The Challenges and Opportunities Involved with Industry 4.0 Technologies for SME Business

[1] Nitish Lal
[1]Thapar University, Patiala, Punjab

Abstract
Industry 4.0 has been brings forth a large number of effective technological tools and techniques in business environment which provides a key support towards small and medium scaled enterprises to enhance its operational performance. Various technologies such as AI, block chain, robotics has been provide key support to improve operational, manufacturing, supply chain, marketing ability of an enterprise in recent days global market. The study is based on the technologies adopted and the contribution of the new generation technologies on the SMEs and the method of collecting the data is a secondary method and the data is analysed by using thematic analysis. The upgraded technologies such as automation, machine learning, big data and robotics are explained and the cloud computing and the opportunities have been discussed. The challenges such as lack of knowledge, bias rigidness are discussed to explain the challenges accepting the new technologies.
Keywords: *Industry 4.0, AI, Block Chain, SME*

1. Introduction

Industrial revolution 4.0 is the revolution in the technological field that happened in the 21st century to enhance the productivity of the SME businesses with the innovative technologies. The first revolution was the concept of the industries, second was the empowering of electricity and implementing its use, the third revolution consists of the preliminary automation and machine engineering and the fourth revolution consists of the more innovative and modern technologies and advanced automation that are used by the companies for their business growth and sustainable development (Ching et al, 2022). The SME organizations are using various kinds of technologies for competing with their business rivals to enhance the product quality. The technologies such as new types of mobile applications, virtual reality, artificial intelligence, big data and block chain helps to improve operational performance of start-up business initiatives. These new generation technologies are the blessings of the fourth revolution of the industry. Despite having the opportunities still there are some challenges facing the SME organizations and that should be discussed as well. This study is focused on analysing the challenges and opportunities of Industry 4.0 technologies on performance of SMEs.

1.1 Objectives

- To know the contribution of technologies introduced through Industry 4.0 on organization performance of a SME.
- To understand the opportunities brought forth by Industry 4.0 and associated technologies for SMEs.
- To evaluate the key challenges of implementing the technologies of Industry 4.0 faced by small and medium scale enterprises.

2. Methods

It is known that for any research work the methodology is the important part for the data collection and analysis of the collected data. There are two types of methods that are primary quantitative and secondary qualitative methods of data collection. The primary data is based on the statistical and numerological data that are collected by the surveys and interviews and analyzed by making the average (Acampora et al, 2022). On the other hand the secondary method of data collection is analysis on the existing data from authentic sources based on articles, journals, newspapers and government reports (Acampora et al, 2022). The analysis of the data could be done by thematic analysis that is based on the qualitative data and explanation of the data that are collected by secondary data collection method (Acampo, 2022). After evaluating the nature of the

research it is considered that the secondary qualitative method is the suitable method for collecting the data and making the interpretation of the collected data to make the research successful.

3. Findings

3.1: An detailed analysis of the contribution of block chain technologies on SMEs performance

Block chain technology is one of the new and modern technologies that are used by the SME organizations. It is a distributed database based on the role in crypto currency and used in the business transactions. The block chain technology enhances the risk of miss transactions and reduces the use of the third party transistors and the added cost as well. As discussed the block chain technologies is best for the industrial transactions for the example the bit coin transaction, it takes several steps that are first the transaction reaches to a memory pool and then quacked at the time of a valid pick up once it enters into a block and the block is filled with transaction it will close and encrypted using encryption algorithm (Santhi and Muthuswami, 2022). That makes the transaction data safe from the hackers.

The above mentioned graph is the image of the worldwide market of block chain technology. In this statistics it is clearly visible that in 2017 it was just 0.98 billion dollars. In the year 2023 it will become 19.36 and in the future the possibility of reach is 162.84 in 2027 (Taylor, 2022). The emphasized statistics is the clear imagery of the growing market of block chain technology for its safe and secure feature and technical encryption that makes a business transaction or data safe and secured. The technology is the blessing for creating the application features and interfaces by using program languages that are delightfully helpful in cryptology. The block chain technology has made its safety by using its cryptology to protect the data of transactions from the cyber attackers. There are four elements of block chain such as nodes, a distribution ledger, an asset, and a consensus algorithm.(Rajasekaran et al, 2022) Most of the third party transistors take time to settle the transaction. Their block chain technology has the fastest process to settle the transaction and give an encryption for safety from money laundering. Thus, it helps a small or medium scaled company to improve its financial and operational performance effectively.

3.2: Impact of digital technologies introduced by industry 4.0 on firm performance

Digitalization is the important decision for all the business oriented organizations. There are such technologies that are adopted by the small enterprises such as cloud computing, high speed infrastructure, smart devices, big data analytics, artificial intelligence, robotics and the block chain technologies. Especially after the coved 19 pandemic the business organizations moved to digitalization. It is a new grant initiative by the finance department of Malaysia to assist small business enterprises (Liu et al, 2022). The statistics are saying that 43% of the companies are using the cloud computing to make the digitalization of their business, 32 % are using high speed infrastructure, 21 % are using smart services, big data analytics are 6%, robotics 5% and block chain technology adoption rate is 3% (Statista research department, 2023). The above mentioned statistics is the clear understanding of the popularity and cost effectiveness of digital technologies. Cloud computing is the most popular technology of digitalization that has been used by the SME companies. The main factor affecting on using or implementing the digitalization tools is awareness and the social prejudices.

The benefits of the digitalization is to satisfy the customer, enhancing the service quality and product quality as well, to reduce the cost in supply chain management in business and ensuring the innovation of the work strategythrough the modern technologies. For the SMEs the benefit of adopting digitalization is to ensure the safety and security for the company, to measure the goal and the objectives for the further financial year, enhancing the collaboration with the suppliers as well as with the customers. There are a few challenges adopting the digitalization technologies that are rigid or biasness and the social prejudices. Somewhere the senior stakeholders of companies do not want to take the new technologies for losing their designation on the excuse of decrease of the human skill. There should be an awareness program regarding the security and the

transparency of the digitalization to come out of these prejudices. Last but not the least in the competition market adopting automation or cloud computing would be the weapon for any SME.

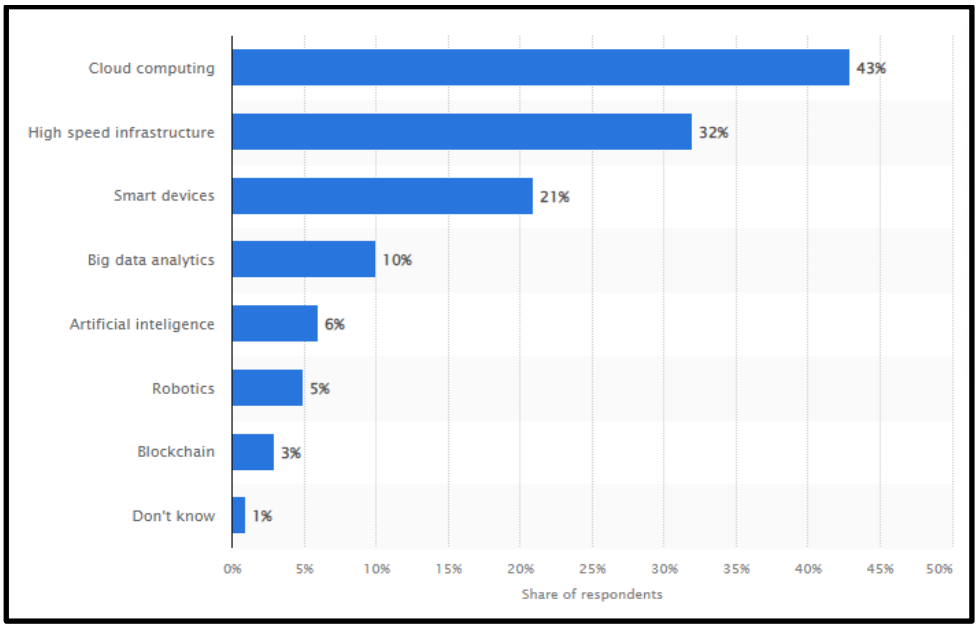

Figure 1:The percentage of using the new technology worldwide

(Source: Statista Research department, 2023)

3.3: Overall assistance proposed by AI and robotics on strategic operations of the SMEs.

Artificial intelligence and robotics are the trending technologies that are used in business organizations. AI and machine learning has given a new pathway for the organizations to grow their business and enhance their work productivity with accuracy. Mainly in the customer service sectors have started to make use of it to ensure a smooth operation and a reliable and uninterrupted customer service with automation and robotics. The AI chat bots are vigorously used in the SMEs to ensure the product marketing and for the feedback of the customers (Jan et al, 2022). AI and robotics drive customer engagement and increase the chances of making more revenue. The technology helps to surgery the business market and helps to gain the knowledge about the customer's needs. The statistics are saying that the utilization of AI and robotics are growing day by day. In the year 2021 the use of this technology was below 20,000 million dollars now in the year 2023 it is at 12,825 million dollars and it will be at a peak of 77,726 million dollars in the year 2030 (Thormundsson, 2023). In the field of HRM practices, AI and robotics are used nowadays. There are the robotics programmed with the particular algorithm and the set of questions they are using at the time of taking the interview. The imitation of the human voice with better accuracy has made AI and robotics unparalleled in the field of business. In the public sector the AI is used in order to manage the service with high level of accuracy and ensure the high quality of productivity of the operation. There are several renowned companies that are used to running their operation using AI robots and enhancing their eye appealing product quality. Using AI makes the enhancement in the supply chain management and in the inventory system and it can reduce the cost of manufacturing and of buying the resources as well. The recycling process and the waste management are also controlled by AI and machine learning.

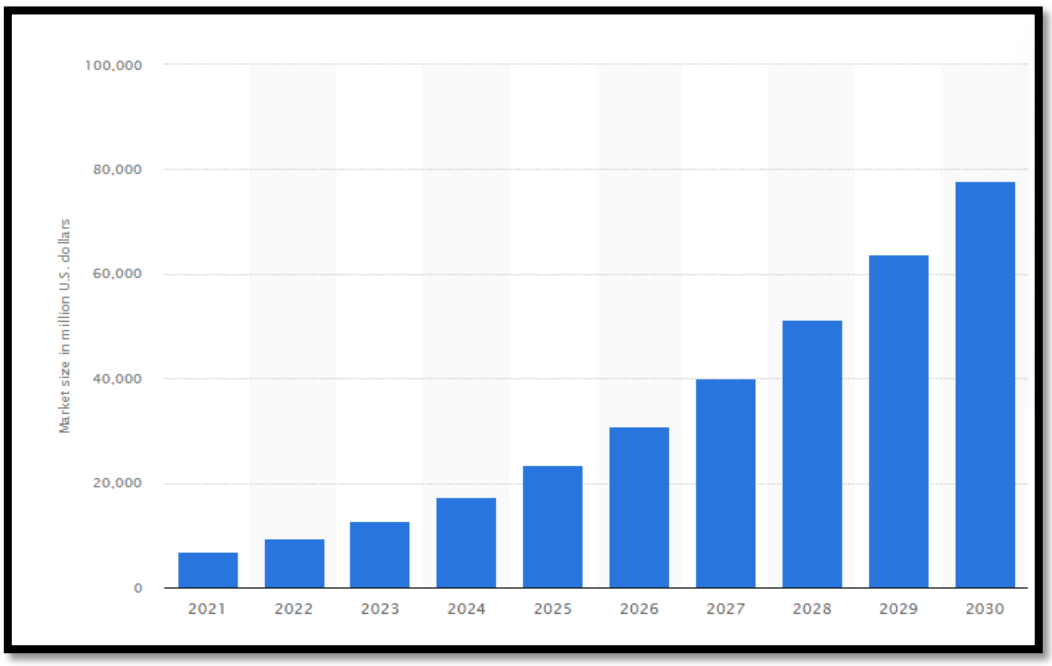

Figure 2:The increasing market of AI and robotics

(Source: Thormundsson, 2023)

3.4: Impact of big data on SME industry after industry 4.0

After the globalization 4.0 in the SME industry the use of big data has become a trend. Big data analysis has made the operational outputs more strategic and made the productivity more qualitative. Big data analysis is a complicated process that is based on uncovering the information after analysing the big data (Shi, 2022). Big data is a technology that helps in the solution of hidden patterns, correlations, market trends and customer preferences. In large and worldwide organizations big data is used to gather new business information with the analysis of data. The organizations are making their habit to use big data for its modern pattern of technology that helps the organizations to make the data driven decision that helps to take the decisions for the business and marketing strategies and can help to evaluate the productivity and performance of the employees by analysing their data. In this technology the data professionals collect the data from various sources such as internet click stream data, web server logs, cloud applications, mobile applications and many other sources.

The data is then used to clean and rectify to improve their quality and then the data is analysed by using data mining and text mining process (Himeur, 2023). The present statistics are saying that in the year 2021 the market of big data was 240.56 billion dollar now in the year 2023 it has become 308.26 billion dollar and it is thought that upcoming years till 2029 it will be 655.53 billion dollars (Taylor, 2022). The statistics is the clear image of the growing market size of big data usage by the organizations to analyse the data and make the proper evaluation of the productivity, market strategy and customer demand. The revolution 4.0 is the blessing for the SMEs to get the access to modern and advanced technologies such as big data analytics that are broadly used in quickly analysing large sets of data, rapidly making the proper decision with analysing the data that is helpful in supply chain management. The analysis of random data is helpful for saving and reducing the production cost and the buying cost as well. The technology has made the market strategy clear to the business organizations and the customer needs as well. Thus big data analysis is getting popular in the SME community.

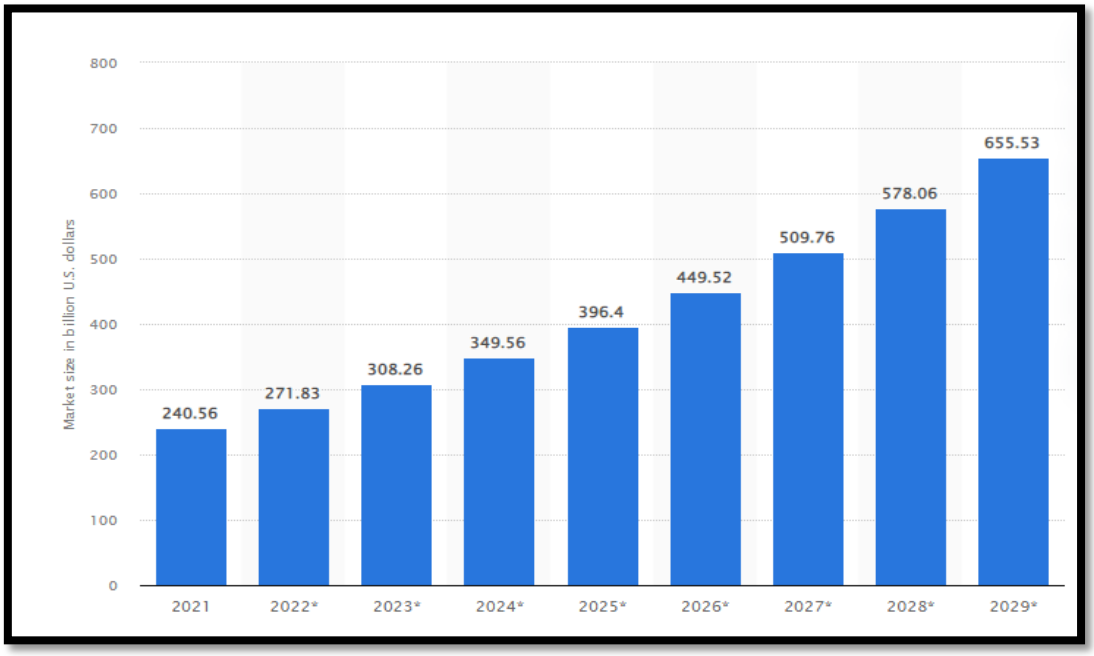

Figure 3:The growing market of big data analytics

(Source: Taylor, 2022)

3.5: Growth of SME industries after globalization and industrial evolution

The fourth industrial revolution has made a change in the pattern of the business and the small enterprises are growing up with the new technologies. The small and medium enterprises are growing up with the access of modern technology tools that are helping the organizations to make their products, strategy and evaluation better. The organizations are now using cloud computing and other technologies such as artificial intelligence, big data analytics and many more. The present statistics says that small enterprises in the EU region was 19,574,376 and from that time till the year 2022 it is 23,190,714 number of companies are there(Statista research departments, 2023) that helps to understand the ratio of the growth of small and medium enterprises. The small enterprises are giving the opportunity to the community to collaborate with the business and making the community influenced with their service and productivity (Frredrich, 2022). The fourth industrial revolution has made a change on the supply chain management and makes it more communicative and cooperative by their use of the new technologies. Globalization has made the buyer-supplier relationship smooth and the supply chain and the inventory system has got a new path for the small enterprises. Data communication has got a new point of view by using big data analysis.

Apart from that, the 4.0 revolution has given the strength to take the global challenges to the SMEs (Batrancea et al, 2022). The use of AI and robotics has made the customer service quick and flexible and to produce the high number of making the high version of the low batch size. It is glad to know that in recent years after the industrial revolution the European commission has directly given the donations and financial support for the SMEs. The commission is helping the enterprises indirectly for their innovative strategy to make the innovation with the new generation technologies and enhance their quality of operation and evaluation of the performance, market strategy and customer demand. The particular organizations proved their strength and innovation to compete in the global market with the big organizations after the global revolution. Despite having the revolution there are a few challenges such as lack of knowledge from the employees about the technical things and that is alarming for the organizations. To resolve the problem the organizations are recruiting knowledgeable employees for the betterment.

3.6: Future of SMEs under the light of Industry 4.0 and Globalization

After the industry revolution 4.0 it is considered that the revolution has made a new path for the new organizations to grow up with their quality products and customer satisfaction. It helps to change the business models and the style of partnerships. The models provide the SMEs the access to the new software licenses and value added service. That is helpful for the collaboration with the partners and gives the flexibility in pricing and competing with the business competitors (Shboul, 2023). The revolution has allowed making the quality of the product better and helps in increasing the productivity of the SMEs. The enterprises are allowed access to modern technologies such as big data analysis, cloud computing, artificial intelligence and many more to shift the company from reactive to predictive. The new generation technologies are helping the enterprises to identify the place of improvements and the quality management helps to reduce the production as well as the buying cost for the company. Increasing the revenue is one of the important features that have to be discussed. The growing demand for the new software and data applications from the manufacturer combined with the customers' needs can increase the revenue of the business for the further upgrading of the business and that will help to get the motivation for more qualitative productivity.

3.7: Challenges and disadvantages of using Technologies introduced after the fourth industrial revolution.

With the opportunities there are various challenges that have occurred due to the industrial revolution. The SMEs need to adopt the modern tools and knowledge on their path and the business models should attract the tech savvy personals and the young IT personals to take care of the new and trending technologies. According to Navau & Sort, (2021), In the North Sea region there is no clarity in the business tools and lack of experts and trend workers, that is the reason for the threat of cyber security. The shortage of skilled staff is the problem for any SMEs. The staff should be skilled and knowledgeable and for making the staff knowledgeable there should be coaching classes inside the organizations for both the staff and for the management staff as well. The social prejudices are the challenges for implementing the new generation technologies and for this problem the awareness program should be conducted to make understanding regarding the opportunities of the new technologies and the transparency of the technologies. The technical schools should give the knowledge regarding the new operation technologies to make the new students more efficient with the knowledge of the revolutionary technologies. There is a major challenge that is resourcing: the companies should make collaborations with the suppliers using the new technologies that will be the solution for the SMEs for making effective and efficient supply chain management. The new technologies have to be more cost effective so that the SMEs can afford the software's and products to make a business revolution. Those are the concerned challenges that have to be measured.

4. Discussion

The arrival of Industry 4.0 has revalorized the overall technological application in performing different strategic operations within business. A large number of technological tools as big data analytics, artificial intelligence, block chain, robotics and many other effective digital techniques in business help companies to perform their manufacturing, inventory, supply chain, marketing operation more efficiently to enhance the growth of the business. A large number of small and medium scaled companies have been arrived in the global market after the arrival of industry 4.0 and globalization. The implication of different technological tools and schemes in performing strategic operations of various small scaled companies worldwide provide key support to cope with highly competitive business environment of recent days. The entire findings has been represents that after implementing AI, Robotics, Block chain, big data mostly supports to escalate the operational performance of different small and medium scaled companies worldwide. The study has also brings forth with the idea that the future growth of SMEs in modem business environment highly depends on overall technological infrastructure of the companies in the business environment. Thus, it can be claimed that industry 4.0 have its superior upper hand and positive impact on improving performance and

growth scope of small scaled companies in the global market. The overall contribution of Industry 4.0 has also been comes with a number of critical challenges and disadvantages for the small scale business initiatives in the worldwide market. The issue related with data redundancy has been identified as the key challenges for small scale companies in time of using technologies introduced after industry 4.0. The lack of financial ability to ensure data security features, lack of experience of human resources to access different modern technological infrastructure mostly increase the case of data redundancy in small scaled companies. It negatively impacted on the overall growth and success of most of the small scaled companies in recent day's competitive atmosphere.

5. Conclusion

The present study regarding the challenges and opportunities of SMEs after the 4.0 revolution has made clear that the challenges and opportunities are parallel for all the industries. The contribution of the new generation technologies are making the communication and production better and the technologies are the blessings of the industry revolution and the contribution of the new technologies have made the potential growth for the SMEs and make the information regarding the business data more safe and secured. The new technologies have made supply chain management more cooperative and effective. The new generation technologies are helping the enterprises to assess the market strategies and customer demand as well as the technologies is helping in recruiting and evaluating the fresh and innovative employees and that is the strategies of the HRM management of the company to evaluate and recruit the staff with accuracy. The lack of knowledge, bias, and rigidness are the important challenges for the SMEs and they are conducting the awareness program and training about the new technologies**.**The overall study has find there are few challenges of implementing technologies introduced by Industry 4.0, although it mostly helps small scaled companies to improve their operational performance effectively.

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