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ARTIFICIAL INTELLIGENCE AND INTERNET OF THINGS BASED FOURTH INDUSTRIAL REVOLUTIO

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Abstract
This article presents a brief concept about the fourth industrial revolution happening globally. Artificial intelligence, Internet of Things, robotics, genetic engineering and 3D printing contributes towards the fourth industrial revolution. The articles mainly focus on artificial intelligence and IoT technologies that is beneficial for companies globally. This study has incorporated secondary informative data collected various existing resources like journals, articles and business reports. All the important articles are presented in the quality reviews to presents its relevance in the study. From the most important articles, two important themes are formed. The study illustrates important outcome by presenting a thematic analysis.
Keywords: artificial intelligence, internet of things, fourth industrial revolution, customer experience, advanced technologies

Introduction

The fourth industrial revolution presents a fusion of artificial intelligence, the internet of things (IoT), robotics, quantum computing, and genetic engineering in order to meet customer expectations. This research paper presents a vivid explanation of the background of the emergence of the fourth industrial revolution with respect to artificial intelligence and the internet of things. The research objectives of the articles are illustrated in this section along with the targeted questions of the study.

Background

The fourth industrial revolution is regarded as a collective force of different technologies that blurs the boundaries between the digital and physical world (Ghosh, Chakraborty & Law, 2018). Furthermore, it is considered a fusion of quantum computation, robotics, cybersecurity, artificial intelligence, IoT, and many other technologies as shown in figure 1. The idea was coined by Klaus Schwab and presents the need for technological innovation in order to increase the global income level. The primary aim of the fourth industrial revolution is to improve the quality of life around the world (Ndung'u & Signe, 2020). Additionally, it focuses on long-term results by dropping costs of logistics and supply chain management globally.

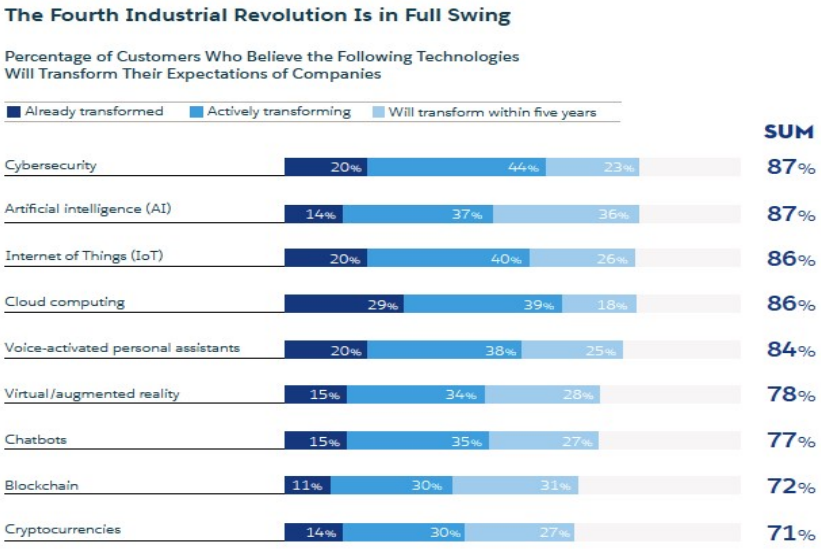

Figure 1: Technologies transforming industries in the fourth industrial revolution

(Source: Ndung'u & Signe, 2020)

However, the revolution has the potential to disrupt the labor market and segregate employees into different sections like "high pay" and "low pay skills" leading to social tension. Artificial intelligence is used to identify complex patterns of data and process the information to draw informative conclusions (Martinelli, Mina & Moggi, 2021). This helps companies review the unstructured data and analyze it to implement strategic plans as shown in figure 2.

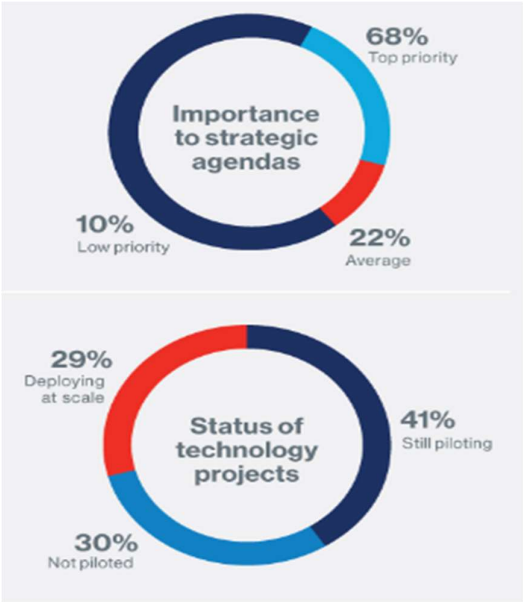

Figure 2: Importance of technologies in strategic planning and completion of projects

(Source:Martinelli, Mina & Moggi, 2021)

Moreover, the Internet of Things is used in tracking devices and gathering customer information to tailor marketing strategies for industrial growth (Skilton & Hovsepian, 2018). It enhances the customer journey with the product by helping a firm to bring personalized services.

Research Objectives

The research objectives of the study are mentioned below:

RO1: To understand the significance of the fourth industrial revolution around the globe

RO2: To analyze the contribution of artificial intelligence toward the fourth industrial revolution

RO3: To explore the concept of the Internet of things and its importance in the fourth industrial revolution

Research questions

The question is the articles are listed below:

RQ1: What is the significance of the fourth industrial revolution?

RQ2: In what ways did artificial intelligence impact the fourth industrial revolution?

RQ3: In which manner did the Internet of things (IoT) influence the fourth industrial revolution?

LITERATURE REVIEW

Introduction

The section presents a brief description of the contribution of artificial intelligence and the internet of things toward the fourth industrial revolution. The portion highlights a vivid explanation of the impact of advanced technologies on the global markets and customer experiences. This research study is enhanced with respect to the theory in order to have a firm understanding of the selected topic.

Artificial Intelligence based fourth industrial revolution

Artificial intelligence is paving the way for industries to produce new and accurate outcomes by processing big data. According to the views of Syam & Sharma (2018), AI is used to review vast unstructured data and present specific aid that significantly reduces time.

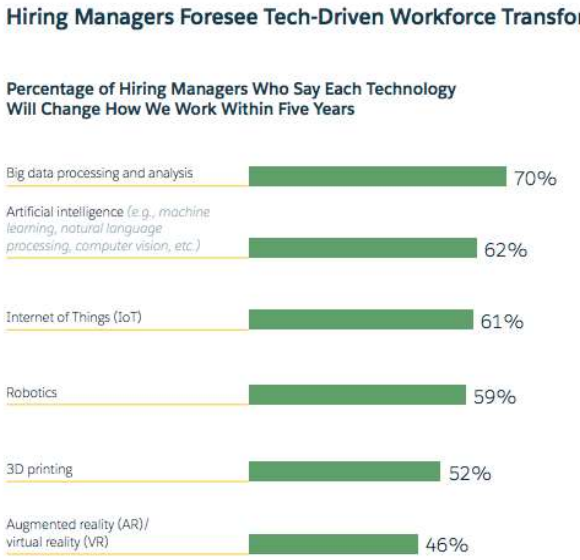

Figure 3: Use of different technologies in the recruitment process

(Source: Singh *et al.* 2020**)**

This technology makes it easier to pre-process a huge amount of data according to the subject matter as the importance of different technologies is shown in figure 3. This enables firms to make decisions in a quick manner and anticipate the demand for products. Shipment of the order is one challenging process that is impacted by different external attributes. As shown in figure 4, Asia Pacific has heavily invested in artificial intelligence to identify the routes of shipment that help businesses to save time and cost.

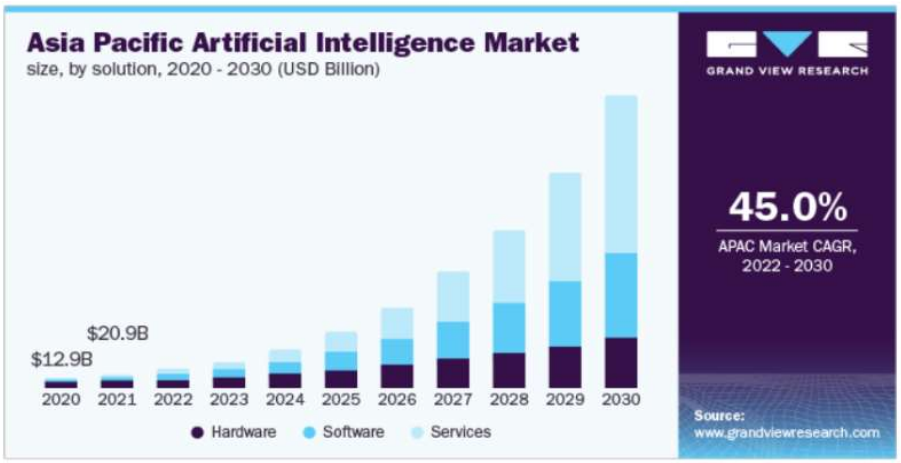

Figure4: Artificial intelligence market observed in the Asia Pacific

(Source: Philbeck & Davis, 2018**)**

It also presents a predictive analysis of the behavior of customers with products and enables firms to monitor the upcoming risks. AI has made its place in the fourth industrial revolution and day-to-day advancement in this field has encouraged organizations to indulge in this technology (Philbeck & Davis, 2018). However, setting up a machine is extremely costly that impacts the financial structure of an organization.

The Internet of things is based fourth industrial revolution

The internet of things has been considered a boon for manufacturing companies around the globe. As per the comments of Hansen & Bøgh (2021), IoT is able to predict equipment damage and forecast repair needs even before a malfunction is detected. It is significantly contributed to the productivity of a firm as the downtime related to the failure of equipment can be reduced. With the advancement in the manufacturing industry, the fourth industrial revolution has brought significant growth in different sectors globally as presented in the figure5.

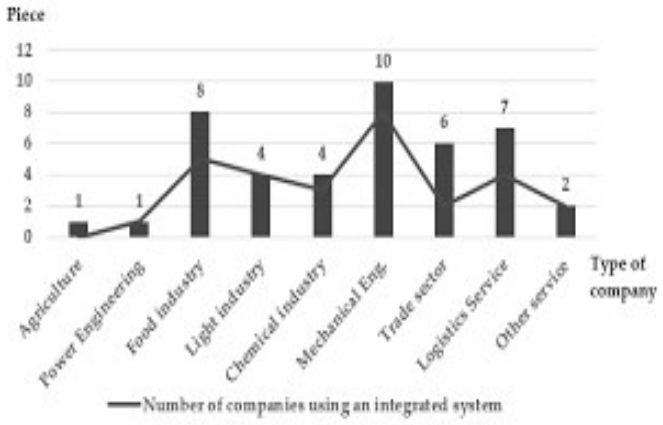

Figure5: Impact of Fourth Industrial Revolution on different industries

(Source: Park, 2018)

The medical sector has incorporated IoT in order to deliver important equipment even in harsh environments. Different industries have included IoT in their daily activities to develop an efficient work culture and encourage "zero-carbon" strategies (Park, 2018). Moreover, this emerging technology is used to track the product life cycle and predict disasters.

Theory

Digital transformation Theory

With the help of this theory, it can be understood that digital transformation is an important phenomenon in the growth and development of an industry. The fourth industrial revolution stresses customer experience and expectation with a product that allows firms to modify or improve their services. In order to bring a new and creative product, firms need to transform their business model by analyzing the existing data (Oke & Fernandes, 2020). This is done with the help of artificial intelligence and IoT. The figure6 shows that different business strategies and cultures are analyzed with data analytical tools in order to present accurate data to the organizations.

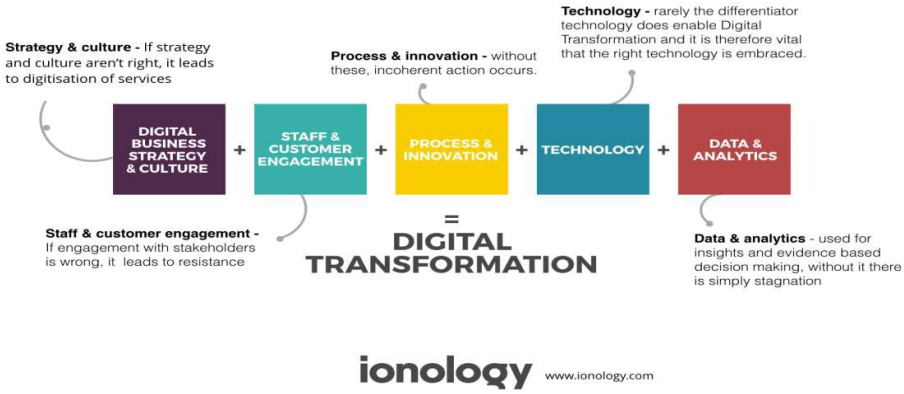

Figure6: Objectives of Digital Transformation Theory

(Source: Oke & Fernandes, 2020)

Therefore, it can be noted that digital transformation is the need of the hour as companies are keen to explore customer needs and expectations (Petrillo *et al.* 2018). Moreover, it provides firms with a competitive advantage in the dynamic business world.

METHODOLOGY

This research paper has followed the ***positivist research approach*** to develop a firm understanding of the research topic. The researcher has selected the ***secondary qualitative research method*** to proceed in this study. Different peer-reviewed articles, journals, books,

and business reports are reviewed to explore the objectives of the study. According to the findings of Pandey & Pandey (2021), secondary data highlights different theories based on factual knowledge. The existing papers are considered as it is a cost-effective process and provide vast amounts of information for the study. In order to establish the significance of the study, researchers have considered the descriptive research design for presenting a brief detail of the research topic.

RESULT

Quality review

Authors	Study design	Number of resources	Measured outcomes	Result	Quality review
Pirson & Bol, 2019	Secondary Qualitative method	25	Influence of IoT on reducing the carbon footprint	IoT is used in robots, to monitor events and reduce carbon emission	Moderate
Manavalan & Jayakrishna, 2019	Secondary Qualitative method	40	Impact of IoT on the supply chain industry and its requirement in the fourth industrial revolution	IoT has promoted sustainability in supply chain management that is beneficial for the firm to make relevant decisions	Moderate

Brown, 2021	Primary Quantitative method	30	Artificial intelligence is driven by a huge amount of data	Big data analysis is done to establish technological performance and make impactful marketing strategies	High
Singh *et al.* 2020	Secondary Qualitative method	12	Impact of artificial intelligence on employees	Artificial intelligence is effective in collecting relevant data and planning out a strategy to increase their effectiveness	Moderate

Table 1: Quality review

(Source: By learner)

Thematic coding

Author	**Code**	**Themes**

Pirson & Bol, 2019 Manavalan & Jayakrishna, 2019	Internet of Things, technologies, the industrial revolution, zero carbon, harmful emission	Implementing IoT in zero carbon strategies marks the advancement of the fourth industrial revolution
Brown, 2021 Singh *et al.* 2020	Artificial intelligence, the industrial revolution, advancement of technologies, recruitment and selection process	Impact of artificial intelligence in the recruitment process adopted by companies globally

Table 2: Thematic coding

(Source: By learner)

Thematic analysis

Theme 1: Implementing IoT in zero carbon strategies that marks the advancement of the fourth industrial revolution

Several countries are investing in IoT technologies to take initiatives that lower the emission of harmful gases in the environment. According to the suggestions of Pirson & Bol (2019), IoT has been significantly used in reducing carbon footprint and emission of greenhouse gases. It is a direct association with the increase in energy efficiency that is monitored with the help of IoT architecture, presented in the figure. IoT is also used in different gadgets like smart plugs, thermostats, and other devices that reduce the consumption of energy as well as help companies promote zero carbon action plans (Manavalan & Jayakrishna, 2019). The figure 7highlights the energy efficiency observed while companies incorporate drones and sensors.

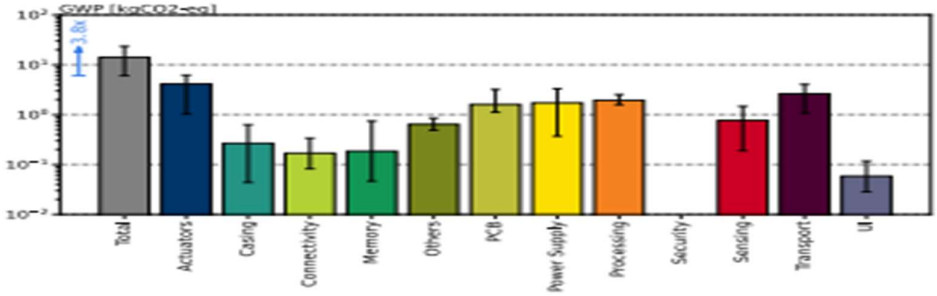

Figure7: Energy efficiency under IoT cloud architecture

(Source: Manavalan & Jayakrishna, 2019)

IoT is used to combat the changes in climate and drastically decrease the emission of carbon by setting up "digital power plants". Moreover, tools like "Cisco" and "Fujitsu" are incorporated into IoT tools to promote energy efficiency. Industries have relied on "heating and cooling systems; that have operated by involving IoT in order to reduce carbon emission.

Theme 2: Impact of artificial intelligence in the recruitment process adopted by companies globally

The hiring management of global companies has included pre-selection software which is powered by artificial intelligence. This software is used to calculate a likelihood of a candidate in order to succeed in the position. As per the notions of Brown (2021), artificial intelligence enables recruiters to make decisions based on data-driven from various technologies. It allows hiring managers to become proactive and determine the cultural background of the candidates to improve their relationship as well.

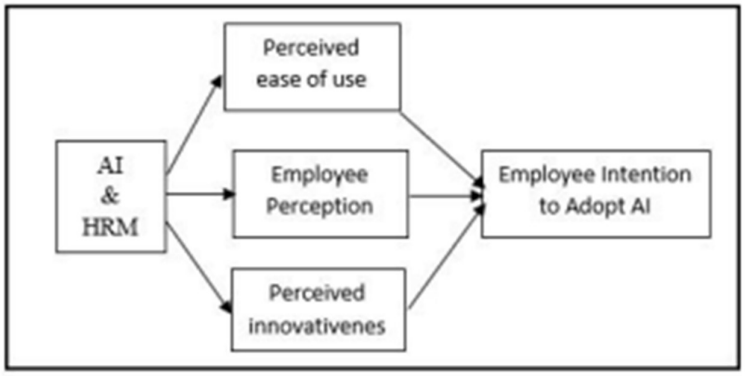

Figure8: Impact of HRM and AI on the hiring process

(Source: Dogo *et al.* 2019)

The figure 8shows that the HRM department of firms is involved in artificial intelligence-powered software to promote employee perceptions (Dogo *et al.* 2019). It enables the employees to adapt new software that improves their efficiency. The use of different technologies like robotics, 3D printing, big data processing, and artificial intelligence in the

selection and recruitment process can be understood with the implementation of innovative technology. This technology provides recruiters with data in order to measure KPIs and find the suitable one for the position (Singh *et al.* 2020). An “applicant tracking system” is incorporated to screen the resumes and make the recruitment an efficient one that saves time.

Discussion

From the above-mentioned themes, it can be understood that both artificial intelligence and IoT have a significant role in the advancement of the fourth industrial revolution. The recruitment process adopted in different forms has used AI software to select the right one and help with necessary technical training. It helps firms to work in an efficient way and make things easier for the hiring managers (Sutherland, 2020). Furthermore, IoT is used to incorporate strategies that reduce the emission of greenhouse gases and their harmful effects on the environment.

CONCLUSION

The fourth industrial revolution refers to a mix of different technologies that are incorporated by companies in order to meet customer demands. IoT has presented a technological leap for firms by tracking the performance of equipment like drones, sensors, and smart gadgets. This technology is significant for estimating failure and production of machines that are effective for operational activities. IoT is used to analyze the change in climatic conditions and enable firms to include action plans that reduce the harmful effects of carbon on nature. Additionally, it provides motion detection and industrial security facilities to companies.

Furthermore, the study illustrates the importance of artificial intelligence and its contribution to the fourth industrial revolution. Different visualization and analytical tools are used by companies to critically analyze the unstructured data gathered by artificial intelligence software. A huge data is processed for firms to understand the customer journey with their products or services. It allows marketing teams to organize impactful campaigns that attract more customers and help the firm gain a competitive advantage. Thus, the fourth industrial revolution is termed the "smart factory" that establishes an efficient work culture and improves productivity of an organization.

Limitations

This research article does not include the opinions and viewpoints of employees working with artificial intelligence. Advanced technologies have made secured data prone to cyber-attacks and thefts. The lack of primary data and viewpoints about security issues is considered a limitation observed in this study.

FUTURE SCOPE

There are certain areas that need more research in the future in order to help firms incorporate advanced technologies. Lack of expertise with this software is the key challenge faced by organizations globally in terms of artificial intelligence. Hence, future researchers can focus

on key strategies that target cyber security issues. In addition to this, employee perception and adaptation towards new advanced technologies.

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