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Assessing the Effects of Artificial Intelligence on Startup Performance: An Analysis of Transformational Initiatives

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Abstract

The research paper discusses the impact of Artificial Intelligence (AI) on organizational and process-level performance. The study follows a four-step process: analyzing AI technologies, exploring case studies, collecting data, and reviewing AI literature. The findings indicate that AI has various technologies, such as machine translation, chatbots, and self-learning algorithms, that can enhance automation, information, and transformation effects. Organizations can use AI to improve processes, optimize operations, and develop strategic and competitive advantages. The study provides insights into how organizations can enhance the business value of their transformation projects by leveraging AI's attributes. The research framework proposes a more comprehensive approach to account for the intangible benefits of AI in organizations. The study highlights that AI combines several configurations of IT in various industries, and organizations should reconfigure their processes to achieve performance through AI capabilities. The research also provides tangible evidence about the business value of AI-based projects and their impact on firm performance, considering it not as a single technology but as a set/combination of several different configurations of IT in various industries. The study has scientific and managerial interests and proposes a model for analyzing the impact of AI on firm performance, providing managers with insights to improve their organizations' performance, profitability, and competitive advantage.

Keywords: Maximum 5 keywords

1. Introduction

Information technology (IT) use is pervasive in professional activities, disrupting and affecting all crucial operations and procedures [1]. Integration of IT with the business ecosystem may significantly affect how well a firm gets along with its clients, partners, and potential clients [2]. Additionally, IT determines how a company's operations and procedures will develop. The most impressive use of IT, artificial intelligence (AI), has witnessed unmatched progress in recent decades [3]. AI is a technology field where computers imitate intelligent behaviour with little human involvement [4]. According to IDC, 75% of business apps will employ AI by 2021, up from the estimated 40% of digital transformation projects that did so in 2019 [5]. Organizations must increasingly rely on AI to improve performance, increase productivity, and develop new services.

Big tech firms with a focus on "Learning Systems" (Machine Learning or Deep Learning) started researching artificial intelligence (AI) actively in the early 2010s [6]. Examples include the American GAFAM and the Chinese BATX. However, AI is seen as the ultimate future market because of its boundless potential and advantages. Data is now the centre of all corporate activities due to the digital revolution that has already taken place around the globe [7]. Data is now collected from numerous sensors in nearly every element of contemporary life. The industrial and digital revolutions have significantly changed business and employment, among other facets of society. If the next AI revolution will affect the commercial value of organizations similarly is yet to be shown [8]. Thanks to sensors of every kind, any item or environment of objects may now monitor itself and provide data [9]. The industrial and digital (information) revolutions have undoubtedly had a financial influence on almost every aspect of modern civilization, including living, business, and employment [10]. Will the next AI revolution have an equivalent and significant impact on the financial worth of businesses? Our study aims to investigate how intermediate-level AI capabilities improve organizational performance and process performance. This inquiry will be centred on the financial benefits of transformation projects in AI-using companies [11].

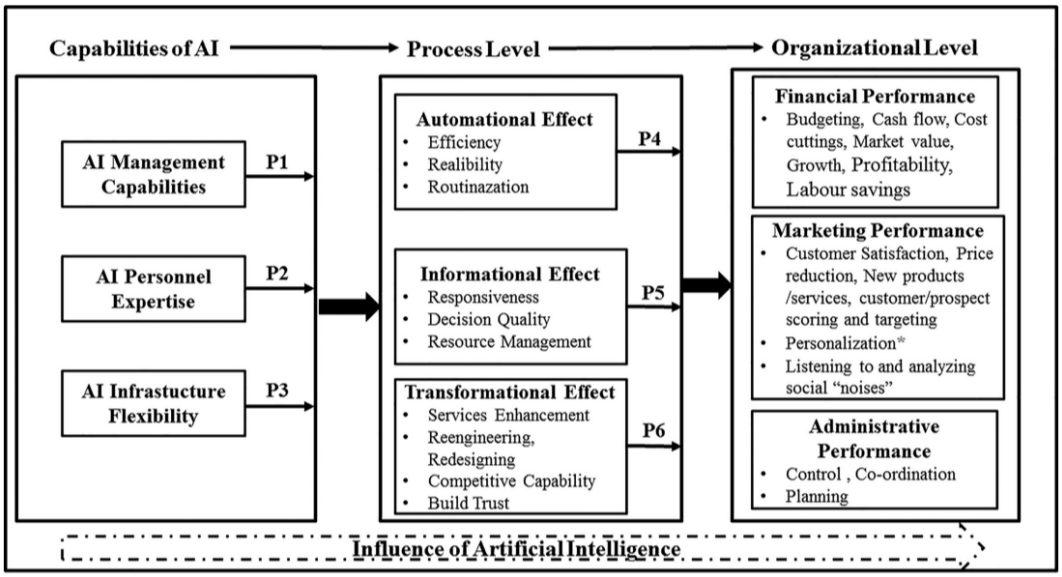
Artificial intelligence (AI) significantly impacts society and companies, even if it cannot yet equal the complexity of human intelligence. AI is very good at completing specialized jobs [12]. As a result, this study focuses on the following research topics: How can AI capabilities impact process and organizational performance improvement? What are the business benefits of organizational transformation projects based on AI? This study used two primary data sources to address these questions: (1) the literature on how ITs, including AI and related sub-technologies like Machine Learning, Deep Learning, Chatbots, and Neuronal Networks, can support organizational transformation; and (2) a collection of mini-case studies that were taken from archives of AI solution providers and a reputable professional journal that examines the influence, adoption, and usage of AI technologies in various industries. The remaining portions of this essay are divided into several sections. The suggested model is presented in Section 3, and the research technique used in the case studies is presented in Section 4. The chosen mini-case studies are analyzed qualitatively in Section 5 to verify and validate the assumptions. Section 6 presents and discusses the findings. Limitations, research implications, and recommendations for future study are presented in Section 7, and the work is wrapped up in Section 8.

2. Research Method

The two stages of the research model's development. First, a study of the literature was done to find out how IT affects organizational and process-level performance. Mini-case studies were also examined to assess the commercial value of AI-based transformation initiatives at the organizational and process levels. The study methodology is founded on six hypotheses that, as shown in Figure 1, capture the significant impact of AI-based transformation initiatives on organizational performance and process innovation.

AI Capabilities (AICAP)

AI capabilities relate to a company's capacity to use organizational, human, and AI resources to add value to the firm [13]. Numerous sorts of IT resources have been identified in prior research. A corporation has various resources, such as immaterial, organizational, human, and material resources [14]. Based on primary research, our analysis concentrates on three categories of AI resources. The capacity of a company and its personnel to simulate or control intelligent behaviour in technology or a computer to generate value for the company's long-term viability is known as AI Management Capability (AIMC). The potential of AIMC is mainly focused on developing connections inside and across companies as well as strategic planning, investment decision-making, coordination, and control. Figure 1. Research model, Adapted from anand and fosso wamba



According to Proposition 1, there is a significant and positive link between AI management capabilities and AI capabilities, and these capabilities have a tremendous impact on how AI is used in processes.

AI Personal Expertise (AIPE) is the term used to describe the professional knowledge and abilities about business operations, interpersonal domains, and AI technologies required for an organization's staff member to simulate or employ intelligent behaviour in a computer or other technology to do given duties. To effectively manage the AI resources at their disposal, IT professionals in a company must have a variety of abilities, including awareness, ownership, integration, and administration of AI technology. They also need to be knowledgeable about IT components. For AI to effectively provide value to an organization's plan, it must be strategically aligned with that goal. Better alignment may be achieved if staff members possess the right mix of capabilities. When they comprehend how the organization's plans are combined with IT and AI talents, the experience of AI professionals becomes an intangible value for enterprises. By integrating AI into strategies and creating dependable, affordable, intelligent systems, organizations with skilled AI professionals are better prepared to fulfil the demands of changing settings. In light of this, we suggest that "the effectiveness of an organization's AI strategic alignment with its strategy improves with competent AI staff possessing the right combination of skills, leading to reliable and cost-effective intelligent systems and greater ability to meet dynamic environment requirements."

According to Proposition 2, personal AI knowledge has a significant and positive influence on AI's capabilities, which in turn has a positive link with the impact of AI at the process level.

"AI infrastructure flexibility" refers to all the technical elements required for an AI system to operate correctly, such as network installations, software, hardware, and data. To effectively use AI, a company must be able to react swiftly to shifting business circumstances and plans. This comprises crucial components: data, talent, technological know-how, outside relationships, and scalable infrastructure. Implementing AI technology and resource optimization requires a robust IT infrastructure. An infrastructure that is self-configuring, self-healing, and self-optimizing can help avoid issues and encourage the development of innovative strategic business processes. The success of AI in an organization is therefore hypothesized to be significantly influenced by the flexibility of the AI infrastructure.

According to Proposition 3, The flexibility of an organization's AI infrastructure, consisting of all the required technological resources, systems, and parts for an AI system, is implied to benefit the organization's AI capabilities significantly. These qualities, in turn, have a

favorable relationship with how AI affects processes. For a company to improve its AI skills and eventually increase the influence of AI on its operations, it is essential to have a flexible AI infrastructure that can adapt to shifting business conditions and plans. This claim emphasizes how crucial scalable infrastructure is as a necessary element for an organization's AI implementation to be successful.

Process-level performance improvement (PLPI)

Typically, key performance indicators (KPIs) like efficiency, productivity, quality, profitability, competitiveness, effectiveness, and value are used in companies to monitor the improvement of process-level performance [15]. Using these indicators, managers may keep an eye on the organization's outputs and decide how to improve the efficacy and efficiency of the processes. Although information technologies (ITs) are frequently seen as a business performance development driver, academics disagree over how ITs affect business process performance. Existing research, however, suggests ways to measure this influence. For instance, distinguished between the informational, transformative, and automation effects of IT on business processes. These three impacts will be used to examine the influence of AI on business operations, which is the subject of our study. The automation effect (AE) refers to using artificial intelligence (AI) technology to replace or significantly reduce human contact, leading to repeatable procedures and instructions. A tremendous financial impact on labor savings and budget reduction can result from implementing AI if it increases efficiency and dependability by automating manual or paper-based procedures.

According to Proposition 4: "The positive impact of automation effect on the process level is significant and is positively linked to the influence of AI on the organizational level."

The ability of AI to receive, store, analyze, and disseminate information inside and between organizations is referred to as the informational impact (IE). Data is the fuel algorithms utilize to power AI technologies, producing reliable, current, thorough, usable, adaptable, quick, and intelligent information. As a result, the greater the informational effects that AI and its technologies can have on an organization, the more quickly and effectively that organization can make high-quality decisions that affect its organizational and financial sustainability. Administrative activities, including restored administrative control over resources, improved coordination between and within companies, and quick staff reactions, are further benefits of AI's informative effect.

According to Proposition 5, the informative impact of AI has a favorable impact on the process level, which in turn has a good effect on the organizational level.

The value created by AI's ability to assist and facilitate innovation and process change is known as the transformational impact (TE). This is a crucial factor in reengineering and redesigning the current organizational structure since it makes improving services and establishing competitive skills and trust possible. These process-level factors enable the transformative impact, crucial for enhancing customer relationships and developing new goods and services. It is a critical variable in our study model because of its direct ties to service transformation through innovation and process reform.

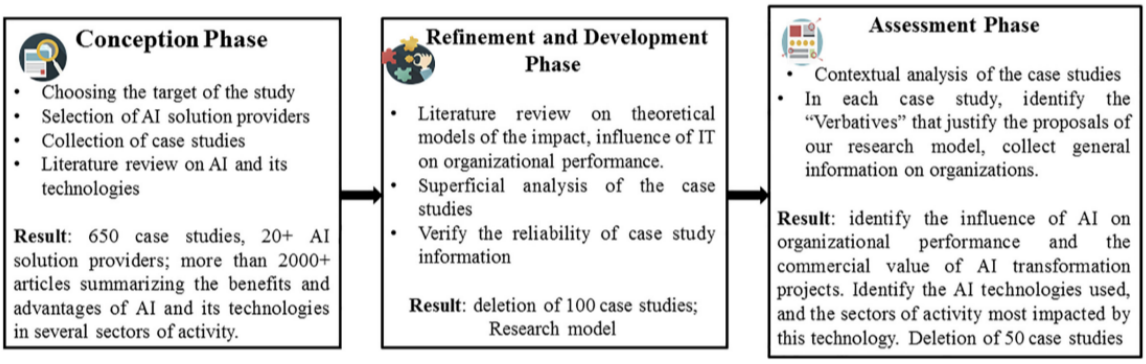
According to Proposition 6, the transformative effect has a substantial beneficial impact on the process level. It is favorably correlated with the organizational-level results of AI. In other words, upgrading organizational structure, developing new goods and services, and increasing customer interactions depend on AI's capacity to enable innovation and process transformation.

Conception Phase

Case studies entail investigating phenomena in context utilizing various data sources, including qualitative or quantitative techniques, participant observation, interviews, and document analysis [16]. Because AI is a cutting-edge and developing technology, archival research is the best way to examine how firms utilize AI and related technologies [17]. The researchers gathered 500 mini-case studies from various expert groups, including IT organizations, consulting companies, expert reviews and journals, research institutes, and IT industry analysts. Trusted and well-known AI solution providers published these studies. The researchers further reviewed the relevant literature to identify the AI domains and axes that have seen the most innovation or benefited the most from significant AI advancements and

associated technologies. They found over 2,000 publications outlining the advantages and benefits of AI and its related technologies/applications in various industries using Google Scholar as their primary search engine. The "Save as PDF" plug-in was used to acquire dependable, current, and comprehensive case studies to analyze the recovered mini-case studies.

Figure 2. Conception Phase



The development and refinement phase

Even with AI's development, studying how IT impacts organizational performance is still important today. Researchers are currently combining various theories and models to examine how AI affects organizational performance and pinpoint the commercial worth of AI transformation programs. The authors choose several theoretical pillars to serve as the basis for their conceptual research model, including Paradox Productivity, Process-Oriented Perspective, Resource-Based View, and Dynamics Capabilities. They then added information from a preliminary examination of certain case studies. The authors checked whether the mini-case studies had verifiable facts such as contact information for the organizations, participants in the case studies, and excerpts from interviews with those actors to guarantee the validity and quality of the secondary data.

Additionally, they looked at several companies' websites to see how closely they worked with their suppliers. They checked to see if the problem at stake was precisely recognized or explored before including a case study in their sample. The writers ensured the case studies were comparable and posed pertinent questions about the background, issue at hand, people engaged, outcomes, and connection to their issue. After finishing the preliminary study phase, we prepared a collection of case studies that addressed various issues linked to the usage of AI in businesses. These subjects included implementing AI-powered marketing campaigns that react to real-time consumer behavior, utilizing AI for predictive maintenance of equipment and machinery, using image and video recognition in the security industry, providing individualized financial planning services, and leveraging AI for fraud detection and anti-matter.

Improving security, supporting data-driven diagnostics, spotting pandemics, streamlining supply chain and production, enabling on-demand manufacturing, facilitating trucks and self-delivery, decreasing traffic congestion, and offering imaging diagnostics in radiology and pathology.

Evaluation phase

We carefully reviewed the mini-case studies in the final step to answer our study question, which was to determine how AI influences organizational performance and highlight the financial value of AI transformation initiatives in businesses. Using this technique, we could recognize and evaluate several themes, ideas, and viewpoints presented in the case studies. Having all authors unanimously choose the case studies during the refining and development phase prevented subjectivity in the analysis. We carefully chose research constructs to support

our research hypotheses. Each author independently examined the case studies, and the evidence we uncovered to back up our study hypotheses was examined and contrasted with additional data to ensure correctness. We arrived at 500 case studies that were verified to be correct regarding facts and outcomes after eliminating any confusing findings from our sample.

2.1 Analysis of Selected Case Study Passages

A case study typically consists of many components, including (1) the context, which details the client's background, line of work, and history, as well as the important participants reporting remarks in the case study. This section highlights AI's capabilities and describes how it assisted the customer in overcoming a specific obstacle. (2) The supplier's suggested solution is offered, emphasizing the advantages of the supplier's intervention and the commercial value of AI for businesses while considering the customer's viewpoint and profitability. (3) In this part, the client's results are provided with an emphasis on tangible and quantifiable results, such as a percentage gain in turnover or a rise in the number of consumers. Any data that shows the supplier's beneficial effects should be highlighted and shown how AI affects performance improvement at both the organizational and process levels. This section frequently has sub-sections and is generally present in case studies chosen for further study. The many case studies created show how AI and its technologies/applications benefit enterprises in terms of value and business value.

2.1.1 Case study 1: Abu Dhabi national oil company (ADNOC)

IBM's AI technology has been effectively incorporated into the operations of the Abu Dhabi National Oil Company (ADNOC) in the chemical and petroleum industries. AI deployment has accelerated the creation of digital geological models for reservoirs and automated several activities, including categorizing and analyzing rock samples. Determining the hydrocarbons' ability to store energy and comprehending the characteristics of carbonate rock samples were difficult tasks for ADNOC. ADNOC understood the potential advantages of integrating AI into its processes to increase efficiency while preserving accuracy. ADNOC has advanced in AI technology by adopting a new strategy for investigating hydrocarbon resources in Abu Dhabi. The joint effort of ADNOC and IBM is focused on employing cutting-edge AI techniques to analyze and categorize rock samples using image recognition technology automatically. The collaboration started by teaching IBM's Watson platform, and it has since moved through several stages to improve the amount of data that can be gleaned from subsurface rock imagery. The outcomes are astounding, with AI greatly increasing the efficiency and precision of geological investigation. Drilling and scanning rock samples are still manual procedures, but picture categorization has gotten faster and more automated. ADNOC can now examine a greater variety of rock samples in a shorter time, producing more predictable data and improving the precision and efficacy of subsurface models. The AI system also guarantees consistency in the description and analysis of rock samples, matching over time the accuracy of an expert. Petrographers' knowledge is preserved using this strategy, and ADNOC can benefit from it even after they retire. The project has bright future potential, and machine learning is anticipated to be essential to building detailed geological models and accomplishing ADNOC's strategic objectives.

The accomplishment of the ADNOC-IBM partnership serves as a testament to the value of AI in the chemical and petroleum sectors. It overcomes the difficulties associated with rock analysis and offers the company considerable financial rewards. This case study emphasizes the function of AI/IT managers in enhancing organizational performance and adding value with the use of AI capabilities.

According to IBM Middle East and Africa's Cognitive and Analytics Practice Leader Talal Malas, "We think that AI is a cooperation between humans and machines. This project with ADNOC is an example of cognitive geology, one of the fascinating applications of artificial intelligence (AI) in the chemical and petroleum industries. In cognitive geology, AI imitates geologists and petrophysicists to categorize rock samples on a large scale precisely. It is the ideal illustration of how artificial intelligence boosts productivity and frees up highly experienced specialists for higher-value tasks. "At IBM, we believe in meaningful innovation for our company and the world," continues Ahya Mahmoud, Industry Leader for Industrial Products, Chemicals,

and Petroleum Industry at IBM Middle East and Africa. With a focus on the success of our clients, we are not afraid to develop unique concepts. These principles have been realized thanks to the collaboration between ADNOC and IBM. It seemed logical to start with the geosciences as they are the base of the entire value chain. We share ADNOC's desire to improve the solution by utilizing additional subsurface data points to maximize hydrocarbon recovery. The advantages of AI's capabilities in the chemicals and petroleum products industry are highlighted in this case study. It should be highlighted that the IBM ADNOC solution has helped them improve their development plans in the field and solved the issue of studying rocks in the depths of the Earth. But it will undoubtedly result in significant future financial advantages for the company. To enhance organizational performance and provide value, including having a beneficial effect on AI management capabilities, this case study emphasizes the necessity for AI/IT managers in businesses to intervene in AI capabilities. This organization has been able to use AI to speed up the delivery and consistency of descriptions of reservoir rock samples (transformational effect, informational effect), quicken the development of models to lower the risk of decisions involving the development of multi-billion dollar reservoirs (transformational effect, financial performance), and maintain the knowledge that petrographers have spent decades developing (administrative performance). The P1, P3, P2, P2, P5, and P6 propositions of our research methodology are further supported by this case study, which offers further evidence.

2.1.2 Case study : A hospital use NLP to help with physician documentation

Corporate Overview: United Healthcare Services (UHS) is a local, non-profit hospital network that serves the New York, USA, healthcare market. They have put into practice an AI program from Nuance Communication that specializes in solutions for systems integration, natural language interpretation, and reasoning. The AI application's primary areas of interest are physician documentation and healthcare data management. Corporate Profile: United Healthcare Services (UHS) is a neighborhood, non-profit hospital network that caters to the healthcare needs of New York, USA. They've used an AI tool from Nuance Communication that focuses on integrating systems and providing solutions for interpreting natural language and reasoning. The administration of healthcare data and physician documentation are the two main interests of the AI application. Actions Taken: UHS adopted Dragon Medical One-powered Computer-Assisted Physician Documentation (CAPD) from Nuance, a healthcare Natural Language Processing (NLP) solution. With CAPD, doctors may narrate progress notes, a history of a current ailment, and other information. At the same time, the AI system uses Nuance's cloud voice recognition engine to transcribe everything in real time. When doctors document, CAPD, integrated into UHS's EHR system, prompts them with clarifying questions to give real-time intelligence. Results: According to Nuance, UHS achieved a 12% increase in the mixed index, indicating resource allocation improvement when physicians agreed with CAPD clarifications and updated their documentation accordingly.

UHS also experienced a 36% enhancement in identifying "extreme" cases of illness severity and a 24% improvement in mortality risk identification. Furthermore, UHS reported a 69% reduction in transcription costs year over year, resulting in $3 million in savings. Results: According to Nuance, UHS achieved a 12% increase in the mixed index, indicating resource allocation improvement when physicians agreed with CAPD clarifications and updated their documentation accordingly. UHS also experienced a 36% enhancement in identifying "extreme" cases of illness severity and a 24% improvement in mortality risk identification. Furthermore, UHS reported a 69% reduction in transcription costs year over year, resulting in $3 million in savings.

2.2 Literature Review

2.2.1 Artificial intelligence's evolution across time

In order to test artificial intelligence, specialists like Alan Turing have considered the feasibility of building a machine that can play chess throughout the history of computer technology [18]. Further study into AI was stimulated by Turing's publications "Intelligent

Machinery" and "Computing Machinery and Intelligence". In artificial intelligence (AI), activities are carried out autonomously while considering potential limits and utilizing technical tools to replicate human cognitive capacities [19]. The significant contributions that have shaped and advanced AI over time are summarized in Table 1.

2.2.2 Commercial endeavors and artificial intelligence

Since 2010, artificial intelligence (AI) development has experienced a fresh upsurge, primarily because of improvements in processing power and access to enormous data sets [4]. The development of more complex algorithms, the availability of inexpensive graphics processors with quick computation capabilities, and the accessibility of enormous, meticulously annotated datasets are the three main drivers of this progress in AI [20]. AI and its related technologies, including machine learning, deep learning, chatbots, neural networks, and virtual assistants, fundamentally alter how businesses operate and are structured [21]. The overall structure of organizations and how they interact with their surroundings are already altering due to this technology. Organizations have a huge issue and opportunity when it comes to managing information in the age of AI, but doing so calls for a change in culture, mentality, and skill set. In various industries, including marketing, management, justice, and healthcare, AI is being utilized to provide natural language answers. An example of this is IBM's Watson product. One such application is Watson Health, which allows doctors to use patient and medical data to tailor patient care, including considering the benefits and drawbacks of a patient's medical history.

Table 1. Comparison Table of Main Findings of Related Literature Studies

Year	Contribution of authors to the advancement of AI
2020	Elizabeth R. Petrick's concept of viewing the mind as a "black box" whose behavior depends on a feedback system. However, this method assumes that the structures of hundreds of billions of brain cells can be mobilized numerically. Serge-Lopez Wamba's work, which helped provide learning capacity to formal neurons, further improved this strategy [22].
2021	The first formal neuron, developed by McCulloch and Pitts, was a mathematical model of a biological neuron. A physiological approach to understanding neuron functioning reached this milestone in artificial intelligence (AI) [23].
2020	Herbert Simon first proposed the idea of constrained rationality. Allen Newell presented the idea of heuristics as an empirical strategy for problem-solving in which the method's efficacy or efficiency has yet to be permanently established. Their work serves as an illustration of how computer science and AI are mutually influenced. First, the implementation of AI experiments is made possible by advances in computer science. Second, the difficulties that AI research projects bring inspire the development of tools that improve computer science [1].
2021	Nathaniel Rochester created the first symbolic assembler language. The creation of the LISP language, the Geometry Theorem Prover, and the first symbolic assembler language was among the AI initiatives he sometimes contributed to [24].
2020	Donald Hebb developed a basic rule that allowed formal neurons to learn. This idea links cognition and language by stating that memory may be modeled as a feedback loop inside formal neural networks [25].

Due to the considerable developments achieved since artificial intelligence (AI) was initially presented in the 1960s, it has become impossible to escape the topic of interest in recent years. There has been a significant advancement in the subject thanks to the rise of Machine Learning in the 2000s, which includes machines "learning" from supplied datasets and the recent development of Deep Learning, which uses neural networks [26]. Contrary to conventional approaches, neural networks learn by analyzing a significant quantity of test data, making them helpful for various tasks, including energy reserve estimation, price forecasting, and medical diagnostics. Various industries, including transportation, health, customer service, security, and urbanism, have already been affected by or will soon be touched by these technological advancements in AI when paired with big data. AI is a valuable tool for organizations since it can be incorporated into practically all facets of an organization, including maintenance, sales and marketing, planning and production, demand forecasting, and services.

AI is a crucial component of organizational growth and efficiency. It may boost operational effectiveness, enhance customer satisfaction, enhance products and services, and offer better product suggestions [27]. The development of AI can be broken down into different phases, such as the golden age of AI from 1956 to 1974, the first winter of AI from 1974 to 1980, a new burst of interest in the field from 1980 to 1987, the second winter of AI from 1987 to 1993, and the emergence of data-driven AI from 1993 to 2011. Aside from helping businesses quickly respond to shifting market conditions, AI may also help them spot fraud, identify and treat diseases, optimize supply and demand, and automate quality control. By 2025, Tractica estimates that AI will bring in nearly $90 billion in revenues, with North America, Europe, and Asia-Pacific reaping most of the gains. The three most promising AI fields by 2025 are detecting and identifying moving objects, static picture recognition, categorization, tagging, and medical patient data processing. Between 2016 and 2025, these industries might produce a turnover of about €21 billion [28].

2.2.3 IT capabilities

Due to globalised markets and escalating competition, businesses are under pressure to increase their creativity, product/service quality, and customer happiness [29]. As a result, IT has been included in its management strategy. As a result, businesses are always seeking new methods to give robots greater responsibilities to cut costs and boost productivity. Assembly lines, which eliminated manual labour from repetitive activities that were previously completed by hand, are where this tendency first emerged.

Organizations must innovate to be competitive in today's ever-evolving economy. Due to the increased competition and information that must be managed due to economic globalization, competitiveness is heavily influenced by the capacity to handle data [30]. Innovative IT is changing how businesses and organizations operate and has already altered how IT and the rest of the company interact. Organizations face possibilities and problems with this innovative approach to information management, which calls for a shift in thinking, culture, and technical capabilities. Innovations in AI are also enhancing the advantages of IT, notably in terms of improving performance and partnerships with customers, prospects, and partners. Entrusting complicated jobs to machines is now a far-off concept. AI is increasingly vital for efficient and adaptable enterprise operations. AI is becoming a critical component of an organization's IT design and capabilities since it has already demonstrated its ability to automate repetitive jobs often carried out by professionals like human resources managers, sales assistants, and small contractors.

Future companies and their leaders are expected to operate in an "economy of power," where pursuing a competitive position in the market will direct their activities to ensure decision autonomy, strategic flexibility, and competitive advantage. This means having the resources to maintain and improve the competitive edge you already have in the market. Therefore, academics, professionals, and companies would be interested in discovering how information technology and its capabilities might improve organizational performance. How do IT skills affect an organization's IT-driven transformation initiatives' ability to increase business value?

Scholars and practitioners have concentrated on examining how investments in information technology (IT) and organizational performance interact and the expanding growth

of performance inside businesses. However, this study has needed help producing reliable, practical, and conclusive data. Although ITs are widely used in many professional activities and are changing organizational procedures and operations, how they will affect organizational performance is still being determined. Koski (1999) discovered that investments in IT had no discernible impact on the performance of businesses and industries. However, other scholars, such as Devaraj and Kohli, think IT favours organizational performance. Some writers suggested six theoretical ways to assess the influence of IT on organizational performance to elucidate the relationship between IT capabilities and organizational performance. These methods include the approach based on economic theory, the system based on social psychology, the course based on competitive analysis, the strategy based on strategic alignment, the method based on assessment based on processes, and the approach based on resource-based evaluation. These approaches try to identify an economic function, analyze the competitive impact of IT, promote alignment between IT strategy and organizational strategy, view the relationship between IT and performance from the perspective of an added value-creating process, or presuppose that organizations have resources that can give them a competitive advantage.

In information systems research, the role of information technology (IT) on organizational performance is an important subject, especially in light of its potential to be valuable. The resource-based evaluation method is centred on a company's IT skills, defined as "the organization's ability to combine its IT resources, including organizational, human, and material resources, to create value for the organization". According to these writers, a company has valuable and in-demand resources that give it a competitive edge and generate commercial value. They separated these resources into three categories: tangible resources (such as capital, physical assets, and capital assets), intangible resources (such as reputation and brand name), and staff-based resources (such as knowledge, skills, and staff know-how) to assess and grasp IT capabilities. In addition, they proposed three criteria: (1) IT management capabilities; (2) IT personal expertise; and (3) IT infrastructure flexibility—to assess IT capabilities regarding the material, social, and organizational aspects of these resources.

3. Findings

After thoroughly analyzing several case studies, AI and its technologies provide a wide range of possibilities, advantages, and services targeted at improving organizational performance. Table A1 in Appendix 1 lists the benefits of applying AI and related technologies to various business sectors while outlining their importance to enterprises. By incorporating AI, processes have become intelligent, optimized, self-reactive, effective, efficient, and automated, removing labor- and resource-intensive manual and paper-based chores. The full value chain of a company, including R&D, operations, maintenance, sales/marketing, planning and production, demand forecasting, and services, is frequently covered by AI implementation. Our analysis highlights the vast potential of artificial intelligence (AI) in organizations.

1. Improving operational effectiveness, maintenance, and supply chain operations;
2. Optimizing the customer experience, products, and services through new functionalities, sales automation, and article recommendations;
3. Facilitating quick and automatic adaptation to changing market conditions and the creation of new business models; and
4. Improving supply-demand alignment through improved forecasting: Nearly half (40.6%) of the 500 case studies we looked used pure AI, which uses various AI kinds and technologies.

Pure AI is used for analysis, task automation, decision support, or the digital transformation of organizational processes. Nearly one-third (31.20%) of the sample showed evidence of automatic learning, which reduces the need for human involvement in processes and fosters system intelligence through continual learning. Furthermore, 18.60% of businesses used robotic, virtual, and personal assistants to automate manufacturing procedures. Despite being a common technology, neural networks were less common in our sample. This is probably because of their complexity, which sometimes necessitates unique development and

deployment by specific firms. With almost every industry being impacted by this technology, the in-depth study of case studies further demonstrates the disruptive potential of AI across all facets of our everyday lives. AI advances benefit technological industries like IT/Telecom and electronics. While IT development companies use AI in development and testing environments, cybersecurity enterprises may use AI to enhance security procedures. Machine learning gives Business intelligence additional resources for analyzing Big Data and automating suggestions. Healthcare and banking are two industries that deal with crucial and necessary data, and they have taken use of artificial vision, neuro linguistic programming, chatbots, automatic natural language processing, and deep learning to provide intriguing new opportunities. Our case studies pay particular attention to data communication security in these industries. The manufacturing and construction sectors including Machinery and Equipment, Aerospace, Rail and Shipbuilding, Construction Materials, and Construction use AI to automate budgeting, planning, and inventory management, improve workflow dependability, make better use of resources, do away with time-consuming procedures, and improve real-time visibility across assets, employees, and supply chains. By removing intermediaries and promoting predictive maintenance, AI significantly impacts the logistics and transportation sector by giving firms insights into complicated elements and relationships. This increases operational efficiency and user engagement. The main benefactors of AI's advances are the business, trade, distribution, communication, marketing, and advertising sectors. Personal virtual assistants, machine learning, emotional agents, and chatbots are used in various industries to improve consumer interactions and communication. The textile, apparel, and costume industries use artificial learning to anticipate customer behavior, forecast future trends, personalize the buying process, and enhance recommendation engines. The education sector also uses AI to design dynamic, personalized learning pathways that adapt educational experiences to student requirements and preferences.

Capacities of AI

An effective, quick, scalable computer infrastructure and powerful algorithms like machine learning, deep learning, and neural networks are three key prerequisites for the successful adoption of AI in enterprises, according to the study of case studies. The other two are rich datasets. Together, these three components AI managerial capabilities, AI personal competence, and AI infrastructure flexibility makeup AI's basic competencies. The case examples show how these qualities are linked together. The results show that the first factor, AI management skills, is under the authority of companies. The other criteria, AI infrastructure flexibility (AIIF) and AI personal expertise (AIPE), mostly depend on providers. In certain instances, managers' knowledge of the commercial benefit of AI transformation initiatives within their firms is low. Suppliers like IBM and CLOUDERA provide knowledge and adaptable infrastructure to streamline data processing and produce value for the associated companies.

The case studies also show that many firms have current IT resources that are not fully exploited, optimized, sufficient, or suitable for the effective implementation of AI. Workflow effectiveness and decision quality have increased due to integrating these resources with automated and intelligent processes and efficient control, coordination, and planning. Two important inferences about the AI staff's skills may be made from the interviews. First, there is a strong cooperation between needs analysis, intelligent process modeling, and algorithm implementation when AI solution providers work directly on-site with enterprises. Organizations rely on suppliers to build, distribute, support, and manage intelligent systems to alter their business environment, increase competitiveness, and enhance services and products. These partnerships are essential given the dearth of AI expertise. Second, because the company's management is primarily concerned with outcomes, when businesses choose an "AI as a service" or "AI as IaaS" solution, their employees cannot profit from the expertise of the AI provider's technicians. When articulating needs, specifying data dimensions utilized for algorithm training, and using the solution, the organization's workforce often has limited involvement.

In the end, these competencies have a big impact on organizational operations if they are managed well. It can result in excellent organizational performance and the effective

realization of corporate value through AI-driven transformation initiatives when appropriately managed by managers and leaders.

Methodical Level

Indeed, our analysis of case studies showed that enterprises' use of AI was intended to address certain process-level problems, emphasizing improving automation, information management, or transformative results. Further investigation revealed several issue areas that organizations were trying to address at the process level, including: (1) redesigning and reengineering the current organizational structure to improve customer relations; (2) automating processes and procedures; (3) utilizing different types of data within and between organizations; (4) streamlining the collection, storage, processing, and dissemination of information within and between organizations; and (5) changing organization, (6) Making business procedures more effective, (7) Making it easier to gather and incorporate information from both inside and outside the company, and (8) Aligning resources with the organization's vision

These innovations' information impacts directly influence administrative performance by giving organizations access to more information and facilitating rapid, high-quality decision-making. In turn, this improves responsiveness and results in improved resource management. The automation impacts produced by AI capabilities in businesses mainly entail eliminating centralized and duplicated operations, cutting down on staff mistakes, and giving real-time visibility of internal and external resources. These factors have considerably boosted administrative and marketing performance through better operational efficiency, dependability, and process simplification. As a cutting-edge and frequently disruptive technology, AI creates brand-new goods, services, production techniques, and organizational workflows that perfectly align with customer demands. Therefore, process reengineering (which involves cutting back on support functions to focus on creating more value for customers), redesigning organizational structures by decentralizing decision-making authority, increasing customer satisfaction, and raising the caliber of goods and services are all examples of how AI's process capabilities demonstrate transformational effects. These changes have a significant positive impact on organizational, marketing, and financial success. Our study broadens the scope to include administrative and marketing performance. In contrast, past research on AI mostly focused on financial measurements as a main indicator of organizational effectiveness. In addition to providing proof of the financial benefit of AI-driven transformation initiatives in companies, this broader viewpoint underlines AI's direct and indirect effects on organizational performance.

3.1 Limitation

Case study research has several restrictions, much as any empirical study. The information gathered for a case study is secondary in character rather than spontaneous. Furthermore, case study data could include omitted details inherited from many sources. Although the case studies contained significant information, the data may have been biased due to overstated claims or limitations on available information. We advise using various data-gathering techniques, such as interviews, questionnaires, secondary data analysis, and direct observation, to lessen these constraints. These tools may be used to cross-check the data, providing deeper insights into the study subject. Reproducing this study, which uses fieldwork, observations, and interviews with businesses to record each case study, might provide more data and improve our comprehension of how AI affects organizational performance.

Remembering that this research project is a cross-sectional study that offers a snapshot of the survey at a certain period is critical. The ability for organizational performance to vary over time is not considered. By assessing productivity trends brought on by IT investments, longitudinal research would investigate the factors impacting AI capability and its long-term influence on organizational performance. Most research lacked data on the costs and time required to implement AI transformation programs. Organizations interested in using AI can efficiently plan and manage their resources by evaluating the costs of these initiatives.

Additionally, knowledge of project length would offer insights into the future course of AI transformation initiatives. Based on this data, businesses may create thorough task lists that consider interdependencies and specify the order of execution.

Overall, case study research has limits, but using various data-gathering techniques and taking longitudinal views might help us better understand how AI affects organizational performance.

3.2 Managerial,Theoretical and Practical Implications

Any firm must have a clear daily plan and the appropriate financial, technological, and human resources to accomplish its goals. Numerous issues can be resolved, and process performance (automated effects, informational effects, and transformational effects) and organizational performance (financial performance, marketing performance, and administrative performance) can be improved by integrating artificial intelligence (AI) into organizations. Our study answers problems that many firms confront internally, in addition to addressing whether AI can help enterprises and spur innovation. Organizations need certain capabilities, such as mutualization (using services across different contexts), scalability (expanding operations without compromising the underlying architecture), and resilience (continuing operations in the event of failures), to integrate AI successfully into operations and processes. The analysis of our case studies showed that firms incorporating AI frequently require efficient project management. As a result, enterprises need to take certain steps to implement AI properly. These steps include finding and retaining AI talent, modifying training materials, modifying governance structures, supporting new AI-driven operational modes and changes in managerial roles, and ensuring job quality in human-machine interaction. They also include establishing internal and external control towers to address ethical issues related to data and algorithms.

Our study adopts a holistic approach by looking at various AI technologies across many industries, in contrast to prior studies that concentrated on particular areas, such as health, automotive, or finance. This thorough study closes a knowledge gap and emphasizes how crucial it is to combine different AI technologies for the best results. Our research indicates that rather than focusing just on providing single technology solutions, AI solution providers should promote solutions that combine various technologies. On the other hand, managers of organizations should look at the benefits of combining various AI technology. This study emphasizes the necessity to see AI as a collection or combination of diverse IT setups in various domains of activity inside enterprises by highlighting the polymorphic nature of AI.

Our work adds to the field of AI capabilities (AICAP) by analyzing the direct effects of AI capabilities on business performance. This demonstrates how crucial it is to invest in AI infrastructure flexibility and AI infrastructure personnel knowledge to increase the economic value of AI transformation initiatives. Our study also contributes to the body of knowledge on the commercial potential of AI by offering suggestions for new lines of inquiry into the development of AI-based services.

Overall, our study highlights the complexity of AI and the demand for an all-encompassing strategy to fully realize its potential, with practical consequences for organizational leaders and AI solution providers.

4. Conclusion

Organizations are becoming more aware of the value of their data and the need for better tools to use it, highlighting the relevance of AI. The digitalization of the economy, the automation of current operations, and the disruption of services dependent on the use of data are two tendencies promoting AI development. This study used a qualitative methodology to investigate 500 case studies to examine the impact of AI on organizational performance. This approach was chosen due to its advantages and use of secondary data. It made it possible to extract specific information about each organization and identify the business value of AI transformation projects and how they affected organizational and process performance. As a result, the findings of the study's qualitative analysis of the case studies in Table 2 were supported.

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