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Artificial Intelligence & Next-Gen Automation in hospitality Industry

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Abstract

AI and Next-Gen Automation are significant drivers of the digital revolution, reshaping the work of industries, institutions and service sectors. Artificial Intelligence (AI) allows machines, software systems and digital tools to learn, reason, make decisions, predict, understand language, recognize images – and do it quickly, accurately, flexibly and intelligently – and Next Generation Automation uses advanced technology to do the job intelligently. Next-gen automation is more adaptive than traditional automation due to the use of machine learning, deep learning, robotics, natural language processing, computer vision, cloud computing, big data analytics and IoT. The technologies enable machines to sense, analyze, decide and act with minimal human intervention. The major technologies, applications, benefits, employment, and ethical issues related to AI-based automation, are explained. In manufacturing, health care, education, banking, agriculture, transportation, logistics and governance, AI and automation are leveraged to enhance productivity, decision making, service delivery and resource utilization. The study also identifies issues of job insecurity, skill development, AI bias, privacy protection, accountability, data security and social inequality. Thus, the use of AI-based automation should be done responsibly, ethically and inclusively for sustainable technological development.

Keywords: Artificial Intelligence, Next-Gen Automation, Machine Learning, Deep Learning, Robotics, Natural Language Processing, Digital Transformation, AI Applications, Automation, Ethical Issues

Introduction

In the current age, Artificial Intelligence and Next-Gen Automation are two of the most crucial factors of technological change. Artificial Intelligence is the capability of computers and computer systems, and software, to execute tasks that typically require human intelligence, including abilities like learning, reasoning, problem solving, decision making, understanding language, recognizing images and prediction. Next generation automation, on the other hand, involves the utilization of advanced technologies to work faster, more accurately, flexibly and intelligently. Traditional automation relied primarily on set commands and repetitive actions, whereas next-generation automation is more dynamic as it is able to analyze data, learn from patterns, and continually improve its actions over time. With the convergence of Artificial Intelligence and automation, a new digital world has emerged where machines are not just doing physical or routine jobs but also assisting in the making of complex decisions and

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intelligent operations. Today, the transition from manual and traditional systems to intelligent digital systems is taking place in organisations and industries (Russell & Norvig, 2021). AI is leading the way in this transformation as it enables machines to make sense of vast amounts of data and generate results. In earlier times, automation has been applied in factories, production line and mechanical processes, but now it has been permeated into virtually all sectors of the society such as health care, education, banking, agriculture, transportation, business, communication, public administration etc. and customer services. AI-based automation might be used for disease diagnosis, detecting fraud, traffic handling, weather forecasting, online learning, robot operation, and consumer behavior analysis and decision-making in organizations. It also demonstrates that AI isn't just a tool for the tech industry; it's a pillar of contemporary online growth (Brynjolfsson & McAfee, 2014).

Next-Gen Automation is more intelligent, connected and adaptive than traditional automation. Traditional automation is based on set rules, whereas modern automation is based on the following technologies: machine learning, deep learning, robotics, natural language processing, computer vision, cloud computing, big data analytics, and Internet of Things technologies. These technologies help machines to sense, understand, decide and act with minimum human intervention. In smart factories, for instance, the machines equipped with AI can monitor the production process, detect defects, predict the failure time of machines, and adjust the production automatically. For offices, automation tools can take care of records, address customer enquiries, generate reports and deal data rapidly. AI-driven automation supports farmers in agriculture by improving crop monitoring, soil analysis, irrigation management and pest detection. Next-gen automation is not only transforming productivity but also how work is organized and managed (Davenport & Ronanki, 2018).

The role of Artificial Intelligence and Next-Gen Automation is growing in significance as the society needs swift services, precise information, cost-effective systems and effective resource management. AI automation helps businesses save on costs, enhance customer satisfaction and stay competitive. Intelligent systems are being used in governments to enhance public service delivery, data management and policy making. AI tools are implementing in educational institutions for personalized learning, assessment, and delivery of digital content. AI is used in health care for early diagnosis, patient monitoring and medical research. These are the advances that AI and automation are making towards economic growth, social development and institutional efficiency. They are also helping with the digital transformation by making systems smarter, faster and more responsive (Schwab, 2016).

Concept of Artificial Intelligence

Artificial Intelligence is a field of computer science and modern technology dedicated to developing machines, software systems and digital tools that can execute tasks which typically can be achieved only by human intelligence. Human intelligence also involves the capacity to learn from experience, comprehend language, to problem-solve, to identify patterns, to make

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decisions, to remember information, and to adapt behavior in response to changing circumstances. AI aims to engineer such capabilities into machines by employing algorithms, data, mathematical models and computing systems. Artificial Intelligence, in layman's terms, is giving machines the intelligence to think, learn, and act in a helpful manner. It doesn't imply that emotions or consciousness, like that of humans, exist in machines, but rather that some intelligent functions of the human mind can be simulated by machines. The concept of Artificial Intelligence is mainly based on learning and decision-making (Nilsson, 2010). While traditional computer programs are capable of only running as prescribed by humans, AI-based systems can enhance their capabilities through learning from data. An AI can pattern match, compare, and predict, for instance, when it is provided with a vast quantity of information. AI's ability can be applied to various fields, including speech recognition, image identification, medical diagnosis, fraud detection, online recommendations, language translation, smart assistants and automated vehicles. AI is not just a simple machine, it is an intelligent system that can analyze a situation and give an appropriate response (Mitchell, 1997).

Artificial Intelligence encompasses some critical technologies including machine learning, Deep Learning, Natural language processing, Computer vision, Robotics and Expert systems. Machine learning is a technique that enables computers to make sense of data without needing to be explicitly programmed for each specific task. Deep learning involves artificial neural networks to process and understand complex data, like images, voice and videos. Natural language processing is a technology that enables the computer to comprehend and reply to human language. Computer vision is a technology that enables machines to identify objects, faces, and signs or any visual information. In Robotics, AI is used in conjunction with machinery to make these machines capable of physical labor in a variety of settings, including factories, hospitals, homes and elsewhere. Combined, these technologies have made AI a very strong enabler for modern development. Artificial Intelligence is becoming more important due to the massive volume of data generated in the modern world every day (Goodfellow et al., 2016). AI systems have the ability to interpret and process such large amounts of data in a short amount of time, whereas human beings would require much longer. This is why AI is very helpful in decision making, planning, forecasting and problem-solving. AI has applications in business, such as customer service, market analysis and sales forecasting. In the medical field, it can help doctors to diagnose and plan treatment. In learning, it delivers customized learning and digital evaluation. It is useful in agriculture for crop monitoring, weather forecasting and soil analysis. In governance, it enhances the provision of services and the collection and use of data. So, AI is not just confined to a technical arena but has become part of development in social, economic and administrative areas. In general, Artificial Intelligence is associated with the notion of building smart devices or machines that can aid humans in their tasks and enhance productivity. AI helps in reducing human errors, saving time, increasing productivity and making better decisions. But, the use of Artificial Intelligence must be done wisely as it also

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poses problems on jobs, privacy, ethics, data security and dependence on the technology by human beings. Hence, the actual role of Artificial Intelligence is not to replace human beings but to augment their capabilities and aid in making the work more accurate, efficient and innovative. This is just one example of how Artificial Intelligence is shaping the future of digital transformation and intelligent automation (LeCun et al., 2015).

- **Meaning of Automation**

Automation is the use of machines, computer systems, software, digital tools and control technologies to perform tasks with little or no human intervention. Automation is the process of doing something or eliminating something manually with the use of technology, in simple terms. It can be used to perform repeated, time-consuming and routine tasks in a quicker, more accurate and more efficient manner. Automation can be applied to physical activities like using machines to produce goods, or to digital activities, like using computers to handle data, send messages, prepare reports or operate online services. The primary goal of automation is to help make work more productive, to minimize errors, to save time and to keep costs low and work consistent. Many jobs in traditional workplaces were done manually using human workers, this takes more time and effort and also has the risk of errors (Groover, 2015). These issues are addressed by automation, which involves the use of programmed systems that can execute the same process repeatedly, highly accurately. Used extensively in industries and offices, banks, hospitals, transport systems, agriculture, education and government service. Examples of automation include automatic billing machines, online banking systems, automated production lines, traffic signals, digital attendance systems and customer service chatbots. Therefore, automation plays a key role in contemporary development due to the fact it makes work faster, systematic and reliable (Parasuraman & Riley, 1997).

- **Traditional Automation**

The traditional automation is the first type of automation in which machines and systems were designed to do fixed and repetitive tasks following the pre-determined instructions. This form of automation is based on specific rules and cannot learn, think or make decisions for itself. Traditional automation is predominantly employed when the same operation needs to be repeated hundreds, thousands, if not even millions, of times in the same way, such as assembly lines in factories, packaging lines, automatic doors, conveyor belts, washing machines, elevators and simple industrial machines. The traditional automation is when a human person writes a program or mechanical arrangement and the machine runs the program over and over. It reduces manual labour but is not flexible in terms of production speed. The system is unable to adapt to changing working conditions and/or new problems without a human operator intervening with instructions. In a factory, for instance, a conventional machine might make a certain item over and over again, but if the product is altered, the machine might need to be reprogrammed or adjusted manually. Traditional automation became important in the growth of the industry as it helped in efficiency, less physical effort and mass production of goods. But

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its drawback is that it is not intelligent, adaptable and has no decision-making power. Can do repetitive tasks well, but can't analyze data, predict outcomes or auto-improve itself (Davenport & Kirby, 2016).

- **Next-Generation Automation**

Next generation automation is a high level of automation that employs intelligent technologies, including Artificial Intelligence, machine learning, robotics, cloud computing, Big Data Analytics, sensors, computer vision and Internet of Things. Next generation automation is not restricted to repetitive and fixed tasks like traditional automation. It can gather data, analyze information, identify patterns, make choices and self-improve over time. This type of automation is more flexible, intelligent and adaptive. Can adjust to varying circumstances and execute sophisticated tasks with less human oversight. In a smart factory, for instance, AI-powered equipment can automatically detect manufacturing defects, forecast machine health and failure, adjust the speed, manage inventory and optimize product quality. Next generation automation can be used to process documents and answer customer questions, to analyze financial data and support decision-making in offices (Nof, 2009).

Major Technologies Used in AI and Next-Gen Automation

The machine learning, deep learning, natural language processing, robotics, computer vision, big data analytics, internet of things and cloud computing are some of the major technologies that are predominately used in the field of Artificial Intelligence and next-generation automation. These technologies combine to create intelligent, flexible and efficient machines and software systems. Machine Learning allows systems to learn from data and increase their accuracy without having to be programmed again. Deep Learning enables machines to interpret complex information like images, speech, videos and text. Natural Language Processing and Computer Vision both play a role in helping computers understand and act on human language, and Computer Vision helps machines identify objects, faces and visual data (Parasuraman & Riley, 1997). Another important technology is robotics which enables intelligent machines to carry out physical tasks in industries, hospitals, agriculture and warehouses. Through Big Data Analytics, AI systems can analyze vast amounts of data and extract valuable insights for decision-making. The Internet of Things links machines, sensors and devices to automatically gather and exchange data. Cloud Computing is used for storage and computing power of AI-based systems. The technologies combine to create next-gen automation that is smarter, faster and more adaptive than traditional automation. They assist organizations to increase productivity, minimize errors, aid in decision making and enhance services.

Table 1: *Major Technologies Used in Artificial Intelligence and Next-Gen Automation*

S. No.	Major Technology	Explanation	Use in AI and Next-Gen Automation	Importance Value (%)

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1	Machine Learning	Machine Learning enables computer systems to learn from data and improve their performance without being directly programmed for every task.	It supports prediction, fraud detection, customer analysis, automation control and smart decision-making.	92
2	Deep Learning	Deep Learning is an advanced form of machine learning that uses artificial neural networks to process complex data such as images, voice, video and text.	It is useful in face recognition, medical imaging, voice assistants, smart cameras and autonomous systems.	90
3	Natural Language Processing	Natural Language Processing helps machines understand, interpret and respond to human language in written or spoken form.	It is used in chatbots, virtual assistants, translation tools, speech recognition and customer support systems.	88
4	Robotics	Robotics deals with the design and use of robots to perform physical tasks, especially when combined with Artificial Intelligence.	It is used in manufacturing, hospitals, agriculture, warehouses, logistics and dangerous work environments.	89
5	Computer Vision	Computer Vision enables machines to recognize and analyze images, objects, faces, signs and visual patterns.	It is useful in quality inspection, security systems, medical scanning, smart vehicles and industrial monitoring.	86
6	Big Data Analytics	Big Data Analytics helps in processing and analyzing large amounts of data to generate useful information and insights.	It supports business forecasting, risk analysis, customer behavior study, planning and decision-making.	85
7	Internet of Things	The Internet of Things connects devices, machines and sensors through the internet so that they can collect and share data automatically.	It supports smart factories, smart homes, agriculture monitoring, traffic systems and automation control.	84

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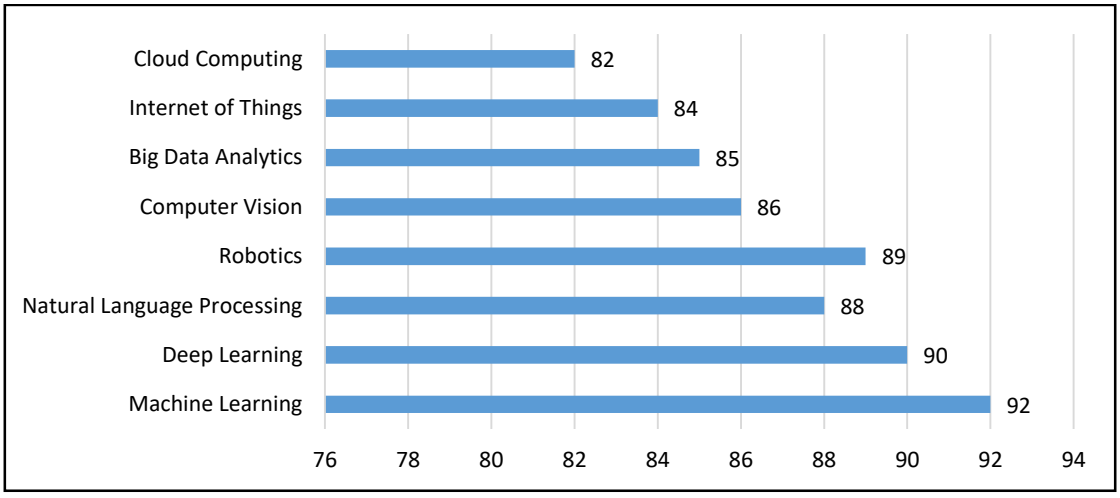
8	Cloud Computing	Cloud Computing provides internet-based storage, computing power and digital platforms for AI-based systems.	It helps AI systems store data, process information, scale services and provide faster digital solutions.	82

Figure 1: *Major Technologies Used in Artificial Intelligence and Next-Gen Automation*



Source: Table 1

Table 1 explains the major technologies used in Artificial Intelligence and Next-Gen Automation. Machine Learning has the highest importance value of 92%, which shows that it is one of the most important foundations of AI-based automation. It enables computer systems to learn from data and improve their performance without being directly programmed for every task. Machine Learning is widely used in prediction, fraud detection, customer analysis, automation control and smart decision-making. Deep Learning has an importance value of 90% and works as an advanced form of machine learning. It uses artificial neural networks to process complex data such as images, voice, videos and text. Deep Learning is useful in face recognition, medical imaging, voice assistants, smart cameras and autonomous systems. Robotics also has a high importance value of 89% because it combines Artificial Intelligence with physical machines. It helps robots perform tasks in manufacturing, hospitals, agriculture, warehouses, logistics and dangerous work environments. Natural Language Processing has an importance value of 88% and helps machines understand, interpret and respond to human language. It is used in chatbots, virtual assistants, translation tools, speech recognition and customer support systems. Computer Vision, with a value of 86%, enables machines to recognize and analyze images, objects, faces, signs and visual patterns. It supports quality inspection, security systems, medical scanning, smart vehicles and industrial monitoring. Big Data Analytics has an importance value of 85% because it helps in processing large amounts of data and generating useful insights for planning and decision-making. The Internet of Things

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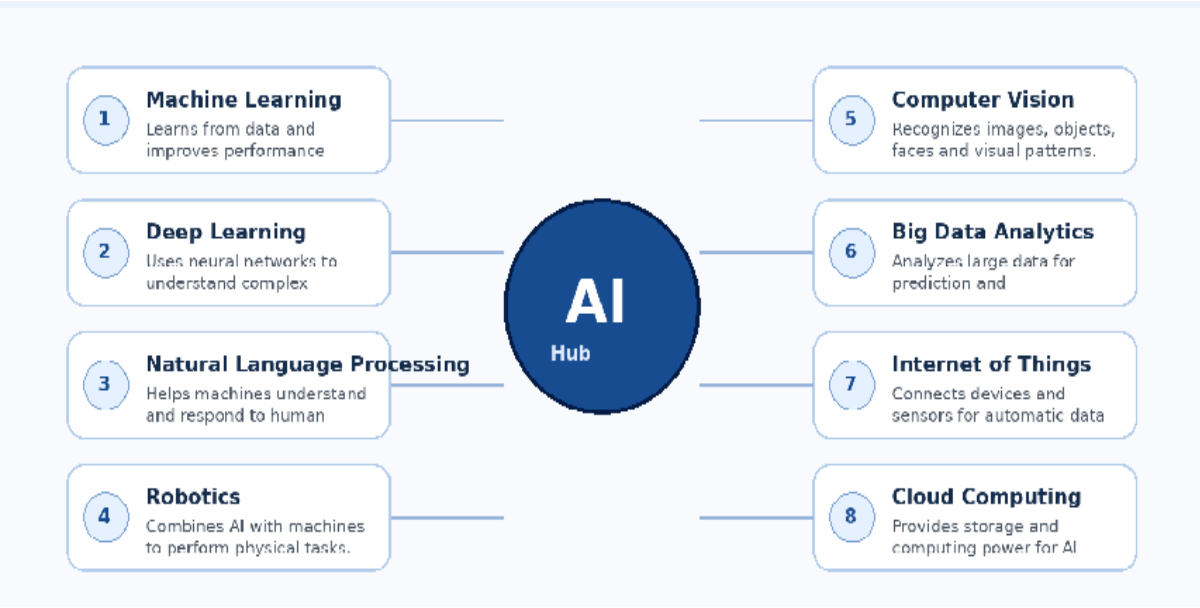
has a value of 84% and connects devices, sensors and machines so that they can collect and share data automatically. Cloud Computing has an importance value of 82% and provides storage, computing power and digital platforms for AI-based systems. Overall, the table shows that these technologies work together to make automation smarter, faster, more accurate and more useful for modern digital transformation.

Image 1: *Major Technologies Used in Artificial Intelligence and Next-Gen Automation*



It can be used in health care for medical diagnosis, patient monitoring, hospital management. It can be used in agriculture for crop monitoring, controlling irrigation and detecting the presence of pests. Next generation automation is also crucial as it enables human machine collaboration. It does not only replace manpower, but it also supports manpower in their work through providing accurate information, faster analysis and intelligent support. This automation, however, poses challenges like skilled personnel requirements, data privacy concerns, cyber security threats and job changes. However, next-generation automation is deemed as a significant solution towards reaching the ultimate goal of digital transformation by making systems smarter, faster, connected and efficient (Siau & Wang, 2018).

• Machine Learning

Machine Learning is a key technology for Artificial Intelligence and next generation automation. It is the capability of computer systems to learn from data and enhance their performance without explicit programming for individual tasks. Traditional programming involves human beings supplying computer with predetermined instructions and the computer executing those instructions. In machine learning, however, the system learns from data, detects patterns and draws conclusions or predictions from past data. For instance, if an online shopping site is able to learn from how customers behave, it can recommend products to them based on their interests. In the same way, banks can leverage machine learning to detect fraud;

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hospitals can apply machine learning to find patterns in diseases; and industries can apply machine learning to predict machine failure. Machine learning has a significant role in automation, enabling systems to learn from their experiences and make intelligent decisions. It enables automation systems to make more informed decisions, minimize mistakes, boost efficiency, and adapt to evolving circumstances. Next gen automation includes smart factories, automated customer service, financial analysis, medical diagnosis, traffic management, agriculture, business forecasting, all by using machine learning. Thus, machine learning is the basis of intelligent automation as it enables machines to learn from their experiences and continuously improve (World Economic Forum, 2020).

• Deep Learning

Deep Learning is an emerging field of machine learning, which involves using artificial neural networks to process complex data. It's based on the way the human brain works, with various levels of neurons aiding comprehension of information. In deep learning, a computer system consists of many layers of artificial neural networks that can be used to analyze large amounts of data, recognizing patterns at a deep level. This technology is particularly useful in complex areas such as image recognition, speech recognition, natural language understanding, medical image analysis, and face detection and autonomous driving. For instance, deep learning can enable a self-driving vehicle to identify roads, traffic lights, other cars, and people. In medicine, it can analyze the X-ray, CT scans and MRI images to help doctors identify diseases. When it comes to automation, deep learning makes systems more powerful by enabling them to process data that isn't structured, like images, sounds, videos, and text (Liakos et al., 2018). Traditional automation systems are not up to the task of dealing with such complex data, but systems that use deep learning can process and interpret the data with a high degree of accuracy. In robotics, security systems, voice assistants, smart cameras, recommendation systems, and inspection in industry are the various fields in which deep learning is broadly applied. It has become a key technology in next-generation automation because it enables machines to perform intelligent tasks that were earlier possible only through human observation and judgment (Kagermann et al., 2013).

• Natural Language Processing

NLP, short for Natural Language Processing, is a technology that assists computers to comprehend, interpret and react to human speech. Human language is complex as it encompasses words, grammar, meaning, emotions, context and various ways of expression. NLP enables computers to read, listen, interpret, translate, respond to questions, summarize information and interact with users in natural language. It can be applied to voice search, customer service systems, speech-to-text technology, automatic email replies, language translation services, and chatbots and virtual assistants. For instance, when someone would ask a digital assistant a question, the NLP would understand the question and give the appropriate answer (Young et al., 2018). The ability to communicate with humans via NLP is critical to

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next generation automation as many automated services rely on human-machine communication. NLP based chatbots are already being used in banks, hospitals, companies and government departments to give service to customers and respond to queries without involving human interaction. Another use of NLP is to for a business to review customer feedback, comments from social media, documents and reports. This enhances the quality of decision making and service. Hence, NLP is a crucial component of AI-driven automation, enabling machines to comprehend human communication and engage with humans more effectively (Jurafsky & Martin, 2023).

• Robotics

Robotics is a key technology of Artificial Intelligence and the next generation of automation. It involves the design, development and application of robots for physical work. A robot is a machine that can perform various tasks when combined with Artificial Intelligence, it becomes more intelligent, flexible and can make decisions. Most of the traditional robots were employed in the manufacturing industry on repetitive tasks like welding, painting, assembling and packaging. But now, with the latest advances in AI, the robots can perceive their environment, identify objects, navigate autonomously, adapt to their mistakes and collaborate with humans. Many fields use robotics including manufacturing, health care, agriculture, defense, space research, logistics, warehouses, and in household services. Robots enhance the working efficiency, accuracy and safety in industry. Robotic systems assist in the delivery of medicine and in patient care in hospital settings. Robots can be used for sowing, harvesting, spraying and monitoring crops in agriculture. At warehouses, robots deal with merchandise, arrange and help delivery systems (Hirschberg & Manning, 2015). The reason for the high importance of robotics in next generation automation is that it enables digital intelligence to be integrated with physical action. It enables automated systems to analyze information as well as to execute physical activities. With AI-driven robotics, human operators are not at risk in hazardous environments, efficiency is boosted, and advanced industrial development is enabled. For this reason, robotics is one of the most solid bases for intelligent automation, and the future of technology.

Applications of AI and Next-Gen Automation

AI and the next-generation of automation is becoming ubiquitous in nearly all fields of the modern world. AI-based automation is not restricted to machines used in the factories; it is an intelligent digital system that can be used for decision making, data analysis, prediction, communication, service delivery and intelligent control. Next-generation automation employs Artificial Intelligence, machine learning, robotics, natural language processing, computer vision and data analytics to assist with more complicated tasks, and it is primarily automated tasks that were previously tedious that are being performed. It is used primarily to improve the efficiency of work, minimize human error, save time, enhance productivity and deliver better service. AI and automation are now deployed across industries and businesses to enhance their

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performance and manage complex data sets, in hospitals to streamline patient management, in banks to boost customer support, etc. and on farms, schools, transport systems and government departments (Wirtz et al., 2019). AI and next-gen automation are increasingly being adopted in the manufacturing and industrial spaces for optimizing production processes. Smart machines and robots can have high accuracy for activities like assembling, welding, packaging, quality checking and material handling. AI can constantly monitor machines and anticipate technical problems before they break down. It's called predictive maintenance. It assists industries minimize downtime, reduce repair expenses and keep a seamless manufacturing. Computer vision technology can also be employed to detect defects in products, monitor quality and ensure standard production. Smart factories use AI-driven automation to link machines, sensors, and software systems and manage production in a smarter, more flexible way. This leads to increased productivity, competitiveness and cost-effectiveness of industries (Zhong et al., 2017).

AI and automation have proved to be very useful in the health care industry in the diagnosis, treatment, healthcare and hospital management. These AI tools can be used to examine medical reports, X-rays, CT scans, MRI images, and patient records, aiding physicians in early disease diagnosis. Computerized systems can be used to schedule appointments, track patients, administer medications, and process hospital records. Robotic technology also has a role in providing high precision during surgeries. AI-powered technologies have the potential to forecast health risks, recommend treatment plans, and assist with tele-healthcare. Automated systems can assist doctors and nurses in emergency care by giving them rapid information regarding the patient's condition. Thus, AI and automation enhance the quality, rapidity and accuracy of health care services (Jiang et al., 2017).

The education sector is undergoing a transformation of the traditional teaching-learning process with the use of Artificial Intelligence and next-generation automation. AI-based learning platforms can provide personalized learning according to the needs, ability and performance of each student. Automated assessment systems can evaluate assignments, make online tests and give instant feedback. AI can also be used by teachers to pinpoint areas where students may be having difficulties and develop more effective lesson plans. Virtual classrooms, smart content, language translation tools and digital tutors are examples of AI applications in education. Administrative tasks like attendance monitoring, admission control, examination records, student data analysis are also assisted by automation. This contributes to a more flexible, accessible and student oriented education (Holmes et al., 2019). AI and next-gen automation are employed in banking, finance, and business to provide swift and secure services. AI is applied to fraud detection, loan approval, credit scoring, customer support, and risk analysis, among other things, by banks. Automated systems can identify and alert customers to suspicious activity and prevent financial fraud. Customer’s queries are answered and banking services provided by chatbots anytime. AI can be used in business organizations for market

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analysis, sales forecasting, inventory management, CRM and digital marketing. Automation means that there is less paper involved, processes are faster, and decisions are made faster. AI also plays a crucial role in the world of e-commerce, where it is used to make product recommendations to customers based on their search history and purchase behaviour and preferences. In this way, AI and automation aid in business expansion and customer satisfaction (Huang & Rust, 2018).

Table 2: *Applications of AI and Next-Gen Automation in Different Sectors*

S. No.	Sector	Application of AI and Next-Gen Automation	Explanation	Application Value (%)
1	Manufacturing	Smart Production and Quality Control	AI-enabled machines and robots help in production, assembling, packaging, defect detection and predictive maintenance.	92
2	Health Care	Diagnosis and Patient Care	AI supports disease diagnosis, medical image analysis, patient monitoring, robotic surgery and hospital management.	90
3	Education	Smart Learning Systems	AI helps in personalized learning, online assessment, digital classrooms, student performance analysis and smart content delivery.	86
4	Banking and Finance	Fraud Detection and Digital Services	AI is used for fraud detection, credit scoring, loan processing, customer service, risk analysis and secure transactions.	88
5	Agriculture	Precision Farming	AI helps in soil analysis, crop monitoring, pest detection, weather prediction, irrigation control and farm management.	85
6	Transportation	Traffic and Route Management	AI supports route planning, traffic control, autonomous vehicles, vehicle tracking and accident reduction systems.	84
7	Logistics and Warehousing	Automated Supply Chain Management	AI and robots help in inventory control, goods movement,	83

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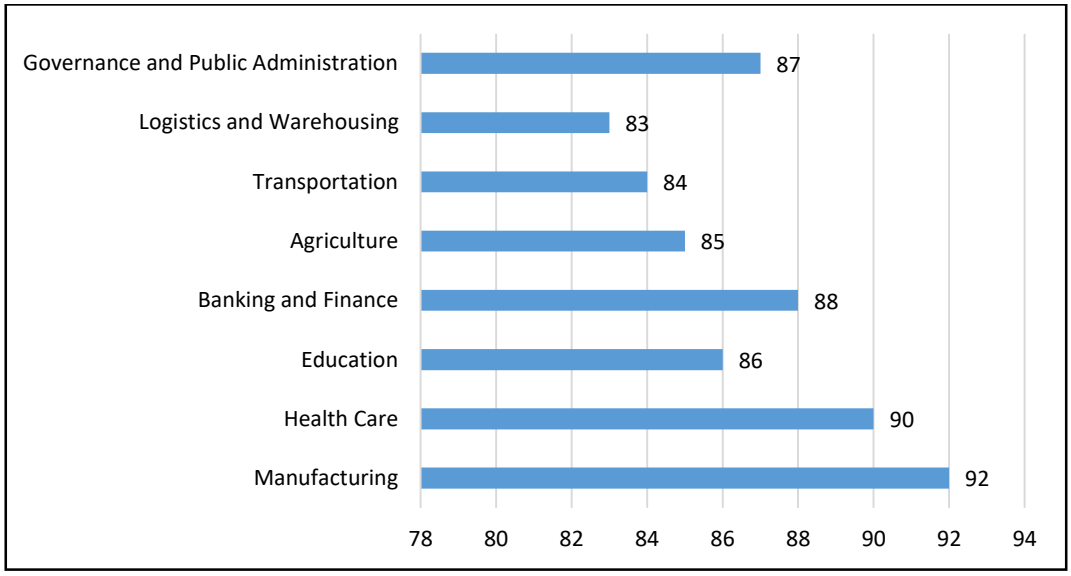
			delivery tracking, warehouse automation and supply chain optimization.	
8	Governance and Public Administration	Digital Public Service Delivery	AI helps in data management, document processing, grievance redressal, public safety, policy planning and citizen services.	87

Figure 2: *Applications of AI and Next-Gen Automation in Different Sectors*



Source: Table 2

Table 2 explains the applications of Artificial Intelligence and Next-Gen Automation in different sectors. The highest application value is found in the manufacturing sector with 92%, where AI-enabled machines and robots are used for smart production, assembling, packaging, defect detection, quality control and predictive maintenance. This shows that manufacturing industries depend heavily on AI automation to increase production speed, improve accuracy and reduce machine failure. Health care has an application value of 90%, which indicates the strong role of AI in diagnosis and patient care. AI supports disease detection, medical image analysis, patient monitoring, robotic surgery and hospital management. Banking and finance also have a high application value of 88%, where AI is used for fraud detection, credit scoring, loan processing, customer service, risk analysis and secure digital transactions. Governance and public administration show an application value of 87%, where AI supports data management, document processing, grievance redressal, public safety, policy planning and citizen services. The table also shows that AI and next-gen automation are becoming important in education, agriculture, transportation, logistics and warehousing. In education, AI has an application value of 86% and supports personalized learning, online assessment, digital classrooms, student performance analysis and smart content delivery. In agriculture, AI has a

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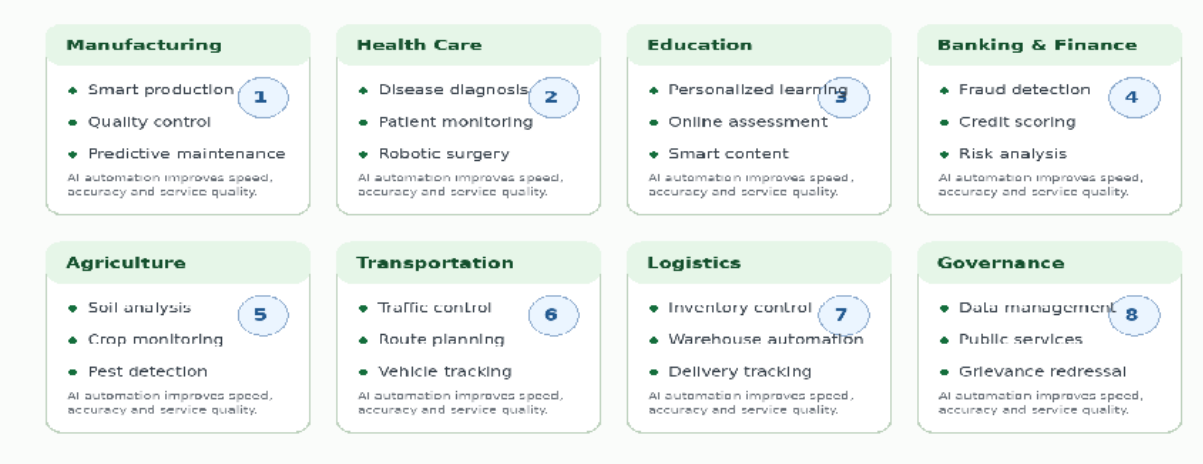
value of 85% and is used for precision farming, soil analysis, crop monitoring, pest detection, weather prediction, irrigation control and farm management. Transportation has an application value of 84%, where AI helps in route planning, traffic control, autonomous vehicles, vehicle tracking and accident reduction systems. Logistics and warehousing have an application value of 83%, where AI and robots support inventory control, goods movement, delivery tracking, warehouse automation and supply chain optimization. Overall, the table shows that AI and next-gen automation are useful across almost all major sectors because they improve speed, accuracy, efficiency, safety and decision-making.

Image 2: *Applications of AI and Next-Gen Automation in Different Sectors*



In agriculture, AI and next-generation automation technologies can be beneficial in enhancing the production and management of crops. AI systems can determine soil quality, weather conditions, crop health and pest attacks. Agricultural monitoring via drones, sensors and smart irrigation systems to improve the use of water, fertilizers and pesticides. AI can predict crop diseases and suggest suitable preventive measures. Automated machines are also used to sow and harvest crops, spray and sort agricultural products. These technologies aim at minimising labor dependence and supporting farmers' decision making. In a nation as vital as India, where agriculture is a significant industry, AI-driven automation can play a role in precision farming and help prevent crop loss and boost farmers' profits. AI and automation in transportation and logistics are applied to route planning, traffic control, vehicle tracking, and delivery and warehouse operations. AI can analyze traffic data and suggest the fastest routes to reduce travel time and fuel consumption. Dr. Alex H. Ritter, researcher in artificial intelligence, develops systems to identify roads, signals, pedestrians and obstacles in autonomous vehicles and driver-assistance systems. In the field of logistics, automated warehouses involve robots to transport, organize and manage inventory. AI can also assist companies in monitoring shipments and forecasting delays and optimizing supply chains. These applications enhance speed, safety and efficiency in transport and delivery activities (Liakos et al., 2018).

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AI and next-gen automation are transforming governance and public administration by enhancing public service delivery and administrative efficiency. AI can be used in government departments to handle data management, document processing, handling grievances, customer service portals, and policy development. Improved service transparency and reduced delays with automated systems. AI can also be used to assist in public safety, health schemes and welfare programme implementation, traffic monitoring, and disaster management. AI can provide governments with insights from big data, informing their development policies. So, AI-driven automation can enhance governance to be more efficient, responsive, and citizen-centric. In short, the applications of AI and next generation automation are vast and revolutionary. They are enhancing the functioning system of industries, health care, education, agriculture, banking, transport, business and governance. These technologies enable the task to be accomplished more quickly, with less mistakes, conserving resources and making decisions. They must be implemented with the right infrastructure, trained workforce, ethical applications, data protection and cybersecurity, however. With proper use, Artificial Intelligence and next-gen automation can be a force for economic growth, digital transformation and social development (Winkelhaus & Grosse, 2020).

Benefits of Artificial Intelligence and Next-Gen Automation

AI and Next-Gen Automation offers these advantages:

In today's digital age, Artificial Intelligence and next generation automation offer a number of important advantages. They enable individuals, institutions, industries and organizations to accomplish the same tasks in a more efficient, accurate and rapid way. Traditionally, it relied on human effort and mechanical processes that are fixed, but with the help of AI-driven automation, it's powered by intelligent software, data analysis, machine learning, robotics, and smart digital tools, which helps to enhance the quality of work. The greatest advantage of Artificial Intelligence and next gen automation is that it eliminates any unnecessary manual effort and enables humans to perform more creative, strategic and decision making activities. Different industries like manufacturing, healthcare, education, banking, agriculture, transport, and business and governance can use AI and automation to boost productivity, enhance service quality, and optimize overall performance (Royo & Ballesta-Garcia, 2019).

A key advantage of Artificial Intelligence and next generation automation is increased productivity. AI systems can complete numerous tasks more quickly than human labor and don't get tired. Automated machines and robots may be able to make a product more quickly and of standard quality in industries. Automation software in the office can handle paperwork, create paperwork, categorize records, and produce paperwork and routine correspondence within a period of time. This enables organizations to accomplish more in a shorter period of time. AI systems can also process large amounts of data quickly, giving valuable insights for planning and decision-making to boost productivity. This leads to an increase in the efficiency and competitiveness of institutions and businesses. Another one of its major advantages is that

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it minimizes human error. While human beings can make mistakes because they are tired, not paying attention, being under pressure or focused on insufficient information, automated systems can execute repetitive tasks with a high degree of precision. In banking, AI can be used to identify fraud patterns and detect errors in transactions. For health care professionals, AI can assist in making detailed analyses of medical images and patient data. In manufacturing, computer vision and smart sensors can detect manufacturing defects which may be missed during manual inspection. This accuracy equates to quality, safety and reliability. As a result, AI and automation are beneficial in industries where any error can have a significant impact.

Artificial Intelligence and next generation automation also plays a key role in quick and accurate decision making (Kamilaris & Prenafeta-Boldú, 2018). Data is a crucial asset for modern organizations, with a significant amount being produced on a daily basis, and manual analysis of this data is challenging. AI systems are capable of handling vast amounts of data, finding patterns, making comparisons and forecasting in a matter of seconds. This assists in the managerial, medical, educational, banking, agricultural and governmental decisions. For instance, AI can be used for forecasting customer demand, to guide farmers on when to irrigate crops, detect disease risks for doctors, and to plan public service for governments. This is how AI can not only be used to automate tasks, but also enhance the quality of decision-making.

Another significant advantage of AI and next generation automation is cost savings. Although the initial cost of installing AI-based systems may be high, in the long term these technologies can reduce operational costs. Automation saves time, cuts paper, less reliance on manual work in repetitive tasks, optimizes resources. Predictive maintenance aids in avoiding unplanned machine failures and costly repairs in industries. Digital automation in offices saves administrative burden and enhances processes. Smart irrigation and crop monitoring in agriculture minimizes losses of water, fertilizers and pesticide. Therefore, AI and automation are contributing to the efficient and economical use of resources by organizations.

AI and new-generation automation also enhance the quality of service and customer satisfaction. AI chatbots, virtual assistants and automated service platforms are widely used by many organizations to provide customers with quick answers to their queries. These systems can be providing services around the clock without having to rely on office hours. In banking, people are able to get help anytime via the digital platforms. AI suggests products to users based on their preferences in e-commerce. In the healthcare sector, automated scheduling and patient tracking enhance patient care (Huang & Rust, 2018). Quick response, customized services and correct information boosts client trust and satisfaction. As such, AI-powered automation is crucial for enhancing the user experience. Innovation and digital transformation is another advantage. Artificial Intelligence fosters new ways of working, new business models and new technological solutions. It supports businesses in the creation of smart products, production optimization, provision of digital services and global competition. Next-gen automation is the catalyst for digital transformation that integrates machines with data, people

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and services with intelligent systems. Such a transformation includes smart factories, smart classrooms, telemedicine, online banking, autonomous vehicles, precision farming and smart governance. These innovations help to improve the technology and efficiency of society and make it more connected.

AI and next generation automation also enhance safety and risk management. In dangerous environments where a human life could be endangered, like mines, chemical factories, disaster areas, deep-sea and high-temperature industrial environments, robots and automated systems can be used. AI can also anticipate issues based on information and alert users in advance of any issue becoming serious. AI systems can also be used in the transportation industry to improve safety by monitoring traffic and providing driver support. AI can be used to identify suspicious activity and safeguard digital systems from attacks. This proves that AI and automation can serve not just purposes of efficiency but also safety and protection. Furthermore, AI and automation aid in more efficient resource management and sustainability. Intelligent systems can contribute to a reduction in waste, can save energy and improve the use of natural resources (Porter & Heppelmann, 2014). AI can help farmers manage their water usage and fertiliser application more effectively on the farm. In urban areas, smart systems can provide better management of electricity, traffic, waste and public services. Automation can help in saving material wastage and energy use in industries. These benefits are vital to sustainable development since they seek to balance the economy with protection of the environment.

Table 3: *Key Benefits of Artificial Intelligence and Next-Gen Automation*

S. No.	Key Benefit	Explanation	Benefit Value (%)
1	Increase in Productivity	AI and automation complete tasks faster and more efficiently, which helps organizations increase output and save time.	92
2	Reduction in Human Errors	Automated systems reduce mistakes in repetitive, technical and data-based work by maintaining consistency and accuracy.	90
3	Faster Decision-Making	AI analyzes large amounts of data quickly and provides useful insights for better planning and decision-making.	88
4	Cost Reduction	Automation reduces operational costs by saving time, reducing paperwork and improving resource utilization.	86
5	Better Service Quality	AI-based systems improve customer service through chatbots, virtual assistants, quick response and personalized support.	85

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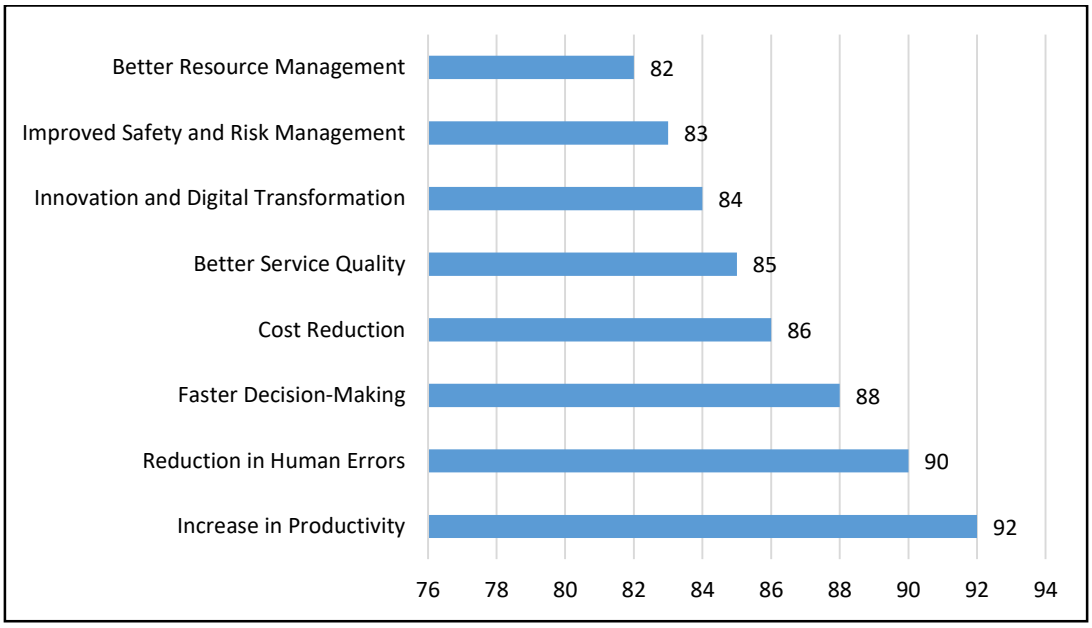
6	Innovation and Digital Transformation	AI supports new business models, smart products, digital services and advanced technological development.	84
7	Improved Safety and Risk Management	AI and robots can perform dangerous tasks and predict risks before they become serious problems.	83
8	Better Resource Management	AI helps reduce waste, save energy and improve the use of natural resources in industries, cities and agriculture.	82

Figure 3: *Key Benefits of Artificial Intelligence and Next-Gen Automation*



Source: Table 3

Explained below are the key benefits of Artificial Intelligence and Next-Gen Automation (AI & Next-Gen AU). The highest benefit value is an increase in productivity with 92%, reflecting that AI and automation contribute to completing tasks more quickly and efficiently within an organization. AI-powered systems can boost productivity and save time by minimizing manual workload and expediting repetitive tasks. Reduction in human errors: 90% benefit, automated systems ensure accuracy and consistency in repetitive, technical and data-based tasks. This is because AI can process massive amounts of data in a short period of time and generate valuable insights for decision-making, planning and forecasting processes, the value of which is 88%. Cost reduction worth 86%, demonstrates how automation can reduce operational costs, by saving time, reducing paperwork, optimizing the use of resources and minimizing the reliance on manual processes. Better service quality, innovation, safety and resource management are also top advantages of AI and automation of the next generation, the table shows. The value of

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better service quality is 85%, which is because AI systems like chatbots, virtual assistants and automated response systems offer instant, tailored and on-demand support to users. AI enables new business models, smart products, advanced digital services and modern technological development, and is valued at 84%.AI is valued at 84% for the innovation and digital transformation and its support of new business models, smart products, advanced digital services and modern technological development. The value of improved safety and risk management is 83% due to the ability of AI and robots to handle risky tasks and anticipate dangers before they become serious issues. 72% of the value goes to better resource management, indicating AI's role in minimizing waste, conserving energy, and optimizing the utilization of natural resources in industrial, urban, and agricultural settings. The table indicates that AI and Next-Gen Automation are a very good choice to enhance productivity, accuracy, efficiency, service quality and sustainable development.

Increase in Productivity

Artificial Intelligence and automation improve productivity by improving the speed of work, systemizing and making it more efficient. Many operations in traditional systems require manual work, making the entire working process slower and requiring more time. This delay is minimized by AI-driven automation of repetitive, routine and data-based tasks. In the manufacturing sector, for instance, automated machines can operate and create products at a faster pace than human workers. AI can handle office-related tasks such as record keeping, generating reports, processing documents, and addressing customer queries in a timely fashion. It gives workers the time to plan, be creative, supervise and make decisions rather than performing routine tasks. AI can also optimize resource utilization by identifying unnecessary delays, optimizing workflow, and forecasting future resource needs. Through this, AI and automation enhance performance, save time and boost efficiency across institutions, industries and businesses (Jarrahi, 2018).

- **Improved Human Errors (Reduction)**

One of the significant advantages of Artificial Intelligence and automation is the minimisation of human error. People can get tired, distracted, stressed, bored or go through repetitive tasks, which causes errors in their work. Automated systems, by contrast, rely on programmed instructions and consistently analyze data, which is accurate as well. This can be particularly beneficial in industries where marginal errors can result in substantial issues, like health care, finance, manufacturing, aviation, and data management (Graetz & Michaels, 2018). AI systems, for instance, can identify any unusual banking activity, find mistakes in digital records, and assist doctors with reading medical reports, or check product defects in factories. The uniformity of quality is also achieved through automation as the machine can perform the same task over and over without losing attention. AI and automation minimize human error, ensuring reliability, safety, service quality and customer trust. Hence, the automated systems

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are very useful in the work requiring accuracy, speed and consistency (Acemoglu & Restrepo, 2018).

- **Faster Decision-Making**

Artificial Intelligence helps in quick decision making by processing vast volumes of data in a matter of seconds. Organisations gather vast amounts of data from customers, machines, markets, financial transactions, and from the Web and public services in today's digital age. It's tough for human beings to manually study all this and make decisions quickly. But AI addresses that by finding patterns and trends, risks and opportunities, from data. For instance, AI can help businesses foresee customer needs, financial institutions in evaluating financial risks, doctors in diagnosis, and farmers in weather and crop analysis. AI-driven systems can offer valuable insights and support the decision-making process to select the optimal solution at the right time. The timely decision-making results in better planning and helps organisations to adapt to any changes quickly. In other words, AI doesn't take the place of human judgment entirely, but it assists in human decision-making by offering accurate, timely and data-driven information (Duan et al., 2019).

Increase in Productivity

Artificial Intelligence and automation increase productivity by making work faster, more systematic and more efficient. In traditional systems, many tasks depend on manual effort, which takes more time and may slow down the overall working process. AI-based automation reduces this delay by performing repetitive, routine and data-based tasks automatically. For example, in manufacturing industries, automated machines can work continuously and produce goods at a higher speed than manual production. In offices, AI tools can manage records, prepare reports, process documents and handle customer queries within a short time. This allows employees to focus on planning, creativity, supervision and decision-making instead of spending time on routine work. AI also helps organizations use resources more effectively by identifying unnecessary delays, improving workflow and predicting future needs. In this way, AI and automation improve output, save time and increase the overall efficiency of institutions, industries and businesses (Shmueli & Koppius, 2011).

- **Reduction in Human Errors**

Artificial Intelligence and automation are both huge advantage to human beings in eliminating human errors. Tiredness, lack of concentration in tasks, work pressure, lack of time or repetition of tasks can cause human beings to make mistakes. Unlike automated systems, which run on pre-programmed instructions and process data in the same way every time, manned systems are man-powered. Manned systems are man-powered, whereas automated systems process data in the same manner each time, and act according to an algorithm or programmed instructions. This is particularly beneficial in industries where errors can have severe repercussions, including health services, banking, manufacturing, and data management and aviation. For instance, AI-powered systems can help identify odd banking transactions, read

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through medical reports and identify product defects in factories. The uniformity of quality is also a benefit of automation as it can perform the same operation continuously without distractions. AI and automation decrease mistakes, thus enhancing dependability, safety, service quality and consumer trust. Hence, automated systems are very useful in tasks which demand accuracy, speed, and consistency (Keding, 2021).

- **Faster Decision-Making**

Artificial Intelligence helps to provide quick decisions based on analysing huge data in a no-time span. Organizations today gather massive customer, machine, market, financial, online service and public data. Human beings can't manually study so much information and make quick decision. AI is a solution to this because it can detect patterns, trends, risks, and opportunities in data. AI can predict customer needs for businesses, financial risk analysis for banks, diagnosis for doctors and weather and crop analysis for farmers, for instance. AI-powered systems can offer valuable insights that assist in making informed decisions at the right time. The quicker decisions are taken, the better they are going to be planned, and the less time will be lost in deciding. The quicker decisions are made, the better they are going to be planned, the less time will be lost in deciding. So, AI cannot entirely replace human judgment, but can aid human decision-making by providing accurate, timely and data-based information (Raisch & Krakowski, 2021).

Impact on Employment and Workforce

Artificial Intelligence and next generation automation have an immense influence on employment and workforce with their impact on the nature of work, skill requirements and job opportunities in almost every sector. In the past, most work was reliant on human effort, manual processes and fixed office or industrial systems. Many tasks, however, are being accomplished by intelligent machines, software systems, robots and digital platforms with the advent of AI-based automation. This has increased speed, accuracy, and productivity, but raised questions about jobs. AI and automation have a more significant impact on repetitive, routine, and low-skill jobs, which are more susceptible to these tasks. For instance, routine data entry, basic customer assistance, packaging, simple manufacturing jobs and repetitive clerical duties can now be automated. Meanwhile, AI and automation not just eliminate certain roles, but also generate new ones. The need for skilled workers is growing in the field of data science, AI development, machine learning, robotics, cybersecurity, cloud computing, digital marketing, software management and automation maintenance, etc. due to the use of intelligent technologies in the industries and the institutions. This indicates that there is a transition from routine jobs to skill-based and knowledge-based jobs. Employees who are able to use digital tools, interpret data, manage automated systems and adjust to new technology will find more career options (Provost & Fawcett, 2013). AI is not just an employment threat, it's also an opportunity for new jobs. This transformation of the workplace by AI also makes evident a need for skill development and training. The ability to work in the digital world requires digital

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skills, technical skills, problem-solving skills, communication skills and adaptability. Educational institutions, industries and governments need to provide training programmes so that workers can adjust to the changing demands of the job market. The skills which are not possible to be replaced by machines like creativity, emotional intelligence, leadership, ethical judgements and critical thinking will remain crucial in the future. Therefore, it will be necessary for the future workforce to rely on the collaboration between human and intelligent machines. AI and automation can be a force for greater productivity, new opportunities and economic growth if properly managed, and can assist workers in transition to higher and better types of jobs (Frey & Osborne, 2017).

- **Job Displacement**

In certain industries, AI and automation can result in job loss as these technologies can take on a significant number of repetitive and routine tasks that are more quickly and effectively completed by machines and intelligent software than by humans. Work roles that are repetitive, related to data entry, routine record-keeping, packaging, assembly line, billing, customer service, and other routine administrative tasks are more likely to be impacted by automation. In factories, for instance, robots can work without getting tired, doing production and package works. AI-powered software can handle documents, record keeping and prepare reports in the office in a short time. In financial institutions, chatbots and automation technologies can provide customer information and handle simple transactions. Consequently, there may be a reduced demand for workers engaged in only low-skilled, repetitive work. But with job displacement, it is not like all the human work will be lost. Primarily it's the transformation of work. In the evolving workplace, workers with only routine skills skills may find challenges, while workers who acquire new digital and technical skills may find new opportunities (Acemoglu & Restrepo, 2020).

- **New jobs created**

While AI and automation might eliminate some existing roles, they also generate numerous new opportunities in the modern and tech-driven industries. With the implementation of AI systems in organizations, there is an increasing demand for professionals who can design, develop, operate, maintain and monitor these systems. New jobs are being created in areas such as AI development, machine learning, data science, robotics, cybersecurity, cloud computing, digital marketing, automation management and software support. Imagine a situation where a business requires someone to analyze vast amounts of data, an AI engineer to create intelligent systems, a robotics technician for automated machines, or a cybersecurity expert to safeguard digital systems.For instance, in the field of data analysis, companies call upon data analysts to delve into massive data sets, and AI engineers to build intelligent systems, while robotics technicians are needed to maintain automated machines and cybersecurity experts protect digital systems (Webb, 2020). However, aside from technical roles, AI is also generating opportunities in other areas such as training, consulting, digital project management, and online

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education and technology-based assistance. AI and automation are not just eliminating jobs; they are reshaping the job market by generating new job roles. These new opportunities are for those workers who are ready to learn and adapt. By doing so, AI-driven automation is transforming the nature of work, moving from manual to knowledge-based, skill-based and technology-based.

➢ **Need for Skill Development**

Skill development is an important aspect for people in their work, school or professional lives, as a result of the evolution and advancement of Artificial Intelligence and Next Generation Automation. The AI era demands a blend of skills that goes beyond the confines of standard working methods. Digital literacy, technical knowledge, problem-solving, data understanding, communication and adaptability are required skills for workers. Skill development is necessary to equip workers with new skills and make them relevant in the evolving job market. For example, a factory worker may need to learn how to operate automated machines, a bank employee may need to understand digital banking tools, a teacher may need to use AI-based learning platforms and an office worker may need to work with data management software. Computer skills, automation, data analysis, robotics, cyber security and digital communication training can help to enhance job prospects. The skill aspect is also relevant, as AI can't replace creativity, emotional intelligence, leadership, ethical judgement and critical thinking. Thus, labourers need to integrate human skills with digital skills. There is a need for training programmes for the future by the governments, education institutes and industries. Through this, the focus shifts to skill-building as the means to minimize the risk of unemployment and for people to enjoy the services of AI and automation (van Laar et al., 2017).

Ethical and Social Issues

Artificial Intelligence and next generation automation have generated numerous ethical and social challenges due to the direct impact on human life and work, privacy, equality and decision making. There are critical sectors like banking, healthcare, education, recruitment, policing, business, governance and public services that employ AI systems. The conclusions and/or supporting conclusions of these systems can have a bearing on people's options, rights and futures. Therefore, it is necessary to ensure that AI is used in a fair, transparent, responsible and human-centered manner. Ethical issues relate to what is right and what is wrong, fair and unfair, responsible and irresponsible or protection of human values. Social issues are related to the impact of AI on society, employment, equality, access to technology and human relationships. However, without adequate regulation, AI and automation can pose challenges like discrimination, data misuse, data imbalance, and lack of accountability (Deming, 2017).

Table 4: *Ethical and Social Issues of AI-Based Automation*

S. No.	Ethical and Social Issue	Explanation	Possible Impact	Concern Value (%)

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1	AI Bias	AI systems may produce unfair results if the training data is biased, incomplete or unbalanced.	It can create discrimination in recruitment, banking, education, health care and public services.	90
2	Accountability	It is difficult to decide who is responsible when an AI system makes a wrong decision.	Lack of responsibility may reduce public trust and create legal or ethical confusion.	88
3	Privacy Protection	AI systems collect and process large amounts of personal and organizational data.	Misuse of data can lead to surveillance, fraud, identity theft and loss of privacy.	89
4	Data Security	AI-based automation depends on digital data and connected systems.	Weak security may increase the risk of hacking, cyberattacks and data leakage.	86
5	Social Inequality	People with better digital access may benefit more from AI than poor or rural communities.	It can increase the digital divide and create unequal opportunities.	87
6	Job Insecurity	Automation may reduce the demand for repetitive and low-skill jobs.	Workers without digital skills may face unemployment or income insecurity.	85
7	Lack of Transparency	Many AI systems work through complex algorithms that are difficult to understand.	Users may not know how decisions are made, which can reduce fairness and trust.	84

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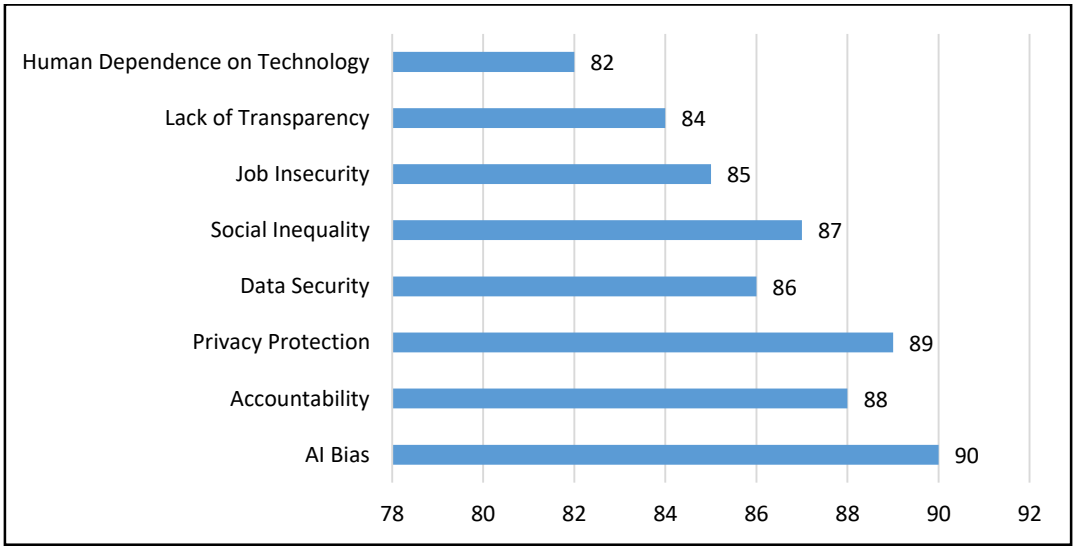
8	Human Dependence on Technology	Excessive use of AI may reduce human judgment, creativity and decision-making ability.	Society may become overly dependent on machines for important decisions.	82

Figure 4: *Ethical and Social Issues of AI-Based Automation*



Source: Table 4

Table 4 explains the major ethical and social issues of AI-based automation. The highest concern value is AI bias with 90%, which shows that biased, incomplete or unbalanced training data can make AI systems produce unfair results. This may lead to discrimination in recruitment, banking, education, health care and public services. Privacy protection is also a serious issue with a concern value of 89% because AI systems collect and process large amounts of personal and organizational data. If this data is misused, it can result in surveillance, fraud, identity theft and loss of privacy. Accountability has a concern value of 88%, as it is often difficult to decide who is responsible when an AI system makes a wrong decision. This lack of responsibility may reduce public trust and create legal or ethical confusion. Social inequality has a concern value of 87%, showing that people with better digital access may benefit more from AI, while poor, rural or less digitally skilled communities may be left behind. The table also highlights data security, job insecurity, lack of transparency and human dependence on technology as important concerns. Data security has a concern value of 86% because AI-based automation depends on digital data and connected systems. Weak security can increase the risk of hacking, cyberattacks and data leakage. Job insecurity has a value of 85%, as automation may reduce the demand for repetitive and low-skill jobs, creating

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unemployment or income insecurity for workers without digital skills. Lack of transparency has a value of 84% because many AI systems work through complex algorithms that users may not understand. This can reduce fairness and trust in AI decisions. Human dependence on technology has a concern value of 82%, indicating that excessive use of AI may reduce human judgment, creativity and independent decision-making. Overall, the table shows that AI-based automation is highly useful, but its development must be guided by fairness, privacy, accountability, transparency, security and social equality.

- **AI Bias**

AI bias is one of the most serious ethical issues in Artificial Intelligence. AI systems learn from data; if the data used to train the AI system is incomplete, it may result in an incomplete learning, which could lead to an unfair and biased outcome from the AI system. For instance, if the AI system employed in the recruitment process is trained using historical data that has historically preferred one gender, caste, region or social group, then the AI can continue to replicate the same bias in its future selections. In the same way, AI in the finance sector, education, policing or health care can yield inconsistent results when data does not accurately reflect all groups. This can cause an unjust discrimination. AI bias can be harmful because human beings think that the decisions made by the artificial intelligence are unbiased and correct, but it is no different from the data that is fed into it. As a result, AI systems need to be trained on a variety and diversity of data, which must also be balanced and thoroughly vetted. There is also a need for human oversight to avoid any individual or social group being adversely affected by the decisions made by AI (Barocas & Selbst, 2016).

- **Accountability**

Accountability is defined as responsibility for actions and decisions. For AI automated systems the matter of accountability can become a significant challenge, as it can be hard to determine who is liable when an AI system gets it wrong. In case of an accident, for instance, it is not necessarily known who is to blame for the incident: the owner of the autonomous vehicle, the software programmer, the manufacturer, the data provider or the service provider of the system. Likewise, if an AI system makes a misdiagnosis or denies a loan or position to a qualified applicant, there must be clarity regarding who is accountable. Typical systems entail human decision makers and responsibility can be more easily assigned. But behind the curtain of AI systems lie intricate algorithms and data models, some of which may be difficult to grasp. This will result in the issue of transparency. To address this, companies need to have human oversight, defined rules, documentation/legal directives. The use of AI to make decisions should not be done in isolation or without accountability and oversight. Accountability matters to foster public trust and ethical technology application (Mehrabi et al., 2021).

- **Privacy Protection**

Another primary issue in AI and next generation automation is privacy protection. AI systems require significant amounts of data to function properly and this data can comprise personal,

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financial, medical, educational, professional and organizational information. If not collected, stored and used properly with due permission and security, this can affect individuals and institutions in a negative way. For instance, AI-powered applications, websites, cameras, digital assistants and online services can track how users interact, where, what voice they use, pictures they take, searches made and personal preferences (Raji et al., 2020). This data may be used inappropriately for surveillance, manipulation, identity theft, fraud or unfair targeting. Confidential information is also a potential problem for organizations if it is leaked or hacked. Hence, data privacy and cybersecurity are very important in the context of artificial intelligence based automations. Users should be aware of the way their data is collected and used. Businesses and governments should adhere to strict data protection guidelines, ensure the systems they have are secure, and only collect what is necessary. Trust is maintained between people and technology, through privacy protection (O'Neil, 2016).

- **Social Inequality**

Social inequality is one of the key social concerns that go along with AI and next-generation automation. AI isn't equally beneficial for everyone. Those with higher levels of internet connectivity, digital infrastructure, education and financial resources can use AI more effectively than others, whether that's individuals, companies, cities or countries. On the contrary, however, the less advanced communities, the rural population, the small firms and the less educated workforce might be left behind as they might not be able to access the advanced technology or the adequate training. This puts those who can access AI and those who can't on different sides of the divide. The use of AI might also widen the employment gap, with more skilled workers having greater access to better opportunities and less skilled workers potentially becoming job insecure. In schools, access to digital tools can help students to learn faster, and those without can learn slower (Mehrabi et al., 2021).

AI should be developed inclusively and accessibly, therefore. Governments, institutions and industries should offer digital education, affordable technology, skill training and equal opportunities so that AI can serve all groups of people and not just privileged groups. In general, ethical and social concerns are important in the responsible use of Artificial Intelligence and next-generation automation. AI has the potential to enhance efficiency, decision-making and innovation, but it should be used in a manner that upholds fairness, transparency, and accountability, respects privacy, and aligns with social justice principles. The focus on human values should not be lost in the process of creating AI. Technologies should serve society and not perpetuate inequality and discrimination. Hence, proper AI policies, ethical principles, data protection mechanisms, public awareness and human oversight are required to ensure that Artificial Intelligence and automation can be a force for inclusive and sustainable development (Buolamwini & Gebru, 2018).

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Conclusion

Artificial Intelligence and Next-Gen Automation are now a vital component of today's technological landscape. These technologies do not restrict to routine mechanical process but can be used for intelligent decision making, data analysis, prediction, communication, service delivery and smart control. The study reveals the applicability of AI automation in various industries including manufacturing, healthcare, education, finance, agriculture, and transportation and logistics, as well as in public administration. It enables them to finish tasks quicker, cut down on human mistakes, enhance service quality, minimise operational expenses and optimise resources. AI and automation are also transforming the nature of work, eliminating some roles that involve repetitive tasks and low levels of skills and creating new roles in data science, AI development, robotics, cybersecurity, cloud computing and automation management. Effective implementation of AI requires skill building, ethical considerations, data privacy, and transparency and human oversight. AI's potential privacy implications, its accountability, and its bias are all matters that must be taken care of. In conclusion, Artificial Intelligence and Next-Gen Automation have to be seen as instruments to support and complement human powers, increase efficiency and enable inclusive digital development.

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