

# Driven by Artificial Intelligence (AI) – Improving Operational Efficiency and Competitiveness in Business

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**Abstract** - Artificial intelligence has already become a necessary factor of advanced digitalization of companies and is one of the main prerequisites for global competitiveness and highly efficient operations. With cloud computing wider usage, decreased costs of AI technology and openAI, advanced AI technology and algorithms have become easily accessible to everyday users and even small to mid-size companies, which has widely extended its application. Based on the relevant research studies, this paper analyzes areas where AI can provide added value with its application in different industries like healthcare, retail, telecommunications, manufacturing, etc. Hence, an overview on different areas of AI implementation potential, like marketing and sales, product and service development, finance, supply chain management, customer experience, maintenance, quality control, services' and products' personalization, etc. and its benefits and challenges will be analyzed in detail. Main focus of this paper is on the organizations that have already started digitalizing their business from end to end and have exact benefits from applying AI by increasing revenues and decreasing costs.

**Keywords** - artificial intelligence, machine learning, process automation, use case

## I. INTRODUCTION

Nowadays, many companies go through intensive digital transformation to transform their businesses, improve their efficiency, automate its operations, improve customer experience, create new digital or digitally enhanced products and services and new digital business models. Artificial intelligence (AI) is one of digital technologies often seen as part of extensive digital transformations.

Artificial Intelligence refers to the simulation of human intelligence in machines and algorithms that are designed to think and act like humans. These intelligent machines and algorithms can be trained to perform tasks that would normally require human intelligence such as visual perception, speech recognition, decision-making, and language translation. AI systems use algorithms and statistical models to perform these tasks and continuously improve them through machine learning. The goal of AI is to create systems that can operate autonomously and work, reason, learn, and advance like humans.

After the initial appliance of AI that was reserved for corporations with significant investments in supercomputers and digital technologies, we are increasingly seeing applications of AI in creative domains, such as science, art and computer programming. With decreased cost of AI associated technology, like cloud computing and OpenAI, availability of massive amounts of data and ability to process the data, AI is experiencing much wider usage than before.

## II. AI BENEFITS

AI can bring many benefits to businesses. Some of the most frequently reported benefits are: increased efficiency and productivity (AI can automate repetitive and time-consuming tasks), improved decision making (AI can analyze vast amounts of data in real-time, providing insights and recommendations that can support better business decisions), enhanced customer experience (AI-powered chatbots and virtual assistants can provide 24/7 support to customers, improving their experience, understanding their needs better, and increasing brand loyalty), better target marketing (AI can analyze customer data to identify patterns and preferences, allowing businesses to deliver more personalized and effective marketing campaigns, products and services), cost savings and increased productivity (automation and increased efficiency through AI can reduce costs and increase margins), risk reduction (AI can help businesses identify potential risks, fraud and ensure compliance with regulations, helping them avoid costly fines and reputational damage), competitive advantage (AI can provide businesses with a competitive advantage by giving them access to new and innovative technologies that can help them differentiate themselves from their competitors).

According to results of McKinsey and Company Survey [1] AI initiatives influence both cost decrease and revenue increase. Cost decreases are most often reported in supply chain management (logistic-network optimization and inventory and parts optimization), service operations optimization and predictive service and interventions, strategy and corporate finance, risk management (risk modeling and analytics as well as fraud and debt analytics), and manufacturing, while the greatest revenue increase is visible in marketing and sales

(customer segmentation and customer-service analytics), product and service development (AI enhancements of products and product-feature optimization), and corporate finance. 25% of respondents claim that at least 5% of their EBIT is generated by the application of AI, 48% claim it is less than 5%.

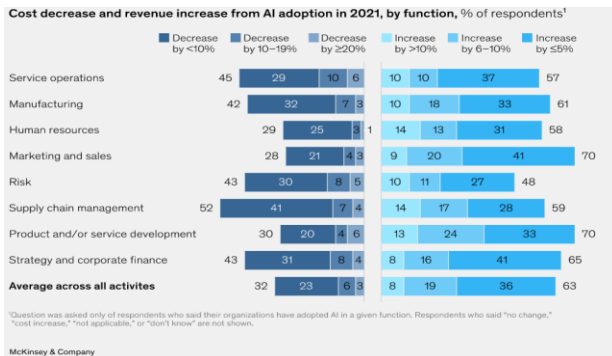


Figure 1. Cost reduction and revenue growth through AI implementation in 2021 by function [1]

CompTIA report [2] shows that adopting AI can have positive benefits for business, including (but not limited to): reduced operational time, greater business insights, reduced human errors, tasks automation, enhanced productivity, better customer service.

According to Statista [3], as of 2020, more than one third of financial services companies worldwide reported an increase in revenue of more than 20 percent because of the adoption of AI technologies. Moreover, 20 percent of the respondents reported a revenue increase between 5 and 10 percent. Many industries are reporting impact effects of AI implementation, e.g., the estimated impact attributed to AI in clinical and operational savings worldwide by the year 2022 is more than \$150 billion, according to [4].

### III. AI APPLIANCE AND USE CASES

According to McKinsey and Company [1], the most widely implemented capabilities of AI are robotic process automation, computer vision, natural-text language understanding, deep learning, recommendation systems, knowledge graphs and digital twins.

OpenAI has helped in wider popularization of AI. Some of OpenAI releases that have already experienced adoption for different purposes are Generative Pre-trained Transformer (GPT) - a neural network, or a machine learning model, created to function like a human brain, trained on input (large data sets) to produce outputs (e.g., answers to users' questions), Dall-E - a generative AI model that analyzes natural language text from human users and then generates images based on what is described in the text, PT-3 - language model that analyzes human-generated text to learn to generate similar text on its own, DALL-E - analyzes text-based descriptions of images that users want to produce and then generating those images exactly as described, ChatGPT - AI chatbot designed for generating humanlike text and producing answers to users' questions, Codex - trained on billions of

lines of code in various programming languages to help software developers simplify coding processes, Whisper - automatic speech recognition trained on a multitude of audio data in order to recognize, transcribe and translate speech in about 100 different languages, including technical language and different accents [5].

AI is not equally accepted across all industries. According to [4], industries that have embraced the most usage of AI capabilities are retail (40% considers industry to have mature AI practices), financial services (38% considers industry to have mature AI practices), telecommunications (37% considers industry to have mature AI practices), computers, electronics, and technology (35% considers industry to have mature AI practices). According to the same research, education (10%) and government (16%) were the laggards. Media (29%), healthcare and life sciences (28%,) were in the middle, as were defense (26%) and manufacturing (25%).

According to [1], most widely adopted AI use cases are in the following areas: service operations optimization, creation of new AI-based products and AI-based enhancements of existing products, customer service analytics, customer segmentation, customer acquisition and lead generation, customer service (contact center) automation, product feature optimization, risk modeling and analytics and predictive service (maintenance) and intervention, as shown in Figure 2.

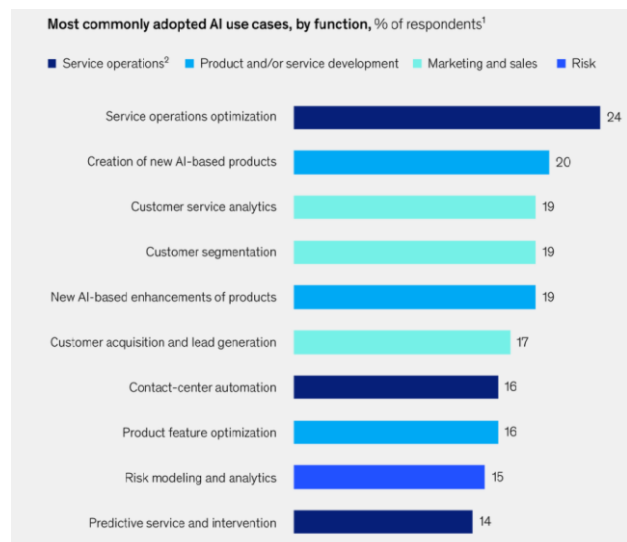


Figure 2. Most commonly adopted AI Use Cases by function [1]

#### A. Telecommunication use cases

According to [6], innovative telecom providers use AI and machine learning techniques for several use cases: to optimize network performance (network planning and optimization, predictive maintenance), improve efficiency of customer support operations, improve customer satisfaction and retention, improve efficiency of sales (personalized offers), provide personalized customer experience, streamline their business processes for higher profit, increase operational efficiency and reduce time to market.

AI-powered customer service solutions are often represented by virtual assistants or a chatbot interface, but these algorithms can also work in the background, making customer service more cost-efficient. For example, AI can support analysis of extensive background data to help customer agents in identifying the root cause of a customer's problem and find the appropriate solution more quickly.

Customer service is a critical component of the telecom industry, and the use of chatbots to increase or replace human call centers is one of the key AI applications in telecoms to date [7]. Many customer actions require specific support from customers, e.g., changing the bill plans or refunds, making payments, raising complaints, etc. Chatbots provide the customers with a single point of contact and are available 24/7, without increasing the number of agents, and can have a significant positive impact on customer experience, on the other hand. Chatbots implementation reduces costs by enhancing efficiency.

AI algorithms in customer service can act as virtual assistants or gateways between customer requests and contact center/live chat (help customers with troubleshooting, account information, or general questions about services), can route customer requests to the proper agent or route a prospect with buying intent directly to the sales agent, analyze customer support requests together with network data to find the solution to customer's problems more efficiently, etc. The assistant can either provide users with helpful tips or in the case of more complex requests, refer them to live chat or the most appropriate agent (based on agents' experience), thus offloading work from customer service and enabling agents to focus on more demanding customer complaints and requests.

One of the major sources of customer calls in telecoms, according to McKinsey and Company [8], is billing inquiries. An AI supported algorithm would consider the primary driver of the billing issue, customer's billing history, lifetime value, and propensity to call based on a bill change, and then take any number of different actions. Some customers might be satisfied with an explanation included with their bill; another might require a retroactive data package to be applied. Some customers might have a high likelihood to choose an upgrade or take some other revenue-enhancing action, in which case the preference would be for them to call customer service. Such an AI based solution would, among other activities, include clustering different customer profiles to identify their propensity to call and likely revenue and customer lifetime value impact of their call. It would need to predict the impact of each possible action on lifetime value and choose the best option. Once in place, AI solutions can be augmented with a machine-learning feedback loop to reflect the effectiveness of the actions taken, thus incrementally making solutions more precise in its decisions.

Improving efficiency of customer service operations use case is often closely connected to predictive maintenance use case. AI supported customer service can reduce number of calls by proactively troubleshooting

issues (for example, a router that is slowing down could be identified and repaired before the customer even notices; it can be reset or re-configured remotely at a time when the customer isn't actively using the device and without customer even knowing a problem might occur). If the problem would be such that requires customer intervention, the AI supported algorithm could predict the customer's propensity to call regarding potential issue before alerting the customer or prepping the necessary information to reduce the length of the eventual call. For an issue that would require on-site resolution, a technician could be dispatched before customers notice the slower network speed and call to complain.

Measures like these can help telcos drastically reduce call volumes and enable agents to spend more time on calls that require direct customer interaction or can create significant added value.

AI can help telecoms improve customer retention and receive higher profit per user by providing personalized user experience. Some of the examples of AI use cases in this area are personalizing recommendations based on a user's behavioral patterns and preferences, predicting which call & data package best suits different types of users, making relevant upsell and cross-sell offers to the right users at the right time, thus increasing the sales success rate. Analyzing social media, brand coverage, and customer sentiment to learn what drives customers to the service provider and what drives them to leave is important, according to [6]. The main goal is to prevent calls that do not add value and take those that do create it.

One of the most frequently applied AI use cases in the telecom industry is matching customers with best-suited products (data packages), which truly suits their need. Self-learning algorithms accumulate insight into which packages match different customer types (based on pattern usage, billing/payment history, price sensitivity evaluation, quality sensitivity evaluation, etc.), easing the burden on call operators and making the sales process far more efficient [6]. Using AI solutions to improve efficiency of customer support operations can significantly decrease call abandonment rate and improve customer experience.

AI-enabled networks (network optimization use case) are capable of self-analysis and self-optimization, thus having greater agility and precision. Some of the examples of AI-enabled network capabilities are: restarting cell sites or towers based on their behavior, e.g. if they're not connecting to the network, algorithms pointing out parts of networks with a large number of users who would benefit from network improvements, optimizing the behavior of the network based on weather data, daily movements and real-time usage data, enhancing network utilization and customer satisfaction through dynamic resource allocation.

AI analyses network data to optimize network performance, reduce downtime, and minimize network disruptions. Optimization network teams use neuron network to analyze drive tests and calls quality based on psychoacoustic characteristics of human ear. AI algorithms can change parameters of network 24/7 to optimize characteristics for expected capacity during big

events or coverage while load in the network is low. AI algorithms can support telecoms to plan and design their networks more efficiently, reducing costs and improving network performance by suggesting optimal infrastructure positioning, based on user behaviors or seasonal traffic specifics.

AI algorithms can be used for fraud detection use cases (in telecommunications and other industries), they can detect unusual patterns and activities that might indicate fraud, reducing the time and effort required to identify and investigate fraudulent transactions.

### *B. Healthcare use cases*

According to [9], some of the most common AI use cases in healthcare are improving medical diagnosis, speeding up drug discovery, transforming patient experience, managing healthcare data, performing robotic surgery, and detecting fraud.

One of the often-used AI capabilities is diagnostic imaging analysis. AI algorithms can assist radiologists in analyzing medical images such as X-rays, MRIs, and CT scans to detect abnormalities and make more accurate diagnoses. After receiving a medical image, the diagnostician analyzes it, reveals abnormalities or signs of the disease. To establish a diagnosis, the doctor must analyze several studies in a graphical form. AI-based systems do not only recognize medical graphics, but they also analyze medical images and report the features they find (sometimes specifics not visible to human eye). The diagnosis will be more accurate if the patient has several pictures taken at different times (then the neural network will analyze the dynamics of the disease). Deep learning-based computer-aided diagnosis system for melanoma is a good example of usage of deep learning algorithms for melanoma detection in dermoscopy images [10].

Humans vary widely at the genetic, biochemical, physiological, exposure and behavioral levels, especially with respect to disease processes and treatment responsiveness. This leads to the conclusion that there is often a need to tailor and personalize medicines to individual patients. Given how data-intensive is to reveal appropriate intervention targets and strategies for personalizing medicines, AI can play an important role in the development of personalized medicines. Personalizing a medicine to a patient requires a very deep understanding of that patient's condition, circumstances, genetics, and medical history, which requires generating, understanding, and processing massive amounts of data, such as DNA sequencing, imaging protocol, proteomics, wireless health monitoring devices inputs, etc. Essentially, the data produced needs to be organized so that analyses can be pursued to identify features that the patient possesses that may indicate the optimal intervention [11].

AI algorithms can help create personalized treatment plans for patients based on their medical history, genetic data, and other relevant factors. There are already many studies and appliances of personalized medicine. As an example, a study conducted by the Memorial Sloan Kettering Cancer Center found that AI algorithms could help identify the most effective cancer treatment options

for individual patients and create Personalized treatment plans [11].

One of the most relevant and most promising AI use cases in healthcare is early disease detection. By using the patient's family and personal history, medical background and records, clinical and other data, the AI solution can help diagnose the disease at a very early stage.

AI-controlled robotic surgeries have brought revolution in the surgical sector in the form of collaborating robots and are already widely used. The main difference may be noticed in terms of depth and cutting rate. In general, the expertise of the surgeon significantly affects the outcome of surgery, especially one involving a novel or complicated procedure. Even the most talented and most experienced surgeons operate more efficiently when AI is used to support surgeries. AI robots, due to their precision, reduce the possibility of tremors or other unintentional movements during surgery. AI-controlled robots can conduct fundamental tasks like precise cutting and sewing while functioning with more accuracy and miniaturization [12].

AI algorithms are used to predict when medical equipment will fail and schedule maintenance to prevent equipment downtime and ensure patient safety. For instance, GE Healthcare has developed a predictive maintenance solution that uses AI to reduce downtime and improve equipment performance. AI is used in drug discovery and development. analyses large amounts of genetic, biochemical, and clinical data to help identify new drug targets and optimize drug development. A study conducted by the University of Cambridge [13] found that AI algorithms could be used to predict the success of drug candidates and help prioritize drug development.

Clinical decision support AI algorithms are used to analyze patient data in real-time and provide doctors with relevant information to support clinical decision-making. IBM Watson Health has already developed such an AI supported clinical decision support system.

AI-powered chatbots can improve patient care and assist patients in scheduling appointments, answer common questions, and even triage symptoms. For example, Babylon Health has developed a chatbot that uses AI to triage symptoms and provide patients with relevant information and advice.

Healthcare claims AI algorithms are used to detect fraud, waste, and abuse to ensure the efficient use of healthcare resources. A study conducted by the National Health Care Anti-Fraud Association found that AI algorithms could be used to detect fraud in healthcare claims with an accuracy rate of over 90% [14].

### *C. Retail use cases*

According to [15], top retail use cases focus on inventory demand forecasting and management, personalization and marketing, pricing strategy, social media monitoring, sentiment analysis and call centers improvements. The retail market is embracing the use of AI due to its ability to hyper personalize and make recommendations based on product selection. AI algorithms are often used in Retail industry to increase

Net promoter score and for customers profiling. AI algorithms can analyze customer data to provide personalized recommendations, advertisements, and experiences. For example, Amazon uses AI to personalize the shopping experience for its customers through personalized product recommendations.

AI can help in predicting churn, determining floor and shelf space for new products, store layout optimization (using heatmaps), optimizing pricing, real-time inventory management (predict inventory needs in real-time and use automated system ordering before items run out to ensure that store shelves are always stocked with the products customers want), etc. AI algorithms help retailers optimize their inventory levels by predicting demand, reducing waste, and lowering costs.

Store operations and logistics are some of the largest cost drivers for retailers. For that reason, many use cases are focused on this segment, e.g., frictionless check out, picker routing, automated task dispatch and shelf checking. Retailers are leveraging AI and ML capabilities to gain efficiency and productivity for their employees by automating tasks across stores and distribution centers [16].

Many retailers are using AI for recommendations to customers based on their buying behaviors. The physically established retail stores will get users to create their accounts, just like users have their online accounts (retailers will motivate customers to participate by offering pickups, deliveries, loyalty points, discounts, etc.). This enables the storekeepers to personalize the preferences and buying patterns of each customer who walks into the store: categories of products bought, combinations bought, preferred brands, amount spent and frequency of buying. This information not only brings products recommendation but helps predicting customer's needs and anticipating their arrival to the physical or online store and particular purchase too [17].

In a similar manner retailers are using AI for customer profiling, AI can be used for product profiling too. Profiling depends on the product type, brand, cost, combinations (if exists) in which customers prefer to buy this product along with other products, the location of the product in physical store, the minimum quantity that is always available with the store, product popularity, etc. The target is that the product is sold along with other products that customers tend to buy and that the optimal quantity of product is always maintained in the stock [17].

Many operational activities in retail revolve around the pricing of the product. Different customers segments tend to behave in different manner: some will wait for the price to drop for non-urgent items, some for products to arrive in combination with another product at an optimal price, some customers are more price sensitive than others, etc. AI can be used to identify an optimal price/product combination for a set of customers which will drive better sales and profitability.

AI systems and history analyses of vending machines troubleshooting can help retailers in predictive maintenance by optimizing maintenance schedules for their equipment, reducing downtime, and saving costs.

Coca-Cola is one of the companies that uses AI for predictive maintenance on their vending machines.

Retailers can use AI to better target their marketing efforts, develop a more efficient supply chain and better calculate pricing for optimal returns.

#### *D. Other industries use cases*

AI has wide application across many industries including: predictive maintenance, quality control (AI algorithms that inspect products for defects, reduce waste and increase productivity), supply chain optimization (AI algorithms analyze data on suppliers, demand, and inventory to optimize the supply chain and reduce costs), process optimization (AI algorithms analyze data on production processes to identify bottlenecks and inefficiencies, leading to improved production times and reduced costs), energy optimization (AI algorithms analyze energy usage data to identify ways to reduce energy consumption and improve energy efficiency), product recommendation (AI algorithms analyze user behavior and preferences to recommend relevant and personalized content), image and video recognition (AI algorithms automatically recognize and categorize images and videos, such as identifying objects, scenes, locations or faces), sentiment analysis (AI algorithms analyze the sentiment expressed in text data, e.g. social media posts or news articles, to understand public opinion and mood, as well as content popularity), speech-to-text conversion (AI algorithms convert speech into text, providing automatic captioning and subtitles for audio and video content), etc.

PwC study [18] shows that AI brings the most substantial business value to the following areas: increased productivity through automation, improved decision-making, improved customer experience, innovative products and services, improved employee experience and skills acquisition and development of new, data-driven business models.

## IV. CHALLENGES OF AI IMPLEMENTATION AND ADOPTION

Not all attempts at implementation of AI were successful. According to [2], the biggest challenges in AI adoption and implementation are lack of skilled people and difficulty in hiring (19%), data quality (18%), followed by finding appropriate use cases (17%) and company cultural problems (14%).

It's no surprise that the demand for AI expertise has exceeded the supply, but it's important to realize that it's now become one of the biggest obstacles to wider adoption. The biggest skills gaps were ML modelers and data scientists (52%), understanding business use cases (49%), and data engineering (42%). Organizations are starting to realize the importance of data quality and 18% consider this to be one of the major challenges to implementing AI.

According to a survey of global organizations [19] that are already using AI, a quarter of surveyed companies reported up to 50% failure rate of their AI projects. Most AI used by businesses today has been trained to maximize model accuracy (the percentage of "correct" answers),

which for many real-world business cases won't bring best business results (AI that provides only five good sales recommendations is of little value to a sales rep who needs to close 100 deals per month). AI will rarely be able to recognize business cost-benefit trade-offs (due to financial/business benefits, you might be willing to pursue one deal and lose other 99 deals; an AI that would see this as only 1 win in 100 would be very inaccurate). AI/ML accuracy is fully dependent on data sets and cases that have been used to train it, which often turns out to be one of the major reasons for AI failures. For example, Amazon had been building ML programs since 2014 to review job applicants' resumes, which turned out not to be gender neutral. Based on 10-years history of resumes and employment, ML algorithms started preferring male candidates over female ones.

Some of the obstacles to implementing AI are lack of skilled individuals and hiring shortages, unclear ROI metrics, complexity of AI systems, lack of governance, fear of job replacement. The biggest risks associated to AI adoption and digital trust, according to [1] seem to be cybersecurity, regulatory compliance, personal/individual privacy, ability to explain how AI models come to their decisions, organizational reputation, equity and fairness, workforce/labor displacement, physical safety, national security, political stability. Many are concerned with AI ethical principles, particularly in AI applications like legal advice, medical diagnosis, autonomous vehicles, etc.

## V. CONCLUSION

Based on the current results of AI implementation in business, it can be concluded that organizations that have the capacity to implement AI in their business processes, either in development segments or with optimization intentions, frequently experience significant cost savings and revenue increase, but also can use AI as differentiator toward their competitors.

The role of AI in business optimization is very promising. AI has the potential to revolutionize the way businesses operate, it provides increased operational efficiency, improved decision-making, enhanced customer experience and loyalty, enhanced and new (AI-based) products and services. AI algorithms are becoming more capable of analyzing vast amounts of data to make predictions about future trends, expectations, and behaviors, helping business to make better decisions and respond more quickly to changes on the market.

AI is expected to play an increasingly significant role in shaping our future and will impact numerous industries, beyond those significantly impacted already today (retail, financial services, technology, telecommunications, healthcare, manufacturing, media). However, it's essential to ensure that the development and deployment of AI systems are guided by ethical principles and consideration for their impact on society as main priority.

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