and implementation.

Keywords: Artificial Intelligence, Sales and Marketing, Pharmaceutical industry.

1 Introduction

“Artificial intelligence (AI) is the branch of engineering science that focuses on creating intelligent devices, particularly intelligent computer programs” (Dastha ,1992). It is the ability of a computer, or a robotic system with computer capabilities, to process information and produce outcomes that are close to how people adapt to decision ladders from gathering information, learning and comparing, making choices, and resolving problems. Building intelligent machines, which are becoming essential in the technology industry, is the aim of artificial intelligence (AI). Additionally, AI has drastically transformed the pharmaceutical industry reflected in new strategies for sales and marketing. It is widely used in all aspects of the healthcare industry from clinical trials to diagnosis and treatment. This advanced type of computer-assisted methodology entails collecting data from various sources, creating rules to manage the required data, and modeling possible outcomes to find appropriate outcomes and processes that can replicate human behavior. Clinical trials, pharmaceutical product marketing and sales, and the production division of the pharmaceutical industry all make use of it.

2 Why is AI Needed in the Pharmaceutical Industry as Well in Marketing?

The pharmaceutical industry today involves not only drug development companies but also academic researchers, data scientists, and business intelligence experts. This field produces large volumes of unstructured data, including

prescription records, medical imaging reports, physician notes, and patient histories. Reviewing a patient's medical history is a critical step in determining the appropriate course of treatment. Managing such extensive and diverse data requires the use of analytical tools and methods. These technologies support data processing, visualization, and extraction to generate meaningful insights (Anuyah, 2024). Building on this, the growing number of patients in the healthcare sector has further contributed to information overload. Machine learning offers effective approaches for leveraging these large datasets to enable evidence-based practice (Chalasani, 2023). At the same time, marketing and sales data are increasingly stored in electronic database systems, allowing for the real-time collection of information on pharmaceuticals, physician prescribing behaviors, and patient or customer perceptions of different medications.

Artificial Intelligence (AI) has emerged as a transformative drive in the pharmaceutical sector, improving various aspects of drug development and marketing strategies. This paper examines the integration of AI in these domains, highlighting its impact on efficiency, personalization, and compliance.

3 AI in Pharmaceutical Research and Development

AI's application in pharmaceutical research can be applied in multiple stages, from drug discovery to post-market surveillance. In drug discovery, AI algorithms analyze vast chemical and biological datasets to identify potential drug results, significantly accelerating the initial phases of development (Chalasani et al, 2023). During clinical trials, AI facilitates patient recruitment, monitors adherence, and predicts outcomes, thereby optimizing trial designs and reducing costs (Anuyah et al, 2024). It optimizes the manual phases of matching data entry of patient medical record and filters the data to obtain the pool of needed sample size for the clinical trial. Furthermore, AI enables personalized medicine by integrating genomic and phenotypic data to tailor treatments to individual patients, enhancing therapeutic efficacy (Wong et al, 2023).

In manufacturing, AI-driven systems monitor production processes in real-time, ensuring quality control and compliance with regulatory standards. Additionally, AI plays a crucial role in pharmacovigilance by analyzing electronic health records and other data sources to detect adverse drug reactions early, thereby improving patient safety (Chalasani et al, 2023).

4 AI in Pharmaceutical Marketing

In the core of pharmaceutical marketing, AI enhances strategies through data-driven insights and automation. Predictive analytics allow marketers to anticipate market trends and consumer behavior, enabling proactive campaign planning (Flaiz, 2025). AI also aids in content creation and optimization by analyzing engagement metrics to tailor messages that resonate with target audiences, thereby increasing engagement and conversion rates (Flaiz, 2025).

Moreover, AI-powered chatbots and virtual assistants provide healthcare professionals and patients with timely, accurate information, improving customer service and satisfaction. These tools also assist in navigating regulatory requirements, ensuring that marketing materials comply with industry standards (Flaiz, 2025). It enhances the two ways communication that is of prime importance to develop a good customer relation management system (CRM).

The integration of AI into the pharmaceutical industry and marketing strategies has led to significant advancements in efficiency, personalization, and compliance. By leveraging AI, pharmaceutical companies can accelerate drug development, enhance patient outcomes, and optimize marketing efforts, ultimately contributing to the advancement of healthcare.

4.1 The significance of artificial intelligence in pharmaceutical sales and marketing

Artificial intelligence (AI) has emerged as a transformative tool in pharmaceutical sales and marketing, offering strategic advantages in an industry characterized by complexity, regulation, and diverse stakeholder needs. By leveraging AI, pharmaceutical companies can convert vast amounts of healthcare and market data into actionable insights, enabling targeted, efficient, and compliant marketing strategies.

AI facilitates data-driven customer insights by analyzing prescription trends, electronic health records, and digital interactions to target and segment healthcare providers and patients accurately. This enables the positioning and the delivery of tailored information aligned with individual prescribing behaviors or patient health needs, improving engagement and therapeutic outcomes (Flaiz, 2025). Through predictive analytics, artificial intelligence anticipates shifts in market demand and emerging trends, allowing sales teams to prioritize high-potential providers, regions, or product lines. This predictive capability enhances resource allocation, increases sales efficiency, and supports strategic decision-making (Anuyah et al, 2024). It will improve advertising and Promotion (A&P) and have a better return on Investment (ROI). AI also supports personalized marketing campaigns by utilizing machine learning to generate customized content across multiple channels, including email, social media, and digital platforms. Personalization strengthens relationships with healthcare professionals, increases engagement, and enhances brand loyalty (Wong et al, 2023). It will help in creating digital persona and match accordingly the content, creating a better application of marketing messaging. Furthermore, AI improves operational efficiency by automating routine marketing and sales tasks, such as lead scoring, follow-ups, and content distribution, allowing teams to focus on strategic activities. It can play a role in mapping a quarterly or even yearly tactical plan that looks like building a story telling or a puzzle. It also plays a vital role in compliance and risk management, monitoring marketing materials for adherence to regulatory standards and flagging potential risks, thereby reducing legal exposure and supporting ethical practices (Chalasani et al,2023).

In conclusion, AI is indispensable in pharmaceutical sales and marketing. By enabling precise targeting, personalization, operational efficiency, and regulatory compliance, AI empowers companies to optimize sales performance, strengthen stakeholder relationships, and maintain competitive advantage in an increasingly data-driven healthcare landscape. It investigates the potential applications of artificial intelligence (AI) in pharmaceutical marketing strategy, focusing on market research, competition analysis, and customer relationship management. Pharmaceutical sales and marketing teams can use AI-powered tools to collect and evaluate data from various sources and build it in a comprehensive analytical report.

Many pharmaceutical companies, such as Pfizer, GSK, Novartis, Lundbeck, Takeda, AstraZeneca, and Teva, are utilizing artificial intelligence to improve their marketing campaigns for both new and existing medications. Sales representatives who adapted their communications based on insights from artificial intelligence analytics saw a 43% increase in prescriptions, according to a report by Eularis. Dr. Merton of JLABS stated that "AI will be able to better process stakeholder aligned information to the customer, enabling more targeted dissemination of information to the customer." He added that marketing costs must soon be reduced. (Ledley et al,1959**)** by having numerous sources to generate information about consumer preferences, competitor activity, and market trends.[8] Artificial intelligence can better allocate sales representatives' areas, identify important medical community figures, estimate product demand, and optimize marketing channels. Pharmaceutical companies can use AI technology to improve marketing strategies, boost sales revenue, and improve promotional activities in response to the constantly shifting market dynamics.

Ignition's VP of Marketing & Communications, Bjarni-Kornbech, stated that the company's goal is to use AI to revolutionize pharmaceutical product marketing and sales. CRM system training is a must for the sales force. However, few companies are taking the time and care to train their salespeople in this manner. Furthermore, Bjarni Kornbech states that to offer genuine value, it is imperative to connect customer interaction data to the CRM and, ideally, to link the data from the marketing engine. The field force must then have access to all of it in one place. (Alper et al,2020).

5 Advertising and Social Networking Used for Sales and Marketing of Pharma Products through AI

Many companies that make products for clients have successfully used social media sites like YouTube, Twitter, and Facebook for viral marketing and advertising campaigns. These campaigns got their name because it's clear that spreading an ad over the networks is like how viral illnesses spread among this group of people. The pharmaceutical industry might not be using these networks to their full potential, and it can be hard to figure out

who is responsible for the content that goes through them which is of prime importance in regulatory rules in pharmaceutical business and communication.

5.1. Strategy for social media

Social media is a great way to market and sell drugs and medical equipment. A wide audience that can be reached through both paid and organic means, making them perfect for running successful advertising campaigns. As part of the social media optimization process, businesses' websites get features like areas for sharing and commenting. This kind of plan could focus on the social media channel that your potential customers use the most, or it could be expanded to include all the major channels, such as Facebook, Instagram, LinkedIn, Twitter, and LinkedIn.

5.2. Apps for mobile devices

Mobile apps are one of the most common ways for drug companies to talk to their customers. Companies can make mobile apps to keep track of how customers act, give health advice, and tell people about their products. It can be helpful for physicians to track their patients along the treatment journey in terms of treatment evolution and compliance to medicine. It is used also to make the patient play a role in the treatment channel. He can be involved in follow up of tracking measurable medical figures like BP monitoring, diabetes …etc. It can play a role in his quality of life if tracking pollution level in some areas for example so that he can adjust the anti-allergic drug dose or add to his treatment plan according to his medical surveillance plan.

5.3. Virtual reality

Businesses may give their customers a more engaging and entertaining experience by using virtual reality (VR) technology. For example, pharmaceutical companies might use VR technology to make interactive product presentations or educational materials. In that case, presence in congresses' booth will be more interactive and can create better communication.

5.4 Personalization and chatbot

Big data and artificial intelligence (AI) can be used by pharmaceutical companies to analyze enormous amounts of data and target customers with tailored advertising. By finding out what each customer prefers, businesses can tailor their messaging to be more engaging and relevant. For example, the company can deliver more appropriate information about a particular medical condition by customizing its marketing messaging based on a customer's previous searches for information on that condition. They provide individualized information and assistance to customers through artificial intelligence-powered chatbots. By answering their questions and providing information on products, dosages, and side effects, chatbots can assist customers in making more informed healthcare decisions. All the answers should be well-scribed by medical staff to preserve medical advice and respect medical confidentiality.

5.5. List building and email marketing

One of the most successful strategies now available to businesses is email marketing. Companies may be able to boost their communication with their partners (physicians, pharmacist, hospitals …etc.) with regular e-mails that will keep them UpToDate with company's releases and news. It can build a rapport and make them feel like partners in each step of communication and play a role in remembering some key activities, congresses, health news and many more. However, this step should be preceded by a consent to send and receive e- mails to hold an ethical relationship.

6 Human involvement in artificial intelligence

Human intervention in the field of artificial intelligence is required for sales and marketing to achieve the goal of marketing pharmaceutical products and devices, which calls for the execution of a precise and flexible process. It

is also important to let human involvement intervene in order to create a flexible space for targeting customers or a window to update and tailor messages based on prescription ladder.

6.1. Analysts and data scientists

Data scientists are crucial to the development and enhancement of AI models. They are in charge of gathering, getting the data ready for analysis, and processing it. They also build and train machines. They are responsible for learning algorithms to glean insightful information from pharmaceutical data (Géron,2017).

6.2. Sales teams and pharmaceutical marketers' domain

specific data and strategic insights are provided by human experts in pharmaceutical marketing and sales. To comprehend data-driven recommendations and effectively apply them in marketing campaigns and sales strategies, they collaborate with AI systems. (Swartout et al,2019)

6.3. Experts in regulation

For the pharmaceutical industry, following the law is essential. To guarantee that AI-driven marketing strategies and materials adhere to industry rules and standards, regulatory specialists collaborate closely with AI teams. (Mullins et al,2020). Since AI systems may unintentionally introduce biases, ethics and fairness experts work to ensure that AI applications in pharmaceutical marketing do not discriminate and follow ethical standards. (Mittelstadt et al ,2016)

6.4. Advisors in medicine and science

Medical professionals and scientists provide valuable insights into the scientific aspects of pharmaceutical products. They collaborate with AI teams to ensure that marketing content is accurate and consistent with current medical knowledge. (Pletcher et al ,2022)

6.5. Supervisors and those who make decisions

Pharmaceutical company managers and executives base their strategic choices on insights produced by artificial intelligence. They depend on AI to offer data-driven suggestions for market expansion, marketing budget allocation, and product development (Brynjolfsson et al ,2017)

6.6. Managers of customer relations

These employees use AI-generated consumer insights to build and maintain relationships with patients and healthcare providers. Through marketing and sales campaigns, they ensure that customer preferences and desires are satisfied (Smith et al ,2018)

7 Importance of digital transformation thought artificial intelligence

Since digital transformation alters how pharmaceutical companies interact with patients, healthcare providers, and stakeholders, artificial intelligence (AI) is crucial for pharmaceutical sales and marketing. Many aspects of the pharmaceutical industry may now use artificial intelligence (AI), which could improve decision-making, customer satisfaction, and efficiency. Here, we examine the advantages of digital transformation for AI in pharmaceutical sales and marketing.

7.1. Improved use of data

Pharmaceutical companies can now make use of the enormous amount of data that the digital world has to offer because of digital transformation. AI systems might be able to analyze this data and derive useful insights about consumer preferences, market trends, and competitor activity. This data is used by pharmaceutical sales and marketing teams to make data-driven decisions, customize marketing strategies, and plan for growth prospects. (Provost et al ,2013)

7.2. Instantaneous interaction

Real-time communication between patients and medical staff is made possible by digital transformation. Chatbots and virtual assistants with artificial intelligence (AI) capabilities can quickly respond to questions, offer pharmaceutical information, and assist medical practitioners in making decisions. This degree of concentration encourages the development of stronger bonds and trust. (Géron,2017)

7.3. Economic effectiveness

Artificial intelligence and digital transformation together have the potential to drastically lower operating expenses. By automating monotonous operations like data entry and analysis, pharmaceutical companies may be able to better utilize their resources. By accurately determining the ideal target audience and cutting down on resource waste, AI may help maximize the use of marketing funds. (Brynjolfsson et al,2017).

7.4. Adherence to regulations and compliance

Strict legal regulations apply to the pharmaceutical business. AI-driven marketing materials are now in compliance with these criteria thanks to digital transformation. By helping with the evaluation and approval of marketing materials, automated technology helps lower the risk of non-compliance. (Mittelstadt et al ,2016)

7.5. An edge over competitors

Pharmaceutical firms can gain a competitive advantage by implementing AI and digital transformation. They can keep an eye on what their rivals are doing, respond fast to market shifts, and develop new products in fields like consumer interaction and medication research. This flexibility is essential in a changing market. (Kamaleswaran, R., & Jia, Y. (2017). The foundation for successfully integrating AI into pharmaceutical sales and marketing is digital transformation. Using AI's skills in data analysis, targeted marketing, predictive analytics, and compliance can help pharmaceutical businesses become more efficient and competitive in a field that is always changing. Including artificial intelligence and digital. In addition to being a wise strategic decision, transformation is also required for the pharmaceutical industry to remain competitive and productive.

8 Conclusion

There is a lot of promise in incorporating artificial intelligence into pharmaceutical marketing and sales. AI makes it possible for better consumer engagement, data-driven decision-making, and tailored targeting. Adopting AI can improve productivity, maximize resources, and eventually lead to more successful pharmaceutical sales and marketing tactics in a rapidly shifting environment as the business develops.

References

Alper, J. and Sawyer, K. (2020) 'Leveraging Artificial Intelligence and Machine Learning to Advance Environmental Health Research and Decisions'. *Washington, DC: The National Academies Press*.

Anuyah, S., Singh, M.K. and Nyavor, H. (2024) 'Advancing clinical trial outcomes using deep learning and predictive modelling: bridging precision medicine and patient-centered care'. Available at: https://arxiv.org/abs/2412.07050.

Brynjolfsson, E. and McAfee, A. (2017) 'The business of artificial intelligence: what it can — and cannot — do for your organization'. *Harvard Business Review*.

Chalasani, S.H., Syed, J., Ramesh, M., Patil, V. and Kumar, T.M. (2023) 'Artificial intelligence in the field of pharmacy practice: a literature review'. *Exploratory Research in Clinical and Social Pharmacy*.

Dastha, J.F. (1992)' Application of artificial intelligence to pharmacy and medicine'. *Hospital*, 27, pp. 312–315, 319.

Duch, W., Swaminathan, K. and Meller, J. (2007) 'Artificial intelligence approaches for rational drug design and discovery'. *Current Pharmaceutical Design*, 13, pp. 13-20

Flaiz, W. (2025) 'AI in pharma marketing: beyond buzz words to real implementation'. *Medium*. Available at: https://medium.com/@williamflaiz/ai-in-pharma-marketing-beyond-the-buzzwords-to-real-implementation-

Géron, A. (2017) 'Hands-on machine learning with Scikit-Learn and TensorFlow: concepts, tools, and techniques to build intelligent systems'. *Sebastopol*, CA: O'Reilly Media.

Kamaleswaran, R. and Jia, Y. (2017) 'Big data analytics in medicine and healthcare', *Journal of Integrative Bioinformatics*, 14(3), p. 2017-2030.

Ledley, R.S. and Lusted, L.B. (1959) 'Reasoning foundations of medical diagnosis', *Science,* New Series, 130(3366), pp. 9–21.

Mullins, C.D., Abdulhalim, A.M. and Lavallee, D.C. (2020) 'Continuous patient engagement in comparative effectiveness research', *JAMA*, 323(5), pp. 409–410.

Mittelstadt, B.D., Allo, P., Taddeo, M., Wachter, S. and Floridi, L. (2016) 'The ethics of algorithms: mapping the debate', *Big Data & Society*, 3(2), p. 517-679.

Pletcher, M.J., Tice, J.A. and Pignone, M. (2020) 'Applying a decision-theoretical framework to guide implementation of AI in medicine', *JAMA*, 324(23), pp. 2395–2396.

Provost, F. and Fawcett, T. (2013) 'Data science for business: what you need to know about data mining and data-analytic thinking'. *Sebastopol, CA: O'Reilly Media.*

Smith, A.C. and Thomas, E.E. (2018) 'Application of artificial intelligence in clinical medicine: the promise and challenge', *Cardiovascular Research,* 114(13), pp. 1699–1707.

Swartout, J. and Sista, S. (2019) 'Artificial intelligence in pharmaceutical sales: is the sales force of the future digital?', *Harvard Business Review*.

Wong, A., Wentz, E., Palisano, N., Elsamadisi, M. and Dirani, M. (2023) 'Role of artificial intelligence in pharmacy practice: a narrative review', *Journal of the American College of Clinical Pharmacy*, 6(6), pp. 1856–1865.