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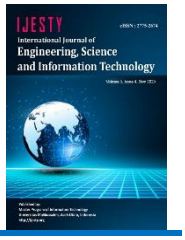

Technology Adoption and Change Management in Smart Manufacturing Industries

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Abstract

The benefits of the Internet of Things are widely acknowledged. Nonetheless, a number of articles and white papers continue to uncover security flaws in IoT, which is a major worry that the industry finds unacceptable. It can be challenging to safely connect these systems to external networks. Since the study focuses on technological acceptance, it's critical to comprehend additional factors that may influence IoT adoption. To identify the elements that impact behavioural intentions to use technology to control user behaviour, a number of theoretical models have been examined. Since academics have provided a variety of explanations for why the adoption of IoT has been hampered in various works of literature, a comprehensive study that examines all of the factors at once and presents accurate data is required. Therefore, determining the factors limiting the adoption of IoT in the manufacturing sector in and around Mumbai is the issue this study attempts to solve. The study examines supportive conditions, performance expectancy, effort expectancy, and security awareness. The study will investigate how these constructions are affected by large, medium, and small organisations. The final study will assist company managers, IoT manufacturers, and service providers in boosting IoT adoption.

Keywords: *Apoptosis Suppression, Cancer Cell, Drug Metabolism, Chemotherapy.*

1. Introduction

The initial definition of the Internet of Things (IoT) was a network of linked gadgets. Gadgets with intelligent identities and interferences that link and communicate to benefit their surroundings and users are referred to as IoT gadgets. Smart buildings, smart automobiles, smart homes, smart manufacturing, environment monitoring, health care systems, energy management, and many other fields are just a few of the many uses for the Internet of Things [12]. Although the terms IoT and IIoT are interchangeable, the Industrial Internet of Things (IIoT) refers to the use of IoT in manufacturing and industrial sectors [1]. The IIoT's superiority, which results from automation, has transformed factory and industrial segmentations. IoT benefits include much higher efficiency, accuracy, scalability, cost and time savings, predictive maintenance, and many more [4]. There are also adaptation-related difficulties with this new phenomenon (IoT). Information security is a major problem for businesses implementing IoT, according to a Gartner projection. The primary obstacle to adoption is security concerns, which come from a fear of manipulating important machinery and industrial systems [2]. The consequences of security threats and cyberattacks in IoT include financial loss, the disclosure of private information, fatalities, and injuries [8]. An ongoing research topic in academic and industrial surveys is the study of IoT security concerns in a distinct application, specifically in industrial segmentation [10]. An examination of the literature revealed that, in addition to security risks, other elements are also crucial to consider and significantly influence IoT adoption [11]. These factors are explained by several researchers who have given different technology adoption models.

Customers' awareness of the security risks posed by the Internet of Things and its associated gadgets is explained by security awareness. It clarifies how users comprehend security risks such as ransomware attacks, phishing scams, and malware [3]. It also discusses how people comprehend the effects of security risks such as data loss, privacy loss, remote hacking devices, and reputational damage.

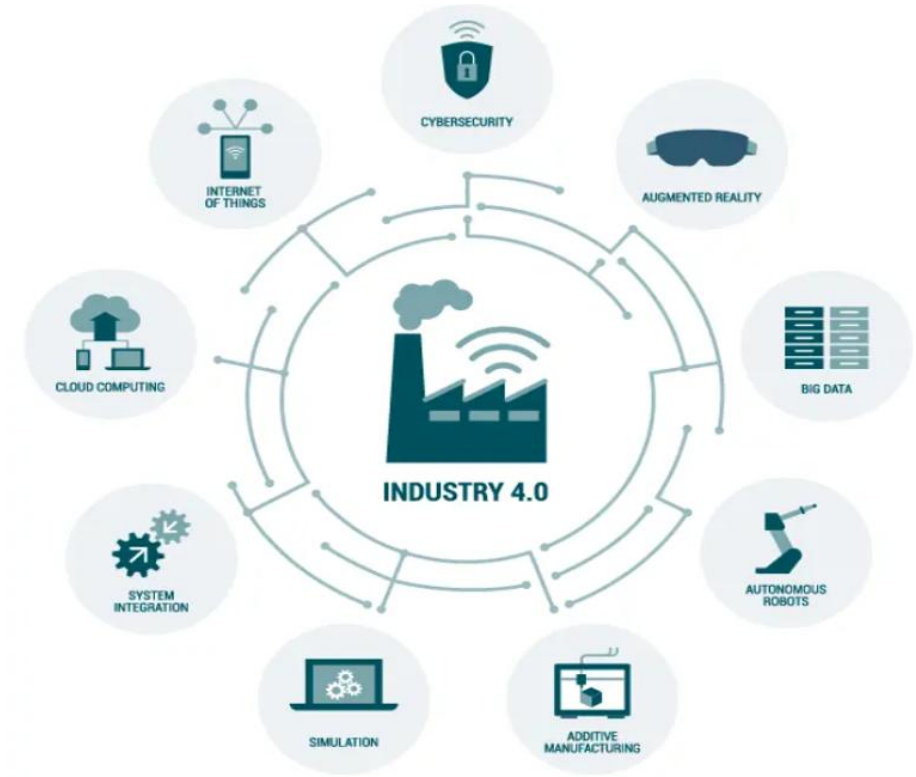

Fig 1. Industry 4.0

2. Methods

The development of the digital economy in India is significantly aided by smart technologies such as the Internet of Things (IOT), machine learning, artificial intelligence (AI), cybersecurity, etc. Consequently, a digital environment backed by innovative technological advancements is percolating in a wide range of industries. According to Rathod, Pandya, & Doshi (2020), acceptance of IOT appears as an Industry norm in the B2B market, with an analogous trend envisioned for the B2C market. Based on the latest analysis by Sullivan & Frost, the adoption of IOT in the country is growing and is also assisted by strong coverage and connectivity, the adoption of smart applications, and initiatives taken by the Government of India, related to smart city projects. With the swift advancement of Internet Technology since the mid-1990s, exponential growth is observed in the use of the Internet with regard to generation and access of information, in addition to performing economic activities [16]. With about 700 million internet users nationwide and projected to reach over 974 million by 2025, India has a sizable market for internet services in the South Asian nation. In Punjab, 90.69% of people utilise the internet. IOT is a revolutionary paradigm shift that Ashton initially introduced in 1999. IOT is defined as "structures that are emerging with the development of modern wireless communication technologies and enabling the communication of objects with each other." Through persistent connectivity, remote control, data exchange, and more, IOT seeks to bring the advantages of the ordinary internet to physical items. Layered structures, including the physical layer, network layer, processor layer, application layer, and service layer, make up the Internet of Things architectural framework [5]. These respective layers capture the distinct structures, i., physical parts, device arrangement criterion, network operational principles, data patterns and procedures employed in its specific applications [6]. It's interesting to note that IOT applications and service levels are closest to end users, supporting a wide range of services and applications across the community (such as smart metering, environment, retail, factory, and surveillance), in transportation (such as logistics, traffic, parking, and emergency services), and homes (such as utilities and appliances, health, entertainment, and security) [13]. To enhance life quality and productivity at work, the current study defines IOT services as application layer functionalities that let users connect directly with hardware (such as smartphones), self-aware objects, and smart environments.

The Mobile World Congress (MWC, 2022) accentuated on theme of “Connectivity Unleashed”, embracing the Internet of Everything, smart mobility, smart manufacturing, leading in connected technology. Furthermore, in this hyperconnected and hyperrealistic environment, technological innovation and connectivity across a variety of industries present the world with new opportunities, income streams, landscapes, and even new words. Consequently, embracing the full potential of connectedness will enable people, businesses, and society to prosper [7]. Hence, with the concept of connecting everything in a network gaining momentum, IOT emerges as the finest technological innovation so far. IOT technologies have the potential to transform the world, much like the internet did, due to the exponential growth in the connections between people, services, and information.

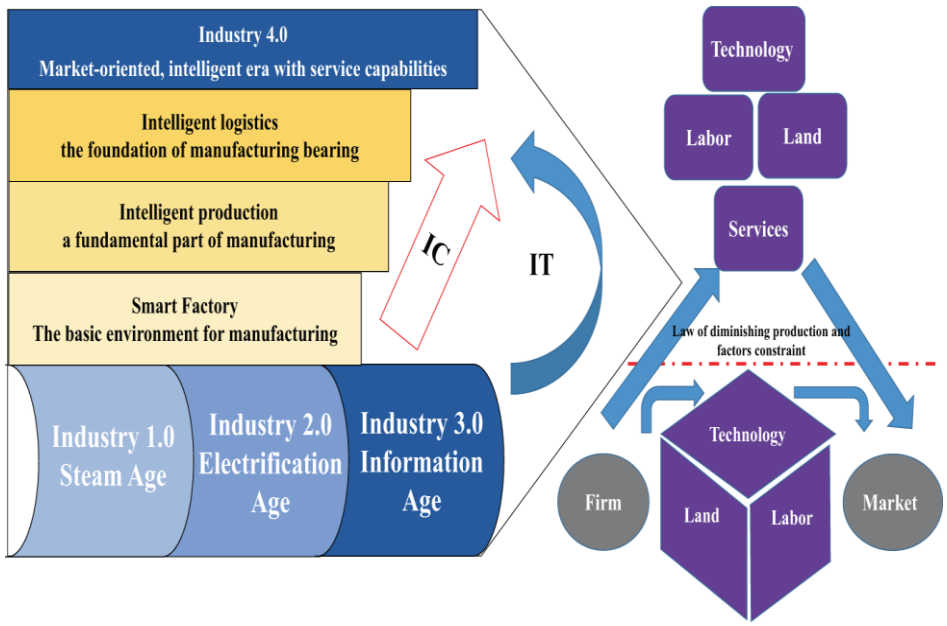

Fig 2. Upgrading models, evolutionary mechanisms

3. Results and Discussion

This non-experimental correlation study aims to quantify the potential relationship between customer intention to adopt the IoT and security awareness, performance expectancy, effort expectancy, facilitating factors, and organisation size.

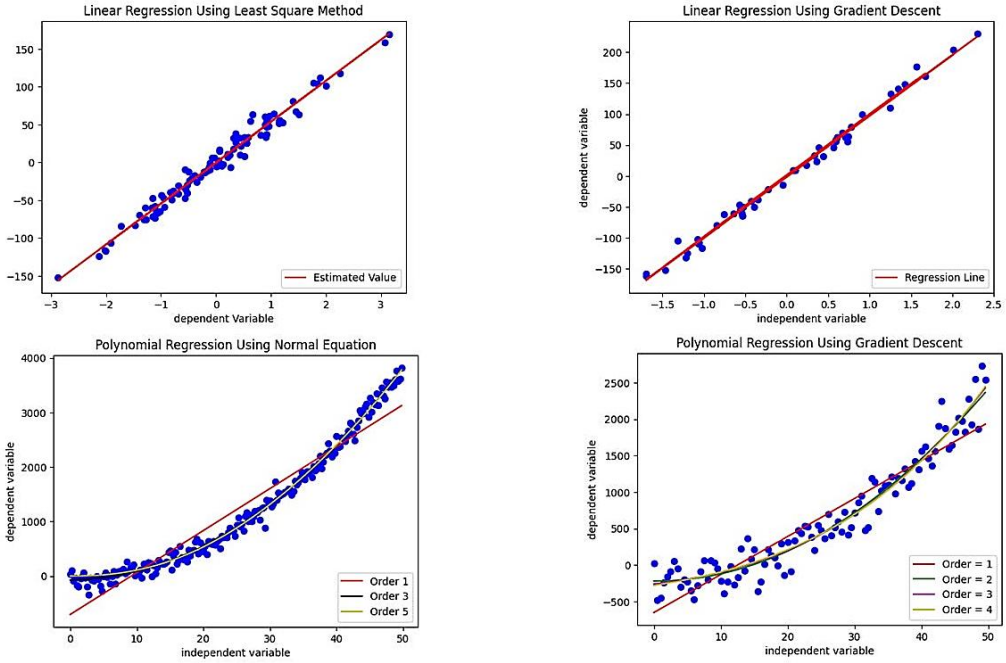

Fig 3. Regression plot

Understanding this link will become more crucial as it will highlight the true reasons behind the sluggish acceptance of IoT, enabling IoT service providers and suppliers to concentrate on the areas that will increase adoption. The industry requires a more secure solution if security awareness is the true issue [14]. A solution must be found to get over these problems, though, if additional elements like performance expectations, effort expectations, and facilitating conditions are obstacles. However, if the company's size affects the aforementioned aspects, then solutions are needed to meet the needs of manufacturing enterprises of a particular scale.

Table 1. KMO and Bartlett's Test

Factors	ExtractionSumsofSquared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative%
How can smart manufacturing industries address the skills gap and talent shortage?	3.017	33.522	33.522	2.864	31.819	31.819
What are the implications of technology adoption for	2.005	22.274	55.796	2.016	22.401	54.220

supply chain management?						
How can organisations ensure data quality and integrity in smart manufacturing?	1.153	12.816	68.612	1.295	14.391	68.612

Since the Internet of Things is still a relatively new technology, there would be a knowledge gap on the real factors preventing its adoption in industrial firms if this study were not conducted. This disparity could cause the IoT's benefits to be realised more slowly [9]. However, improvements will be made sooner to boost the adoption rate if the specific elements influencing consumers' intention to use the IoT are identified.

Table 2. Rotated Factor Matrix

Description	Factor		
	1	2	3
What are the benefits and challenges of using digital twins in smart manufacturing?	.154	-.011	.889
How can smart manufacturing industries address the skills gap and talent shortage?	-.069	.085	.473
What are the implications of technology adoption for supply chain management?	-.069	.913	.205
How can organisations ensure data quality and integrity in smart manufacturing?	-.158	.802	-.150
What are the cybersecurity implications of adopting new technologies in smart manufacturing?	.251	.733	.282
How can smart manufacturing industries balance the need for innovation with the need for stability and reliability?	.150	.221	-.598
What is the impact of technology adoption on business models and revenue streams?	-.593	.662	.453
How can organisations measure the success of technology adoption and change management initiatives?	-.048	.762	-.269
What are the benefits and challenges of implementing Industry 4.0 technologies in smart manufacturing?	.893	.014	-.051
What are the benefits and challenges of implementing Industry 4.0 technologies in smart manufacturing?	-.069	.913	.205
How can employees be effectively trained and upskilled to work with new technologies?	-.158	.802	-.150
What role does organizational culture play in technology adoption and change management?	.251	.733	.282
How can leadership support and champion technology adoption in smart manufacturing?	.150	.221	-.598
How can organizations effectively manage change when implementing new technologies in smart manufacturing?	-.593	.662	.453
What are the key drivers of technology adoption in smart manufacturing industries?	-.069	.913	.205
How can smart manufacturing industries address the skills gap and talent shortage?	-.158	.802	-.150
What are the implications of technology adoption for supply chain management?	.251	.733	.282
How can organisations ensure data quality and integrity in smart manufacturing?	.150	.221	-.598

The main justifications for the industry's resistance to its adoption are data security and protection issues [15]. Data privacy for the Internet of Things is still a possible worry in the post-Snowden world. Additionally, security failures can be particularly harmful because IoT devices can collect vast volumes of data. Due to the fact that many industrial devices were originally intended to remain isolated, businesses creating industrial IoT applications may encounter considerable difficulties.

4. Conclusion

Also referred to as Industry 4.0 or the industrial internet, the Internet of Things (IoT) is the application of intelligent sensors and actuators to improve manufacturing and industrial processes. 'Dumb machines' have been producing data in industrial settings for years, and IoT uses real-time analytics and smart machine power to harness this data. IoT is based on the idea that intelligent machines are superior to humans, not just at real-time data collection and analysis, but also in conveying critical information that can be utilised to make more accurate and timely business choices. In addition to supporting business intelligence (BI) initiatives, connected sensors and actuators help businesses identify inefficiencies and issues early and save time and money. The Internet of Things has promise for supply chain traceability, sustainability, quality control, and overall supply chain efficiency. IoT is essential to industrial activities, including asset tracking, energy management, improved field service, and predictive maintenance.

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