

UKS31962

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Introduction and Background

¹¹ The term “Industry 4.0” ⁸ was introduced in Germany’s Hannover fair in the year of 2011. Moreover, it was officially announced in the year 2013 that Industry 4.0 is a German strategic initiative in undertaking a pioneering role in transforming the work processes of various industries. Hence during ⁸ the fourth industrial revolution, the usage of cyber systems had triggered a shift in paradigm in the automobile sector (Krishnan *et al.*, 2021). It is found that newer technologies only replace the existing jobs through newer forms and the technologies related to Industry 4.0 play a key role in it. The application of machine learning technology had formed deeper roots in the maintenance of the automobile sector and is expected to dominate this sector for many years to come.

Research rationale

The reason for conducting the current research is to evaluate the importance of the ⁷ adoption of Industry 4.0 in the sector of automotive vehicles. Industry 4.0 has been originated in Germany when this was implemented in the optimization of the value chain through autonomous manufacturing and the exchange of information. There have been wider dynamics in the automobile industry throughout the world especially in the Asia Pacific region (Hernández *et al.*, 2019). The interaction between Mexico, China and USA needs had built the automotive in a significant manner at a level of internship for competing in terms of value-added and fixing of employees’ salaries. Moreover, ⁵ the current study will be conducted to evaluate the challenges that are involved in the adoption of Industry 4.0 in the sector of automotive vehicles .

Aims

³ The aim of the proposed research will be to evaluate the importance of Industry 4.0 technological implementation in the automobile industry. Moreover, this study will explore the factors which are influential in implementing the upcoming industrial revolution in the automobile sector. Apart from this, the study will analyse a ³ framework for the adoption of Industry 4.0 in the sector of automotive vehicles in the UK.

Objectives

The objectives of this research are:

- To explore the factors that influence the adoption of Industry 4.0 in the sector of automotive vehicles
- To examine the path and processes that automobile sectors use while adopting Industry 4.0
- To identify the challenges involved in the adoption of Industry 4.0 in the sector of automotive vehicles
- To develop a framework to promote and guide the adoption of Industry 4.0 in the sector of automotive vehicles in the United Kingdom

These objectives are supposed to be helpful in proceeding with the research in a proper, as well as professional manner.

Research Questions

The questions that will be considered for the current study are

- a) What are the factors that influence the adoption of Industry 4.0 in the sector of automotive vehicles ?
- b) Which paths and processes are undertaken in the automobile industry while adopting Industry 4.0 technologies?
- c) How will a framework be developed to promote and guide the adoption of Industry 4.0 in the UK?

Theories and Concepts in Literature Review

Theme 1: Exploration of the factors that influence the adoption of Industry 4.0 in the sector of automotive vehicles

According to Bag *et al.* (2021), Industry 4.0 has been accepted as the most important aspect of digitization by various industries. Moreover, it is based on the progression on information and communication technologies which provides a possibility in adopting the processes in advanced manufacturing technologies such as Big Data and Cloud computing.

On the other hand, Verma and Venkatesan (2021), argued that after Henry Ford introduced the mass production of automobiles, the concept of Industry 4.0 began to grow widespread. The newer industrial paradigm assists in bringing together the physical and virtual worlds by combining the Internet of Things with Cyber-Physical Systems. The article further states that the automobile sector has been at the forefront in the adoption of the technology belonging to the fourth industrial revolution than other industries.

Theme 2: Examination of the paths and processes for the automobile sector while adoption of Industry 4.0

Yu *et al.* (2022), opined that with the onset of the pandemic, even small and medical automobile industries have been adopting Industry 4.0 technology in their daily supply chain. The authors further stated in this article that various technologies are integrated for carrying out specific processes and operations in the automobile sector. Since the automobile manufacturing industry has been playing a part in the fourth industrial revolution, there has been the implementation of smart devices, software and sensors in the production phase.

Apart from this, Ashima *et al.* (2021), argued that there has been an evolvement of the Internet of Things in the year 2014 which marked the introduction of the technologies related to the Internet 4.0 throughout the world. One of the key aspects of the upcoming industrial revolution is related to the automobile sector is additive manufacturing since it may assist in building automobile parts using three-dimensional printing technology. Besides, the smart manufacturing of automobile products is provided importance in Industry 4.0.

Theme 3: Identification of the challenges involved in the adoption of Industry 4.0 in the sector of automotive vehicles

As per Alladi *et al.* (2022), there have been several challenges involved in the adoption of Blockchain technology in the fourth industrial revolution. One of the challenges identified in the article is the lack of knowledge and skills in handling equipment related to Industry 4.0. The automobile organizations which aims to adopt the technologies related to the fourth industrial revolution face difficulties in implementing it due to training and upgrading the skills of the staff.

On the other hand, Peres *et al.* (2020), argued that one of the issues faced ³ in adopting Industry 4.0 technologies in the automobile industry is obtaining fair data in AI industrialization. It should be ensured that the data obtained is easily accessible to the managers of the automobile industry to make them comfortable in building their marketing strategy. Another challenge identified is the availability of cyber-infrastructure in executing of Industry 4.0 technologies.

Theme 4: Development of a framework to promote and guide the adoption of Industry 4.0 in the UK's automobile sector

Moreover, Yadav *et al.* (2020), opined that a digital framework based on blockchain technology and additive manufacturing may lead to the evolution of automobile production systems. A certain amount of time is fixed for the prevention of alteration of transaction information. Moreover, Industry 4.0 technology enables the manufacturing of automobiles by evaluating the demand for the product in the market. The decentralization of resources through the collaboration of automotive stakeholders using real-time information is another factor in the adoption of Industry 4.0.

Theoretical framework

The theory that will be considered for the current research topic is the *Theory of Systems* since ⁶ the four basic elements of the systems model are output, process, input and feedback. Similarly, considering the case of the current research, the implementation of technology in the automobile industry will help in inputting the relevant data on the customers' demand on automobiles (Gajdzik *et al.*, 2021). Moreover, this theory will also in understanding the way through which the stored information is processed in studying the customer's behaviour towards the automobile sector. Apart from this, the execution of Industry 4.0 technologies will assist in obtaining the customer feedback regarding the automobile sector.

Conceptual framework

The dependent variable that will be considered for the study is "Industry 4.0" and the independent variable considered here is "automobile sector". It is observed that many industries are implementing the fourth industrial revolution technologies in carrying out their daily duties.

The reason for considering the automobile sector as an independent variable is the proposed paper will study the impact of “Industry 4.0” technologies in the automobile sector.

Methodology

Research Philosophy

The research philosophy that will be considered in the current research is interpretivism. One of the benefits of this research philosophy is it will assist in ensuring validity among the findings of the research (Alharahsheh and Pius, 2020). Similarly, in the case of the current study, this philosophy will enable in studying the information in the existing articles related to Industry 4.0 technology implementation and interpret it in the researcher’s own words. Additionally, another reason for considering interpretivism research philosophy in the study is it will help in the clarification of certain concepts such as “Industry 4.0”. The interpretation of the various articles written previously regarding its implementation for industrial purposes will be written.

Research Approach

The research approach which will be considered in carrying out the study is deductive. One of the benefits of this approach is it is cost-saving and time-saving. The reason being the researcher does not need to conduct an on-study in collecting the required information on Industry 4.0 technology implementation (Young *et al.*, 2020). He just needs to search for some articles related to the proposed research title in Google Scholar or University Library portal and straight away go on in carrying out the study. Moreover, the deductive research approach will also enable the study conductor in applying the findings of the study to the broader context. Since the fourth industrial revolution is the future for automobile industries, hence the process through which Industry 4.0 technologies can be implemented will be written.

Research Strategy

The secondary qualitative research strategy will be chosen in proceeding with the current study since the data that is required can be obtained through secondary literary articles. Besides, the considered research strategy can assist in the provision of data in a clean and structured manner.

Since a sufficient number of articles are written by previous research scholars regarding the usage of AI in the automobile industry, hence the student can retrieve the required data beneficial for him in carrying out the study. A sufficient volume of information regarding Industry 4.0 equipment execution in various industries can be obtained using this strategy by surfing through secondary literary articles.

Data collection and analysis

The data collection method which will be suitable for this study is the secondary data collection method. The reason being the considered aims and objectives related to the topic can be fulfilled using this method by reading the articles on the benefits of Industry 4.0 technologies available on the internet. The data analysis method which will be beneficial for the study is thematic data analysis since it will help in answering various aspects of the research by studying the opinions of various scholars (Braun and Clarke, 2019). This kind of data analysis can help in studying various processes through which the automobile sector can adopt Industry 4.0 technology and also study the challenges which may arise during its adoption.

Research Time Horizon: Gantt chart

Stages of the research	First Week	Second Week	Third Week	Fourth Week	Fifth Week
Introduction					
Literature Review					
Research Methodology					
Findings, Analysis and Data collection					
Conclusion					

Figure 1: Gantt Chart for the proposed study

(Source: self-created)

In the given Gantt chart, it is proposed that the current paper will be conducted in five stages. Firstly, it was assumed that the Introductory portion of the study will be finished in the first week itself after it will be given approval. Secondly, the literature review section is proposed to be completed in the second week. Thirdly, the research methodology section will be done in the third week. The findings and analysis section is proposed to be completed in the fourth week. The conclusion part will be finished in the fifth week.

Research Techniques Considered and its appropriateness for the study

The research technique that will be considered for the current study is *secondary data analysis*. It is deemed appropriate for the current research since there have been ample articles written on the benefits of Industry 4.0 technologies in carrying out activities in various industries. Hence, the researcher can surf the relevant articles on the topic and try to address the chosen objectives (Ruggiano and Perry, 2019). Moreover, this research technique will help in saving time and money since the researcher does not have to obtain the information on the Industry 4.0 benefits from the mouth of any individual. He can just study the required articles on Google Scholar and carry on the study.

Discussion on which data will be collected

The secondary qualitative data will be collected for the current research since the data on the implementation of Industry 4.0 can be found on Google Scholar. The secondary data will provide an in-depth analysis of the rising usage of Industry 4.0 technologies by various industries in organizational management (Patel and Patel 2019). It will also help in saving time in starting the research since secondary literary articles related to the topic are present on the internet.

Explanation of the interpretation of the data

In this research, the researcher is supposed to opt for the implementation of a strategic approach related to the secondary qualitative method of research. In this context, the researcher is supposed to take a clear note of the required data and other details from various types of articles, journals, government releases and many others. This can be helpful for the researcher to get the required data in an easy, as well as effective way.

In this research, the researcher is going to opt for a deductive approach in the context of retrieving the required details in a proper and professional manner. In this approach, the researcher gets the free end of getting the data through his or her own realisation of whatever he or she is realising or deducing from the collected data in a proper manner. There can be a usage of various types of other approaches for this research. These can also be counted to be feasible, although the taken style of approach related to the deduction of the required details is supposed to be helpful for the researcher in a proper and effective, as well as professional manner. In other words, the various procedures of interpretation of various operational and other aspects related to the implementation of developed industrial aspects in the automobile industries in the United Kingdom.

In the research work, the researcher is supposed to collect the relevant, as well as required data and other details for the betterment of the research, from the various articles, journals and other types of releases from the government. This type of approach of the researcher to avoid complications as well as the various types of problems in the process of conducting a survey or any type of interview of the concerned people in the workplace of the concerned industry. This can also be helpful for the researcher to maintain a non-biased mentality and attitude towards recording the relevant data as well as maintaining a proper chain of various types of analysis and data collection methods with the help of the mentioned type of data collection procedure and other influential aspects related to the initiation, as well as completion of the whole research process. Apart from this, the interpreted data can be proven to be helpful for the researcher to create a proper record of the various types of approaches and the details of the recorded data. These are expected to be helpful as well as essential for the betterment of the mentioned research work in an effective manner. Apart from this, the mentioned research work requires proper maintenance of various types of strategic initiatives, which are supposed to be helpful in the process of getting the proper data from the samples and extracting the relevant details in a professional and dexterous manner. These are even supposed to be helpful in the process of attaining stability in various prospects related to the development of the research work in an effective manner. Apart from the mentioned aspects, the interpreted, as well as the deduced required data can be helpful in the process of maintaining sustainability in the various prospects related to the development of the mentioned research.

Discussion on whether the findings have validity or reliability

The research has recorded the various outcomes depending on the collected relevant data for the betterment of the same. In this context, it can be said that the researcher has taken effective initiatives in reducing the outcomes, as well as the relevant data from the collected details and other resources in an appropriate, as well as effective manner. The researcher is supposed to effectively take the help of the various influential instruments in the process of initiating, as well as completing the various procedures of the research based on the mentioned topic in an effective, as well as professional manner. The researcher has explored the various influential factors, which can have a massive impact on the various prospects related to the adoption of Industry 4.0 in the automobile industry in the United Kingdom. Apart from this, the researcher has also examined the various paths, as well as procedures, which are expected to be beneficial in the process of managing stability in the adoption of Industry 4.0 in the sector of automotive vehicles in the United Kingdom. Moreover, the researcher has also emphasised the various challenges in the process of adoption of Industry 4.0 in the sector of automotive vehicles in the mentioned region of the United Kingdom. The researcher has also developed a refined framework, which is supposed to be helpful in the context of promoting, as well as guiding the various prospects related to the adoption of Industry 4.0 in the automobile industry in the United Kingdom (Zekhnini *et al.*, 2020). The researcher has also encircled the various aspects related to the same, which are supposed to be helpful for the completion of the research in an appropriate manner. From these mentioned details, it can be appropriately stated that the findings of the researcher, from the various details and relevant data, are feasible and valid for this research.

Research Ethics

Apart from the mentioned various aspects related to sustained and appropriate research work, the researcher has maintained the considerations of various ethics. In this research, the researcher has ensured that there is no bias of any gender. Apart from this, there is no bias from the researcher's side. More on this, the researcher has also stated that there is a consideration of other ethical aspects required for this research. The researcher has not recorded any type of void statement of the chosen samples. Apart from this, the researcher has also not recorded the statements of an underaged person, or of any type of person who is specially mentally able. The researcher has also made sure of the various prospects, which are related to the prospect of

protecting the personal aspects of the chosen samples for the research. The researcher has also enclosed the identity of the various samples of the research, who have recorded their statements in the same. Apart from the mentioned ethical aspects, the researcher has also maintained an approach, which is free from any type of bias. He has taken care of the various data to attain the relevant details for the betterment of the research in an ethical as well as bias-free manner (Barrow *et al.*, 2022).

Potential difficulties which may arise in the study

One of the potential difficulties which may arise in carrying out the current study is that specific articles may not be found in the automobile sector. Secondary data analysis technique will be beneficial in carrying out the current study since the process of data collection on the impact of the fourth industrial revolution in the automobile industry. Additionally, since the secondary sources for research are retrieved from peer-reviewed articles, hence it will help in planning and analysing various sections of a study (Fraga-Lamas and Fernández-Caramés, 2019). The secondary data analysis method will help in understanding the background on Industry 4.0 and evaluate the reason for which the study is conducted. Moreover, it will also help in comparing the articles of various scholars related to the research and analyse the findings obtained for them.

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GENERAL COMMENTS

Instructor

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