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A Literature Review on AI and Its Economic Value to Businesses

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ABSTRACT

The vast array of technologies that make up artificial intelligence (AI) holds great potential for several benefits that enterprises may reap in terms of increased value for their businesses. In response to the data flood and the dramatic rise in computing power, more and more companies are looking to artificial intelligence (AI) to help them achieve a competitive edge. The adoption and utilization of AI in business processes remains a challenge for many firms. A comprehensive knowledge is necessary since there is currently no consensus on how AI technologies generate value for businesses or what kind of value can be anticipated from them. The purpose of this study is to offer a comprehensive literature analysis on the topic of artificial intelligence (AI) and its potential applications in business operations, with the goal of shedding light on the ways in which these technologies might generate value. In this review of the literature, we identify three main points: (1) the factors that promote or discourage AI acceptance and use; (2) the many types of AI implementations in business settings; and (3) the immediate and long-term consequences of AI. Finally, the report lays forth a research plan for future studies by pointing out where the current literature is lacking and what needs to be investigated further.

Introduction

Although AI has been around for a while, it has just recently come to the forefront of people's minds. Many people believe that artificial intelligence will cause major changes in many different industries throughout the world. Businesses that use AI applications could see improvements in areas like revenue, cost reduction, and efficiency, among others. More than 80% of firms regard AI as a strategic asset, according to a recent research published in the MIT Sloan Management Review potential, and over eighty-five percent saw AI as a means to gain a competitive edge. Consequently, many companies are investing in AI technology to gain a competitive edge. Nevertheless, several businesses still face challenges in achieving AI's potential. Despite firms devoting time, energy, and resources to adopting AI, the anticipated advantages could not materialize [1–5]. There will be additional difficulties and hurdles to overcome as a result of implementing AI into business processes. The development of accurate and relevant models requires bridging domain knowledge, discovering, integrating, and purifying varied data sources, and integrating AI applications with current processes and systems. In order to reap the benefits of AI, businesses must first comprehend both the obstacles they will face and the ways in which these technologies might improve their operations. However, the organizational challenges linked with AI deployment have received less attention in contemporary AI research than the technological understanding of AI adoption. We still don't have a complete picture of how AI is utilized and embraced in businesses, or what the primary mechanisms are for creating value, even though several studies have pointed up research gaps and examined critical components of AI technology leveraging [6–18]. To fill this void, we have compiled the existing literature and come up with a plan to further our understanding in this study. The result is a narrative

review that summarizes the current literature and provides a thorough report to direct future research based on our systematic literature collection. The goal of this study is to find out how businesses can use AI and what kinds of value creation AI may make possible. Gathering research on AI acceptance and application in organizations from 2010 onwards [19-33] is the first stage of our investigation. A framework for determining the value of AI for businesses is developed after reviewing and evaluating the papers for relevance and quality. A research agenda is generated from the synthesis, which identifies topics that require further investigation in the future.

Methods of Research

Following the standard procedure for a systematic literature review, the review was carried out in six separate steps to guarantee that all pertinent material up to this point was incorporated into our analysis. The development of the review methodology, which detailed the selection and organization of keywords and phrases, came first. To further narrow the articles that met our criteria for inclusion and exclusion, we secondly established what kinds of publications were relevant to our review. Finally, the third step was to do the paper search using the pre-defined phrases that were combinations of the keywords. Data extraction and synthesis followed a rigorous evaluation of the search results articles. In subsections [34–56], the aforementioned steps (Fig. 1) are further upon.

Development of Protocols

Creating a review procedure in accordance with the guidelines laid forth in the Cochrane Handbook of Systematic Reviews of Interventions was the first step in conducting the systematic literature review. The protocol outlined the primary research topics, search technique, inclusion/exclusion criteria, and quality standards. Also laid down in the protocol was the procedure for synthesis. The review was driven by research questions that sought to answer the following: What factors facilitate or impede the organization's deployment of AI? In what ways does AI find application in the business world? How does AI contribute to society? The next procedures, including selecting appropriate keyword sets and data sources, were based on these study topics.

Requirements for Participation and Rejection

The parameters of the systematic literature review were defined using a variety of inclusion and exclusion criteria. We included studies that looked at the adoption and usage of AI in an organizational setting or how AI may deliver value to businesses. Therefore, the articles that were chosen did not cover research that were limited to AI's technical elements, such as its infrastructure or the comparison of different models. Since most organizational deployments of AI using unique approaches have occurred in the previous decade, only articles from 2010 and after were chosen. This review did not include any studies that were not written in English. Journal papers and proceedings from conferences were also included of the comprehensive literature evaluation. Publications that were not subject to peer review, such as reports, websites, book series, and dissertations, were also not included.

Information Gathering and Methodology

The search technique began with the formation of search strings. An artificial intelligence (AI) and related technology-focused collection of keywords was compiled, while an organizational viewpoint set of keywords was compiled separately. For the purpose of reducing the amount of search strings, wildcard symbols were used to mix the keywords from the two groups into the search string. After that, the search terms were run through Google Scholar and a number of other online databases, including Scopus, BSC, Emerald, Springer, Web of Knowledge, ABI/inform Complete, IEEE Xplore, and the AIS library. We did this to make sure that every article that was relevant had been indexed. On September 14, 2020, the collecting procedure started and ended on September 30, 2020. Using the same sets of keywords, we conducted a further search in the AIS basket of eight journals to further confirm that the most significant articles had been selected.

Evaluating Quality

After the eligibility check was complete, two of the co-authors independently reviewed the articles and graded them using a variety of criteria. Research was evaluated for its validity, reliability, and practical applicability. Scientific rigor, in the sense that it employs suitable research methods. What makes research credible is how convincing it is and how well it presents its findings. The findings should be relevant to the academic community and organizations involved in AI research; this is what we mean when we talk about relevance. The articles that make it past this stage are carefully selected based on a set of quality criteria that guarantee they will contribute significantly to the review. As a result of this step, 43 publications remained for synthesis and data extraction.

Findings Synthesis and Data Extraction

The research were categorized and their findings were synthesized using a concept matrix. The papers were reviewed and data from the research were organized in a spreadsheet. This kind of study organization facilitates cross-study comparisons and the development of more generalized interpretations of the results [57–75]. Focus topics for the studies were AI adoption and usage in an organizational environment, organizational change caused by AI adoption, and organizational performance consequences of AI. Everything from the paper's research process to its crucial definitions, degree of analysis, essential findings, theories employed, investigational setting, and other relevant themes were documented. After two of the writers extracted data from the created matrix, the remaining authors iterated until they arrived at a reached a consensus over the context that is encompassed by each category and regarding the addition of extra dimensions to gather all pertinent data. Prior to synthesising the results, all 43 remaining publications were read and included in the idea matrix [76-89].

Recent advances in computer technology, internet speeds, the quantity of available data, and processing algorithms have led to a great deal of interest in artificial intelligence (AI), but there is still a lot of confusion around the concept and what it involves. A wide range of technologies and applications are encompassed by the term "artificial intelligence," which is really the umbrella term for a number of distinct sub-disciplines that focus on AI research. Thus, it is crucial to differentiate between these fundamental ideas and offer thorough explanations. The three main areas of attention here are artificial intelligence (AI) as a

scientific field, AI technology, and AI capabilities. There is a clear delineation between the field and its aim, the methods and technologies employed to achieve that aim, and the organizational capability to employ a wide suite of AI-supporting tools and technologies at each of these three levels. We give a synthesis of the existing body of information and present the terminology utilized in previous research in the sections below.

AI

There have been several attempts to define AI in a way that sets it apart from more traditional forms of information technology (Table 1). One must first grasp the meanings of "artificial" and "intelligence" independently in order to grasp the idea of AI. The term "intelligence" may be defined as the capacity to learn, reason, and comprehend. The term "artificial" is used to describe something that is created by humans instead of happening naturally [107–118]. When these two concepts are combined, the term Artificial Intelligence may be defined as the process of creating machines that can mimic intelligence.

Based on the criteria in Table 1, it's clear that most people agree that AI means providing computers human-like skills, so they can do things that ordinarily need human intellect. Reasoning, comprehension, and problem-solving are all part of this category.

Artificial intelligence (AI) imitates human performance by taking on the role of an intelligent agent that acts in response to environmental inputs based on a predetermined interpretation of those inputs [90-106]. Basically, artificial intelligence is all about trying to mimic human learning and processing abilities so that it can mimic human cognition. Many people use the phrase "cognitive technology" to describe this capacity. Cognitive technologies enable computers to mimic human thought and behavior by simulating mental processes.

Some academics center their concept on the premise that AI should be able to execute intelligent tasks without explicit programming. Autonomy in AI means it can detect, understand, interpret, learn, plan, comprehend, and act independently. This means it can accurately interpret data from the outside world, apply what it has learned to accomplish specific goals and tasks through flexible adaptation, and do all this without constantly being told what to do.

Additionally, two primary definitions of AI may be identified. The first of them is that artificial intelligence is a technology that can accomplish a certain activity that a human being would find extremely difficult or monotonous to do by hand. The second set of definitions considers AI to be a system that can learn, understand, and make conclusions much like a human being. There are some commonalities between the two types of definitions, but there are also some key distinctions. Both groups share the idea that artificial intelligence (AI) won't ever fully supplant humans, but rather will complement us in carrying out arduous and labor-intensive jobs [119-124]. However, there are several key differences between the two types of definitions.

One school of thought holds that AI can perfectly mimic human behavior, while the other sees AI more as a tool and rejects the idea that it can replicate human intelligence to any degree. Another key distinction is that AI is defined differently depending on whether it is

seen as an applied capability of a system or machine or as a field of scientific study. From these definitions, we can see that there are significant disagreements over the scope and nature of artificial intelligence, as well as clear assumptions underpinning them. This article takes the position that artificial intelligence (AI) is an applied field that seeks to empower computers to recognize, understand, draw conclusions, and acquire new knowledge from data in order to accomplish predefined societal and corporate objectives.

Machine Learning

Starting with a high-level overview of what artificial intelligence (AI) is, subsequent definitions aim to encapsulate the methods used to achieve the goals outlined in the earlier definitions. Our review of the relevant literature reveals that there are several approaches to this problem, with the majority of research concentrating on applications of machine learning and deep learning. many forms of artificial intelligence (AI) have been characterized in many ways throughout the literature; this section summarizes such definitions, draws attention to crucial features, and outlines the fundamental distinctions between them according to their potential uses.

Deep Learning and Machine Learning

In recent years, machine learning—a branch of artificial intelligence—has become one of the most popular approaches. Thanks to improvements in computing power and an explosion in the amount of available data, machine learning has become increasingly popular in recent years. Table 2 displays some of the machine learning definitions found in our literature review. There are plenty more. Machine learning aims to teach computers to learn from data in order to help in decision-making via inference, prediction, and association discovery. Machine learning methods do this by analyzing data, gaining knowledge from it, and then using that knowledge to make judgments. Decision rules are identified utilizing statistical approaches based on the obtained data in this inductive manner.

Additional subcategories of machine learning algorithms include supervised, semi-supervised, unsupervised, and reinforcement learning. With supervised learning, the goal value is already part of the training set. Next, it uses the labelled data to deduce its own rules after recognizing patterns in the training data. But with unsupervised learning methods, the goal value isn't part of the data set that is trained. The machine can't figure out how to fix the issue without first studying the training data's structure and statistical features. Anomaly detection, association mining, automated grouping, and other similar applications are prime examples of unsupervised learning's ability to unearth latent patterns in data sets. The utilization of both labelled and unlabeled data is key to semi-supervised learning. On the other hand, reinforcement learning isn't based on historical data. On the contrary, it facilitates learning by means of input derived from contacts with the outside world. The basic premise is that a human agent sets an aim for the system to achieve, and the system's performance in determining the optimal strategy or set of actions to achieve the objective determines the incentives it receives.

Machine learning has two levels: deep and shallow. Both deep learning and shallow learning fall into each of the four training types. Traditional designs for learning from data specified

by pre-defined characteristics are known as shallow-structured learning architectures. When compared to this, deep machine learning—sometimes just called deep learning—is able to extract structure from data using several layers. The utilization of an artificial neural network design distinguishes deep learning from more conventional machine learning. Neural network solutions mimic the functioning of the human brain. Building multi-hidden-layer deep neural networks is the foundation of deep learning. The layer next to the input vectors learns basic characteristics, while the layers above it learn more complex ones. As a representation of the world, it uses a concept hierarchy, wherein more straightforward ideas may be subdivided from more generalized ones. With its wide range of applications and impressive track record of accurate outcomes across industries, deep learning has recently attracted a lot of interest.

Applications of AI

The preceding explanations have focused on the larger question of what artificial intelligence (AI) seeks to accomplish and the ways and technologies employed to accomplish these goals, but the idea of an AI

Capability is centered on the organization's ability to implement these applications to bolster operations. A rising amount of research is exploring how AI and related technologies and methodologies might be leveraged to achieve organizational goals, which is understandable given the growing importance of AI as an asset for companies. We now have the concept of an AI capacity to shed light on how this value is created and how businesses should best structure themselves to reap the benefits of AI investments.

Table 4 shows that there is a growing corpus of research that builds on the idea of analyzing AI from the perspective of an organizational capacity, even if there are still very few studies that do so. While there are some subtle differences, all of the definitions cover the ground that a business should cover when it comes to AI expenditures, with some also incorporating the intended results of introducing an AI capacity. For example, in the second group, you'll find the following definition: "the ability of organizations to use data, methods, processes and people in a way that creates new possibilities for automation, decision making, collaboration, etc. that would not be possible by conventional means." This is the definition that Schmidt et al. use to describe AI capabilities. All the information, procedures, and individuals needed to coordinate and make use of AI are encompassed in this concept. The complementary resources needed to fully take use of AI technology have also been defined in various ways. All of the definitions agree on one thing: an AI capability is all about how a company makes use of its AI-specific resources to facilitate value generation. Technical resources, such as training data and AI algorithms, and non-technical resources, such as consider the abilities of the staff. So, to fully leverage AI's strategic potential, the concept of AI capacity broadens our understanding of AI to encompass all relevant organizational resources, not just technical ones.

The Application of AI

Advertising, manufacturing, business administration, and customer service are just a few of the many fields that might benefit from AI. With the ability to permeate an organization's

value chain, AI technologies hold immense promise for transforming several essential facets of our everyday lives. It's possible to classify AI applications into two main groups, based on their intended use: automation and augmentation. In contrast to augmentation, which boosts human intellect by giving insight that can help with decision-making, automation describes AI systems that are supposed to replace human workers. An organization's clients can benefit from new or enhanced goods and services that use artificial intelligence (AI) thanks to automation and augmentation, which find use in several organizational activities.

Robots

Automating once human-only processes, like assembly line robots, is not a novel idea; in fact, it is a well-established one. While this does apply to the automation that AI makes possible, it falls short when it comes to describing the revolutionary shifts that AI brings about. Improvements in AI have made it possible for robots to learn and adapt, leading to a gradual rise in performance. As a result, deeper cognitive processes like learning and problem-solving may be mechanized by AI technology. Intelligent automation is a common term for this type of automation. Intelligent automation makes it possible to automate knowledge-based and service-oriented jobs that were previously thought to be too challenging to automate. Automated email processing using virtual robots is one such example.

Artificial intelligence (AI) automates planning and budgeting, inventory and replenishment, and other processes in the construction and industrial sectors. In the service industry, AI has the potential to impact consumer experiences through the provision of digital and robotic services. The conversational software systems known as chatbots are a good illustration of this. They are designed to mimic human communication abilities. Customers can get help from chatbots via text or voice. Chatbots have found widespread application in the credit card insurance sector, where they assist consumers with frequently asked inquiries, handle claims, upsell items, and verify that their policies provide sufficient coverage. Thus, chatbots are taking over tasks that were previously handled by human employees.

Artificial intelligence (AI) may automate processes inside an organization, but it can also automate processes for consumers by developing better goods and services. This is shown by conversational intelligent agents like Alexa from Amazon and Siri from Apple; these agents can automate a variety of actions, including texting, calling, and creating a playlist, simply by speaking to the user. Smart home automation through voice interaction is also possible with these agents when connected with devices like Raspberry Pi and Arduino. Interactions with the television and lighting are only two examples of the easy everyday duties that these kinds of devices may automate. The usage of face recognition technology in smartphones is another example of how authentication may be automated. These examples demonstrate the wide range of possible uses for artificial intelligence and the various domains in which it may be employed to automate processes.

Enhancement

Recently, AI has shown that it can do more complicated jobs than humans. Artificial intelligence has the ability to handle massive volumes of data far faster than humans can.

That is why AI can help us get above our brain constraints. To improve judgments and optimize activities, augmentation involves integrating AI with human knowledge. In this context, "assistive" means "supportive," not "replacement," of humans by AI.

Companies frequently generate or possess access to enormous volumes of data. Managers can make more educated choices by analyzing this data. The data, however, are frequently too complicated for human analysis. So, AI may help managers make better decisions by gaining insights from data. Possible applications of predictive analytics include evaluating management control indicators that were previously unknown and suggesting course corrections in the event of a drop in sales or the introduction of new items by competitors. It is becoming increasingly important for firms to understand how their consumers perceive their offers, and AI may help with that. Another use of AI is analyzing views, attitudes, and emotions connected to products and services.

Medical professionals may use computer vision to process magnetic resonance imaging (MRI) scans of the brain and identify small haemorrhages. Artificial intelligence (AI) has many other potential applications in healthcare, including the detection of cancer patterns and the creation of surgical robots to aid doctors in complex procedures. Keeping an eye on social media and forecasting media trends are two ways that public relations may make use of AI. Use of AI in customer segmentation allows marketers to categorize consumers according to their tastes and way of life. Optimal recommendation systems, trend forecasting, and consumer behavior prediction are some of the ways in which artificial intelligence is improving the fashion industry.

Products and services that businesses provide to their customers can also benefit from AI. One such example is Netflix's recommendation engine, which tailors its suggestions to each individual user by taking into account their location, the material they've seen, and even their search history. Machine Learning, December 3, 2020. With these tailored suggestions, viewers are more likely to pick an episode they'll actually enjoy 3.5% AI effects

Every CEO is curious about the answer to the issue of how AI might boost performance in the marketplace. Research on the effects of AI at the process (first-order) and company (second-order) levels is necessary to address this question. How might AI impact corporate operations and ultimately boost performance? The first- and second-order effects of AI are discussed in the following sections.

Effects at the First Order

Using AI impacts things at the process level of an organization, which are the first-order consequences. Key common metrics of process-level performance improvements used to track an organization's output include key performance indicators (KPIs) pertaining to efficiency, effectiveness, capacity, productivity, quality, profitability, competitiveness, and value. We examine three effects—process efficiency, insight creation, and business process transformation—to evaluate the consequences of AI at the process level.

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