The strategic impacts of Intelligent Automation for knowledge and service work: An interdisciplinary review

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Abstract- *The main purpose of this paper is to review the strategic impacts of Intelligent Automation for knowledge and service work. Artificial Intelligence (AI) and its sub-fields have made great progress in recent years in automating knowledge and service tasks. This phenomenon is referred to as Intelligent Automation. As a result of this change, companies now have a new strategic option to boost their company value. Intelligent Automation is a more advanced kind of automation in which robots imitate human activities and have cognitive skills such as natural language processing, voice recognition, computer vision technologies, and machine learning. Such intelligent computers absorb huge amounts of organized and unstructured data, analyze, interpret, and learn it on the fly, and intelligently automate activities to increase operational and corporate efficiency [1]. The notion of automation in the digital age is expanding, and technology is developing day by day, incorporating more human brain functions into computers. As predicted by a report published last year, the BFSI robotic automation industry is likely to develop at a compound annual growth rate (CAGR) of 75%, reaching USD 835 million by 2020. According to the survey, the quick adoption rate implies that during the anticipated time, BFSI organizations would prioritize spending in training and ownership of automation technology above investing in professional services to automate operations. These phenomena are being studied by academics from a broad variety of academic fields, but there is no agreement on the major results and ramifications as a result [1].*

Keywords: *Artificial intelligence, automation, robotics, algorithms, robotics, service work, machine learning*

I. INTRODUCTION

Many experts and observers believe that automation would lead to massive unemployment as a result of job responsibilities involving predictable, repetitive activity becoming obsolete. Intelligent Automation1 is a new kind of automation that has been enabled by advancements in artificial intelligence and its sub-fields. Cognitive activities might be mechanized with the help of new algorithms now being developed [2]. A further benefit of using AI in mobile robots is that more manual jobs can now be automated. Cognitive and manual duties are often encountered in knowledge-based and service-oriented jobs. A knowledge profession is one in which the employee must use and generate new knowledge. It is intellectual, creative, and non-routine work. A broad variety of professions, such as information dissemination, consultancy, pharmaceuticals, and teaching are all examples of knowledge-based employment [3].

Service work may be described as the act of utilizing one's abilities (for example, knowledge) for the greater good of the people (self or others). Merchandising, security, commercial cleaning, and knowledge-intensive occupations like consulting are all included in this category. As a result, office and administrative work fall within the category of service work [3,4]. Tasks requiring a high degree of cognitive flexibility and physical adaptation have traditionally been thought too tough to automate. This has changed lately. However, artificial intelligence (AI) has lately risen in breadth and capabilities, and this trend is expected to continue. To provide just a few examples, AI applications are expected to dramatically diminish the need for people in jobs such as translation (by 2024), driving a truck (2027), retail (by 2031), and surgery (2053), all of which are forecast to be automated shortly. This means that as AI develops, the availability of knowledge and service work will shift dramatically [4]. As a result of its impact on knowledge and service work, the fourth industrial revolution differs from previous ones, such as the industrialization of factory work in the nineteenth century or the adoption of transactional computers for administrative and service work at the end of the twentieth century. Organizations now have a new strategic opportunity to boost company value as knowledge and service work evolve. Applied Intelligent Automation to middle-income cognitive employment might allow organizations to establish new commercial value prospects via recent breakthroughs in AI.

Another option is for companies to replace high-skilled work with new AI capital or to reassign high-skilled personnel to concentrate on more complicated, non-routine cognitive activities solely. The probable effects of AI on knowledge and service work are, on the other hand, subject to substantial debate. Because of this lack of agreement, new strategies for realizing commercial value via Intelligent Automation have limited coherence. An urgent need thus exists for study into the current breakthroughs in artificial intelligence (AI) and how they can affect the use of Intelligent Automation for the creation of economic value Current academic knowledge is an excellent resource for gaining strategic views on Intelligent Automation [5]. AI's possible influence on the workplace has been the subject of several research papers, many of which used good, and rigorous approaches. These contributions, on the other hand, come from a diverse variety of academic fields and are informed by divergent research paradigms,

theories, methodologies, and views, resulting in a lack of agreement on important results and consequences.

II. PROBLEM STATEMENT

The main problem that this paper will address is to review how intelligent automation is applied in service work especially in sectors that have not been previously explored. In advanced countries, employment in knowledge and service industries has increased significantly in the late 20th century and early 21st century, whereas employment in manufacturing sectors has decreased [6]. Reviewing the transformative implications of Intelligent Automation in areas that have been largely untouched by automation in comparison to other industries, including manufacturing. This is why the focus of this research will focus of this study will concentrate on the impacts of intelligent automation on knowledge and service work.

LITERATURE REVIEW

A. Dawn of the Service Revolution

A series of technological advances that began in the late eighteenth century transformed manufacturing by automating blue-collar employment. Because they made high-quality, low-cost manufactured items widely available and freed people from backbreaking manual work, they significantly raised our level of life. These days, our economies seem to be at a crossroads akin to that of the Industrial Revolution, except that it is occurring in the service sector [6]. Technology advances at a quick pace, becoming smarter, more powerful, and smaller, lighter, and cheaper in the process. Some of these technologies include hardware such as physical robot components (such as processors, sensors, cameras, chips), wearable technologies (such as smartwatches), drones, and autonomous vehicles (including their components), and code or software like analytics tools, voice recognition, image recognition, biometric identification and virtual and augmented reality (VRAR), cloud computing, mobile computing (such as GPS), geo-tagging, and low-code systems. These new technologies will have a profound impact on practically every industry. Together, service robots and artificial intelligence (AI) will spur innovation and, as a result, increase customer satisfaction, service quality, and efficiency [6].

The majority of the expenditures are invested in the development of robot and AI-delivered services, which delivers unparalleled economy of scale economies. In comparison to increasing the workforce, physical robots are cheaper, and virtual robots may be deployed with little additional expense. You don't have to spend any more money to make more virtual service robots (like chatbots and virtual agents). Virtual service robots like chatbots have significant scalability, but so do 'visual' ones like holograms [7,8]. To help travelers and cope with typical inquiries (e.g., arrival and departure data, instructions to check-in desks for a certain airline, and an airport lounge), an airport may place holographic humanoid service robots every 50 meters. To create these holograms, you simply need low-cost technology (such as a camera, microphones, speakers, and projectors) and no floor area. Many companies are already keen to try out service robots. Humanoid robots are being used in hotel lobbies to greet customers, deliver information, and amuse them. Boarding cards are scanned, and travelers are assisted in locating the correct departure gate at airports. To assist travelers, save time, self-moving check-in kiosk robots are being tested [8].

B. Intelligent Automation

The concept of automation is now well-known among businesses, with many automating workflows, recurring processes to save time. Artificial intelligence (AI), robots, and other new technologies bring the intelligent factor by performing human tasks and acting autonomously by making judgments or interpreting data without direct human involvement in the process. This "smart" confluence of technology and automated processes are called Intelligent Automation, and it is used in business process automation." [9]. The integration of robotics with many components from diverse developing technologies" is intelligent automation (IA). When it comes to Intelligent Automation, some companies may think they have time before it becomes a part of their everyday routine. While Alexa is a robot that reads tales to youngsters and plays music for elders using voice cues, the start of the pandemic has driven interactive sales bots to engage in dialog with potential customers through email and qualify sales chances; traffic reports combined with commuting advice. There is an infinite number of possibilities. Intelligent Automation has made its way into business as it has in our personal lives [9].

C. Technologies for Intelligent Automation

Decision support systems (DSS) and expert systems have been the focus of AI research since the 1970s (ES). Some of the AI discipline's most basic problems have been addressed in game-changing ways during the last few years [10]. Computer vision, machine learning, and natural language processing have all made significant strides in recent years. Cloud computing has enabled these advancements due to the fast expansion in big data's availability and accessibility as well as access to enormous processing capacity. In the last several years, improvements in artificial intelligence (AI) have given rise to a new class of systems that differ from previous DSS and knowledge-based algorithms in different aspects.

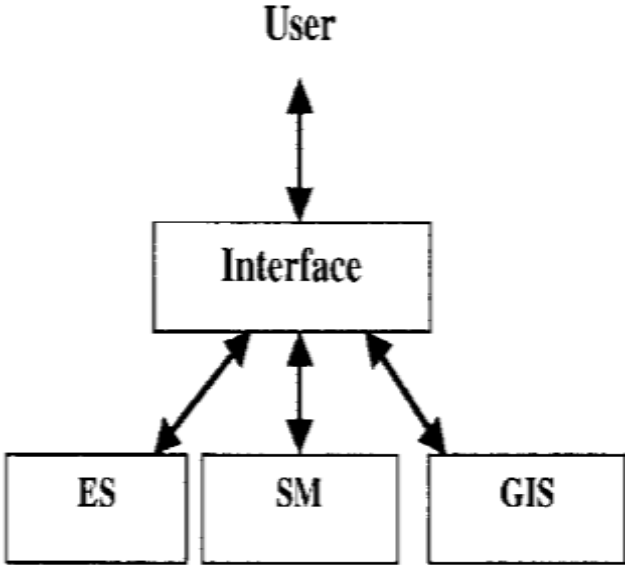

Fig i: Decision support system shell

In the knowledge and service industries, advances in machine learning are making it possible to design algorithms that can automate cognitive processes. Progress in machine learning algorithms that replicate human cognitive behavior is critical. Advances in artificial intelligence are therefore crucial, as improvements in machines' ability to create on their knowledge for strategic planning will likely follow in application areas of automated decisions. For instance, machine learning

algorithms are automating cognitive functions such as medical image processing and auditing duties such as finding accounting discrepancies in unusually high sales statistics [11].

Automating manual chores is made possible by combining ML and mobile robotics. It is difficult to pin down exactly what is meant by robotics because there are so many definitions out there. Scholars generally agree that embodiment and the portrayal of embodied behaviors set robots apart from other forms of artificial intelligence. As a result, we opted to go with the "technology having both virtual and actual embodied actions" definition of robots {12]. There are numerous applications for mobile robots in the knowledge and service industries. If you want a robot to do something like clean up after you or serve food in a restaurant, you may have one of these mobile service robots do the dirty work for you. These robots are capable of working independently without human supervision or input. The use of mobile robots may also make it possible for people to do physical tasks more quickly and accurately than they would have been able to if they relied solely on their physical talents [12].

Additionally, some robots exhibit human-machine interactions that resemble human conversation and are dubbed "social robots." Robotic systems can assist the elderly, the ill, and even serve as nannies and tutors.

D. Intelligent automation for employees and customers

It aids employees in completing tasks more quickly and efficiently while also providing them with more free time to accomplish other things. Insights, comments, connections, and team management may all be improved thanks to intelligent automation, which takes care of the mundane and transactional tasks for them [13]. There is a common excuse we use: "I don't have the time." We've freed up some time to focus on higher-quality work. Both the employee and consumer experiences are crucial. Intelligent automation can eliminate the need to stand in line for a rail ticket or visit a bank representative. Almost no one bothers to complain, and if they do, it's because most consumers never return. So, understanding what makes a customer happy and how to gain their loyalty is a bit of a mystery right now, with clever automation at the center of it all [13,14].

E. Organizational performance enhanced by intelligent automation

Either full automation of procedures or increased human capability can improve business process performance. Using Robotic Process Automation (RPA), for example, administrative processes can be automated. Instead of having employees do mundane data entry tasks, they can focus on higher-value activities such as validating insurance premium sales, making utility invoices, writing stories for publications and settling healthcare insurance disputes [14]. Even while doing complex jobs like robot-assisted surgery, Smart Automation and human skills have improved performance levels. Human surgeons may perform surgery with greater precision and less invasiveness with the help of a surgical robot, which results in faster patient recovery times and better outcomes. Examples include a comparison of robot-assisted radical cystectomy along with an improved healing process and the reduction of surgical morbidity and length of stay as compared to open surgery [15]. An impressive number of productivity gains have been documented in studies that combine Intelligent Automation technology with the interpersonal skills of employees. Because of this, the role of workers and Intelligent Automation technologies may have an impact on business process performance when both are present. Many studies have looked at how individuals working with automated business processes affect their performance, and the results have been conflicting, to say the least. Research on an experiment comparing rising levels of Intelligent Automation in rail signaling, for example, in the transportation industry depict how intelligent automation works [16]. Train signaling efficiency is more consistent at the greatest degree of automation, and personnel felt that the workload had decreased because of it. Air traffic controllers were able to achieve greater accuracy in air traffic delivery thanks to automation, according to a study based on real-world experience and testing. Researchers discovered that certain air traffic controllers experienced less physical but not mental fatigue.

III. FUTURE IN THE U.S

Intelligent automation is shaping the future of work in the United States. In the United States, several agencies are pioneering the use of sophisticated automation. For the Marines, there's the Department of Defense Innovation Unit and departments including Energy, Homeland Security, and HHS, as well as the Department of Defense. Data governance is another area where IA might be beneficial. According to the article, the Defense Innovation Unit of the Department of Defense has "focused on access to essential data sets, such as remotely sensed satellite photography." DIU has used subject-matter experts to train machine learning models to categorize unstructured data, resulting in more trustworthy data [17]. When it comes to intelligent automation implementation, the United States is rapidly setting the standard. Examples of new automotive safety features include automatic, self-driving autos, or risks detection. There will be many new technologies and applications created by intelligent technology that we have yet to envision. Progress will always lead to new opportunities, and innovative approaches to technology can assist in guiding future advancements toward more positive and powerful outcomes.

IV. ECONOMIC BENEFITS IN THE UNITED STATES

Intelligent automation in service jobs will have a positive economic impact on the United States. The American economy has always adapted and progressed along with technological advancements. Many jobs that were available 150 years ago are no longer available, and new jobs that no one could have predicted have risen in their stead. For example, in 1870, agriculture accounted for about half of all-American jobs, supplying the food needed by the country. 10 Today, agriculture only employs around 2% of the American workforce, and the amount of food produced in the United States surpasses the country's needs thanks in major part to technological advancement [18]. Intelligent Automation is being adopted by businesses at an increasing rate and on a larger scale. According to the American ideal, economic progress can lead to a more inclusive society where wealth is more widely distributed. Work serves a purpose beyond only providing a means of subsistence. It provides us with direction, dignity, and meaning in our daily lives. Therefore, employees should not be considered a cost of running a company but rather be valued for their contributions to productivity and innovation [19]. Many questions remain unanswered about the severity and speed of the consequences. It's possible that AI won't have significant new effects on the economy, so future workforce trends will be similar to those of the last several decades, with some favorable outcomes and some that are concerning and may necessitate policy

changes on the government's part. To put it another way, the goal here is to increase production rather than eliminate jobs. That's exactly what's required to boost the economy and create more jobs. Automation, on the other hand, does not merely replace work; it also serves to complement it. In the 1970s, banks, for example, adopted automated teller machines (ATMs), which replaced the work of bank employees. However, between 1980 and 2010, the number of bank tellers in the United States increased by 10% as bank branches refocused on providing consumers with relationship-based services like loans and investments.

V. CONCLUSION

The main purpose of this research was to investigate the strategic impacts of intelligent automation in knowledge and service work. The findings of this analysis indicate that Intelligent Automation of knowledge and service work is going to be a massively important worldwide economic advancement, and so this study lays the groundwork for further research by synthesizing previous studies, defining research needs, and proposing a research agenda. This paper makes three substantial contributions to the existing literature based on a thorough multi-disciplinary literature survey and business value theory. Our first step was to redefine Intelligent Automation in terms of its conceptualization and implementation. Secondly, was to present an Intelligent Automation business value model for information and service work and highlight research gaps that limit a thorough understanding of its benefits to service work and knowledge.

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