



## The Impact of Artificial Intelligence on Innovation- An Exploratory Analysis

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**Abstract**—Artificial Intelligence (AI) transforms businesses and organizes innovation activities. AI could compel companies to restructure the whole innovation process in response to rapid technological advancement and the rearrangement of human resources. Society at large sees artificial intelligence (AI) as a representation of unlimited possibilities [1]. AI will contribute to fresh, more efficient market models and efficient, public sector and user-centered services. The objective of this research was to explore the impacts of AI in innovation and its outlook in the U.S and the economy. According to a worldwide survey of 203 managers, health and life sciences, manufacturing, retailers, and financial institutions are involved in testing water, especially in The United States. Among these entities, about one-third of businesses are exploring AI technology and its implementations, while another third is experimenting and a tenth of them are using AI in small fields. They are now in the exploratory stage. AI has also been deployed extensively by a handful of the companies (2.5%) [1]. This paper will illustrate how AI can fix problems and what it is necessary to consider when transforming innovation into a global economy. Finally, the paper will explore insights into the potential of AI in the U.S.

**Keywords:** Artificial intelligence, Innovation, Automation, Machine learning, Robotics

### I. INTRODUCTION

Artificial intelligence (AI) refers to a specific collection of computational techniques that make systems capable of carrying out various tasks that were previously thought only possible for human intelligence, such as language translation, recognizing visual information, speech recognition, and decision making [2]. Machine learning and deep learning are types of artificial intelligence that assist computers to learn and develop through sophisticated data processing. Machine learning, deep learning, and other similar techniques and technology will be referred to as "artificial intelligence," or AI, in this paper for easy analysis [2]. Although a lot of business leaders believe that artificial intelligence will impacts their

organizations, few think it will be dramatic. Almost 40% of those surveyed expect that artificial intelligence will put them out of work in their business over the next five years. Within the same period, the roles they perceive they will play are also being slightly modified by AI. However, they see this as augmentation rather than marginalization.

The majority agree that AI would boost their efficiency while making their jobs easier. They conclude it would have the same effect on the organizations they oversee. A lot of companies want to be able to use AI and machine learning to improve their operations, but finding effective ways to implement such tools is an important task for everyone working in innovation management [2,3]. On the other hand, it helps companies to cope with the increasing competitiveness in their environments and increases the depth of information they must handle. Promoting the innovation process with AI may bring tangible benefit to companies by decreasing both the uncertainty and the cost of innovation. Currently, human-organized innovation management plays a vital position in organizations and their potential to transform themselves through unexplored ventures [3]. Even so, AI has the potential to support various operations in ways that humans cannot.

Meanwhile, robot vacuums handle the complex terrain of home furnishings in and around the living spaces. Automobiles are becoming increasingly intelligent on the highways, allowing them to map and understand their surroundings as well as to drive independently. Machine forecasts are constantly being used to boost decision-making around the economy, including in business, transportation logistics, medical care, and financial management. The vast array of new AI-based goods and services shows that AI can radically alter people's perceptions of the environment and how they live their everyday lives. This is the root of modern advancement, and it is only by innovation that these improvements can be realized. It can transform the world in the same way as the steam engine and electricity did centuries before [3]. Gauging the future effect of AI is the hard part. One way to measure the advancement of AI technology is to look at and

evaluate its dissemination and applicability by patents. The use of AI technology patents provides a good advanced indication of technological diffusion, particularly across sectors, but also of the breadth of inventors and inventing firms and geographic dispersion. This study aims to understand the changes in artificial intelligence and how it contributes to innovation. The report would also analyze its economic consequences and potential opportunities in the United States.

## II. RESEARCH PROBLEM

The main problem that this paper looks at solving is how artificial intelligence can be used to change how innovative ideas are developed going forward. This paper will address how artificial intelligence has brought various innovative initiatives and how the future will look going forward as the advancement of technology continues to evolve. There is a wide gap between the understanding and adoption of AI in most companies and the need to incorporate the technology to support innovation and sustain a competitive advantage. Many companies lack the technical know-how on how AI can best suit the operations in their work environment. They don't have an idea of how the AI will be integrated or which tools will be relevant to their daily operations. A better understanding of what AI can offer will create motivation and attraction to better AI tools that will be user-friendly and effective for daily organizational operations. According to new research conducted by the Boston Consulting Group and the MIT Sloan Management Review, most organizations already have a significant gap in their comprehension and implementation of artificial intelligence (AI) [4]. The global survey of more than 3,000 companies and industry experts shows that almost 85% of managers agree that AI would enable their firms to maximize or maintain a competitive edge [4]. Even so, only about one out of five businesses have integrated AI in certain systems or processes.

The latest study identifies core traits of AI leaders and provides organizations with a point of departure for the development of an AI strategy.

The study states that Artificial Intelligence (AI) ambitions are high, but concerns arise as to what organizations do to fulfill such aspirations. For most businesses, the gaps between optimism and implementation are wide. Three-quarters of managers agree that AI would allow their businesses to transition into emerging markets [5]. Nearly 85 percent agree that AI will achieve or maintain a competitive edge for their firms. AI will have major impacts on innovation especially in management and organizational processes. Though various models for the organization of AI already exist, organizational stability is a core element of them all. The cultural transition needed to introduce AI for big corporations might be overwhelming but needed as the technology and competition increase [6].

## III. LITERATURE REVIEW

### A. Understanding of Artificial Intelligence

AI is a method that can determine what the correct value is depending on the datasets it is presented. It will therefore neither eliminate the roles of human beings in any effort nor is an end-in-itself; instead, it is a tool. There is a stark difference between the number of companies that have been to operate on AI, which is rapidly increasing, and the number of AI companies in manufacturing, which is far smaller [6]. Where AI has been applied by businesses, it has generated significant economic gains in terms of sales and

employment. There are examples. Starbucks, for example, is regarded as an AI pioneer, citing 15-17 percent growth in the last two years despite just 8% store development [7]. This rise has expected resulted in Starbucks becoming the major contributor to employment in the fast-food sector in 2016, with more than 60,000 expected to generate 240,000 jobs by 2021 [8].

There is often an incomprehension of the styles of employment most likely to be substituted by AI. Most people think of AI as a way to substitute low-skill industrial jobs, but the technology is better tailored to filling roles that need a narrow range of skills [8]. Accountants, radiologists, bankers, attorneys, and other practitioners in higher pay levels would have unique sub-tasks transferred to AI. For example, Goldman Sachs hired 600 equity traders in 2000. Currently, two staff are assisted by 200 programming engineers. In this context, it is also necessary to point out the distinction between robot automation and AI and also to note that robotics development does not evolve at the same pace as AI.

There is a question as to whether AI will maintain the acceleration with which it is growing. Some people speculate that its trajectory is expected to peak and fall. Cooling methods, for instance, have not advanced at the same rate as computation power, potentially limiting further computational power developments [9]. There's still a disconnect between the present degree of AI capability and the level of AI that's currently being utilized. Since it is such a strong weapon, global leaders must work out how to leverage the positive outcomes while minimizing the negative aspects. Artificial intelligence and robotics are becoming important in a period of growing digitalization for innovation; several human activities can now be changed, accelerated, or, with the usage of AI, also partly automatized by robots [9]. Top management and professionals anticipate automated innovation to improve enormously in the next 10-15 years and that any map of innovation leaders, IT specialists, and management must take the subject on board as a promising new field.

The research demonstrates that AI provides the potential of streamlining and efficiency-enriching such innovative activities in the innovation process. New algorithms and ever-growing data volumes enable improved research, more precise forecasting, and less risky decision-making [10]. AI will boost innovation management dramatically and enhance or even merge human innovation groups with computers and robotics [10, 11]. AI is rapidly involved in innovation and demonstrates immense promise, but still meets a low degree of expertise and skill. The realistic usage of AI for analytical engineering activities is apparent for everyone, the capacity for more innovative tasks is reserved for businesses with AI expertise. AI has the advantage mostly of increasing productivity and decreasing the growth of new market areas or creating new technologies, in particular for businesses already unaware of AI [11]. AI can just help people in the foreseeable future but does not decide things.

### B. Impact of Artificial Intelligence on Innovation

AI is a very rapidly emerging application used in many industries. A wide variety of creative solutions is currently being produced, with several already on the market. AI is essentially a support technology, with the ability to simplify a broad variety of learning and problem-solving activities [12]. Consequently, as AI is introduced to the innovation setting, it can change the way innovation decisions are being made, particularly concerning how new ideas (whether a service, a good or a process) are developed and validated. Design is the term used by academics to describe the decision-making process at the center of innovation. In reality, the design is essential to "model actions to transform current conditions into desired ones. To study how AI impacts innovation systems, it is necessary to explore how it influences design.

Even so, specific business models of AI are less straightforward and keep evolving. Companies face several obstacles from legislation to the selection of human capital and collection of data. Innovation processes evolve even quickly as the economy begins to shift, utilizing sensors, automated networks, and algorithms [12]. Regardless of whether the product comprises solely of apps such as an iPhone app or a more conventional hardware-centered system such as a Tesla car, modern products are constantly connected to their company, offering constant data flows documenting multiple facets of user experience. Furthermore, the software embedded in the goods allows knowledge to move the other direction, from the company to the customer, making for a personalized approach for each client while continually enhancing the experience in real-time [13]. These two-way connections describe a growing variety of products and services, from streaming services for Netflix to Tesla Model 3. These creative ideas change as users encounter them in real-time.

### C. Innovative practices and artificial intelligence

To date, emerging innovations have largely been applied to companies, minimizing costs, times, and the distribution of goods and services. However, the design of these goods and facilities has remained mostly human-intensive. AI radically shifts this scenario: from production to design it pushes digital automation upstream. It's worth remembering that automation could easily be used to speed up conventional design tasks. Airbnb, for example, is working on an AI framework that will recognize hand-drawn drawings of consumer experiences on a drawing board and convert them into prerequisites for software engineers [13]. If this is the only use of AI, the core of product practice would be unaffected: innovators would continue to do as they have been doing in the past (drawing elements of the user interface and translating them into specifications), albeit at a quicker pace. But Netflix and Airbnb go even farther. They integrate automation into problem-solving by defining precise design decisions such as which layout to display to a single customer, which contents to

produce, and how to place a product in comparison to competitors [14]. Designers and developers are not making these choices quicker in this modern setting. They don't just make them, because they are assigned to AI.

Netflix has altered the television world by leveraging the influence of big data and artificial intelligence. Netflix's main data and operational model are AI-centric. It operates on software architecture that collects data and trains and implements algorithms that govern nearly every part of the enterprise, from customizing the user interface to choosing popular movie ideas for potential productions [14]. Netflix has been using AI to power its recommendation engine since at least 2010. In 2014, Netflix extended its strategy to thoroughly invest in consumer comprehension and to build an individual streaming experience for each user. The displays a person uses today are "in real-time" programmed by a computer. Many constraints and criteria are defined at the start of the process by human designers. However, the choices on which movies to screen, how to show them, what images to show them, and several other architecture decisions are focused on algorithms implemented in the AI problem-solving loops as shown below [14].

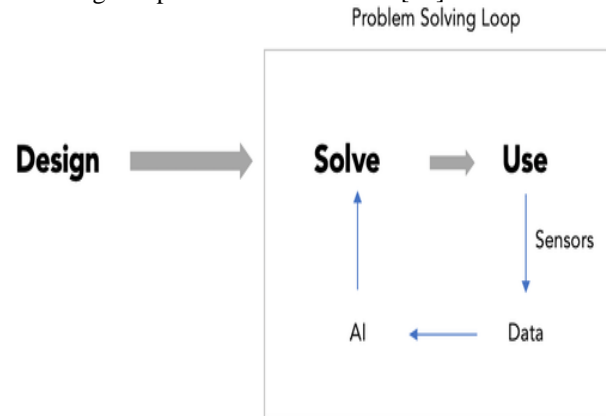


Fig i: Artificial intelligence problem-solving loop

Many AI programs aim to solve simple problems to form a design experience by forecasting results. The forecast is an algorithm – a series of rules a computer follows to solve a specific problem. AI will have several algorithms. Some have incorporated updating and making improvements, typically focused on "Markov decision-making," which aims to model a sequence of actions that are formed by a policy and followed by an award. An example is the Netflix algorithms that change their user interface automatically, depending on the real usage patterns, as shown by their clicks (when the policy determines what is shown, the click is "the reward") [14].

Although the number of implementations has increased dramatically in the last decade, the fundamentals of algorithm design have been there for a long time [15]. Classic statistical models such as linear regression, clustering, and Markov chains have been conceptualized and mathematically developed for more than a century. The neural networks of today were first established in the 1960s and only now are they being used on a scale for production-ready results [16]. AI's ultimate purpose is to make machines smarter for human understanding, decision-

making, and execution of operations. In this context, AI systems don't often have to surpass people. In that context, AI systems need not necessarily replace human roles. In several recent applications, AI systems are designed to achieve automatic awareness, decision-making, and behavior with fewer than human degrees of precision. The AI framework will add round-the-clock output in several useful application situations, or simply an ability to manage huge volumes of data. Good examples include image identification and classification programs which might not necessarily be 100% accurate but which also help to pre-sort human assessment scenarios [16]. Other AI applications can target enhanced efficiency, e.g. in AI-based medical image recognition or high-precision robotics systems. These instances point to overall value ideas of AI technologies concerning future advancement, involving the ability of AI-based innovation varying from efficiency and consistency gains, to fundamentally different functionality that might not be possible without AI technology, e.g. when learning from historical data when there is no clear alternative human knowledge.

Apart from these qualitative advancement goals, the usage of AI promises to provide technological innovations in fields not historically addressed by computer programs. AI learning systems trained on vast volumes of data may be used for automatic video recognition [17]. This would enable previously inaccessible security solutions that can increase efficiency and lower costs. Thus, this demonstrates that AI-based progress is both gradual and also allowing technology when there was historically no automated device with satisfactory results.

#### IV. FUTURE OF AI IMPACTS ON INNOVATION IN THE U.S

AI is the future of growth for many companies in the United States. AI will directly increase the quality of government processes and programs, including greater access to public services for low-income and disadvantaged communities, when used in conjunction with IT modernization. AI will also save money by increasing the effectiveness and quality of government-funded services, such as lowering the incidence of patient re-hospitalization and related Medicare costs [17]. The year 2020 is one that most people would want to forget. On a vast global scale, the pandemic posed fiscal, logistical, and technical problems, forcing companies to scramble for strategies to adapt. AI can be incorporated into almost all aspects of life, creating new efficiencies and improving human capacity. Many of the top experts lauded the benefits, which they anticipate to develop as AI technologies adapt to do more stuff for more people.

In the future, Hedge funds will continue to use AI to dominate the financial markets, Google will seek to expand the use of the technology to diagnose various diseases like heart failure in a more efficient, accurate, and reliable, while American Express will use AI bots to better serve its online shoppers. Most of these applications are now outpacing the humans who created them, and experts no longer talk of only one AI, but hundreds, each specialized in a unique role [17]. When automated robots taking on roles previously performed solely by people, existing legislation may need to be reviewed. In such instances, additional law is needed. For instance, even though artificial intelligence (AI) may be extremely useful in helping medical diagnosis, doctors are hesitant to use it for fear of being accused of malpractice. This ambiguity could stifle adoption and progress in the future. Artificial intelligence (AI) may be a part of the answer, allowing for adaptive, self-improving regulation that fills the gap

between technical development and regulatory intervention [17]. Many analysts are afraid that artificial intelligence (AI) would reduce jobs, exacerbate inequalities, and reduce wages. This is why demonstrations against the implementation of a universal basic income have been more common across the world. These concerns are legitimate, and policymakers must acknowledge them.

#### V. BENEFITS TO THE US THE ECONOMY

Long-term increases in economic growth can boost taxes, but declines in salaries or jobs can lower payroll and income tax income. Federal R&D expenditures would remain vital to the United States' leadership in AI technology. Artificial intelligence (AI) can double the annual rate of economic growth by 2035, as per Accenture's Technology Vision 2017 [18]. AI has the potential to become a new engine of production, rather than just another variable of total factor efficiency. According to McKinsey, AI could produce an additional economic production of about US\$13 trillion by 2030, raising global GDP by 1.2 percent per year. Automation's labor replacement and increased product and service creativity would be the key sources of this development.

U.S businesses will turn to strategic moves and automation to stay agile in the face of market transitions to have a better return on investment. Businesses are already betting on the future, expecting a boom of economic growth in the second half of 2021 when more people across the country are vaccinated and the world will move to a more "normal" state of affairs.

Inside E-Commerce, there would be Hyper-Personalization. The broad use of AI by e-commerce businesses would be ushered in by "algorithmic e-commerce," or the smart, systematic automation of business functions that were previously performed manually. U.S businesses will turn to strategic moves and automation to stay agile in the face of market transitions to have a better return on investment. Businesses are already betting on the future, expecting a boom of economic growth in the second half of 2021.

Inside E-Commerce, there would be Hyper-Personalization. The broad use of AI by e-commerce businesses would be ushered in by "algorithmic e-commerce," or the smart, systematic automation of business functions that were previously performed manually. Online companies like Amazon, will get over more visitors from all over the world, and owing to an immense number of requests, it briefly restricted shipping to only essential items [18]. In 2021, consumers can expect much more tailored services, culminating in hyper-personalization and increased consumer service in the e-commerce industry [18].

Most significantly, the federal government will need to engage in measures that fix income disparities caused by AI, as well as job displacement and transition needs. Our workforce would need to be skilled and updated with innovative methods and government funding for training, schooling, training, and certification partnerships – particularly for midcareer employees who will also need to support themselves and their families in acquiring new skills. Strengthening social insurance services as well as access to quality health coverage, child care, and housing would be needed to support employees through these transformative times [18].

## VI. CONCLUSION

This paper aimed at understanding how artificial intelligence would help with innovation management. AI is becoming increasingly important to U.S. innovation, as shown by the scale and spread of AI through innovations. If AI proves to be as transformative as electricity was, it will rely, in part, on innovators and technological advances in applying AI ideas and innovations. Based on the findings of this research, there is a reason to believe that AI has significant capability to transform innovation. Overall, AI has a positive role to play in situations when the tried-and-true advantages of innovation management tools are overshadowed, are difficult to do due to digitization, or where AI appears as the preferred option. The fact that AI is the preferred option for developing a more comprehensive solution by incorporating AI into organizations that are seeking innovation is one of the findings of this study. This study adds to the body of knowledge in the field of process innovation by emphasizing the use of artificial intelligence (AI) algorithms in the future of organizational innovation. AI technologies are now being used to successfully incorporate innovation – that is, in situations where the implementation of innovative ideas is hindered largely by data processing constraints. Anomaly detection-based AI solutions, for example, can be useful when companies are dealing with information management limitations and looking for new opportunities. Finally, the paper discusses recent advances in AI algorithms, which show that AI can overcome some of the most challenging problems of innovation management. The proliferation of tech, automated networks, and artificial intelligence (AI) is accelerating the widespread economic transition. Artificial intelligence (AI) automates decision-making and understanding, which are at the heart of innovation. The possible effect on innovation performance, as described in this paper, is significant. AI will have greater results when it comes to consumer centricity, ingenuity, and pace of innovation by eliminating the usual limitations (in scope, scale, and learning) of human-intensive architectural design. However, to capture this opportunity, administrators must radically reinvent how their company innovates. Design methodology in the AI era is entirely different from the human-intensive engineering methods that many companies have in place today.

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