An Empirical Study on APPLICATION AND IMPACT OF INTERNET OF THINGS IN COMMERCIAL SECTOR

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Abstract Internet of Things is fundamentally changing the way we do business. By connecting devices and sensors to the internet, we are entering an age where data analytics, connectivity, and automation are creating innovations and progress previously out of reach. Internet of Things has also affected the way of living and earning livelihood, Internet of Things is widely used for domestic purpose now it is also used for commercial activities which has led to boom in world economy. In this paper we will discuss about the impact and application of Internet of Things in the various sectors of the economy.

Keywords: INTERNET OF THINGS, HEATING, VENTILATION, AND AIR CONDITIONING (HVAC), industries, Energy industry, agriculture Industry, automated shopping, RFID tags

I. Introduction

Basically, Consumer Internet of Things solutions are focused on individual users or families through the use of wearables, smart home applications, and personal monitoring devices. A suitable example are voice smart assistants. In other words, products that make our lives easier by performing tasks or services for us. Another common example are smart thermostats, which help reduce utility costs by turning the HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) system on just when it's needed, and off when the indoor climate is in the perfect conditions for us, even if you're away from home. These devices could last many years, but they tend to be replaced with the newest versions launched with the advent of new tech generations. Objectives of study is to

- Understand the application and impact of Internet of Things on retail shops
- Understand the application and impact of Internet of Things on industries.
- Understand the application and impact of Internet of Things on the life of consumers

II. Internet of Things in retail marketing

The Internet of Things and retail allows store managers to find new ways to establish a connection with a client, create a short and direct customer journey, improve the process of product maintenance, and build a long-lasting bond with first-time shoppers.

Impact of Internet of Things in retail marketing

- **Reducing shrinkage and fraud** as the Internet of Things adds an additional layer of traceability and visibility of the inventory and delivery process.
- **Optimizing product placement**. Internet of Things allows store managers to identify premium store areas, test the placement of different items in those spots, and find the most efficient layout thanks to detailed reports based on the data gathered by sensors.
- **Efficient use of in-store staff.** Internet of Things can use cameras, sensors, and facial recognition algorithms in order to identify an impatient or confused shopper. Staff will be able to make proactive decisions and successfully engineer the atmosphere within the store.
- **Improved retail management and tracking.** Internet of Things helps store managers be aware of the number of products on the shelves and in the inventory, replenish stocks on time, and more. The technology can also send automated reports that will later improve financial management and taxing.
- **Connecting online and in-store experiences**. The Internet of Things in the retail industry allows users to benefit from brand-related digital solutions while using physical stores. This way, retail companies can achieve synergy between online and in-store experiences.

Application of Internet of Things in retail market

- **Location tracking**

  The Internet of Things solves one of the biggest issues in retail - a lack of delivery reliability. The technology is capable of increasing operational efficiencies and Predictive equipment maintenance

  Malfunctioning electric appliances (refrigerator units, for example) can lead to tremendous reputational and monetary losses, and it can send dozens of product units to waste. [6]In order to be updated on store maintenance and take a proactive approach in equipment managers, store managers often use Internet of Things in retail. The technology

is capable of providing real-time equipment monitoring and notifying the user in case of likely malfunctioning.

Outside of the Internet of Things used in retail, predictive equipment maintenance has already been implemented in transportation (Volvo and IBM), manufacturing (Chevron and Microsoft), and utilities (Florida Power Light)

- **Inventory management**

Internet of Things allows store managers to automate product orders, is capable of notifying when a certain product needs to be re-ordered, gathers data regarding the popularity of a certain item, and prevents employee theft.

There is no lack of inventory-centered Internet of Things solutions, including:

- **MIT Drone Inventory System**—an Internet of Things-based drone that monitors inventory in real time and sends alerts in case there are no available units left.
- **Intel Retail Sensor Platform** - the RFID antenna scans the number of units on the sales floor and alerts a store manager in case it's low. The platform looks like a plug-and-play device.
- **Lululemon**—a technology for customer-facing inventory managers. A buyer can conduct a real-time check to ensure the desired product is available at the nearest store.
- **Internet of Things in various Industries**

Industries like energy, agriculture, and cryptocurrency face an ever-increasing demand from our rapidly growing population and are under the most stress to deliver better outputs Embracing the Internet of Things is helping these industries perform in a more effective and efficient manner. [7]

- **Internet of Things in Energy industry**

With diminishing resources for non-renewable energy, green energy solutions like solar panels are a big thing today. Green energy devices connected with the Internet of Things have removed the human element to a big extent, allowing better monitoring and maintenance. [8]

Energy providers are now using smart meters to better collect data related to the consumption of both non-renewable and green energies. This makes it easier to credit green energy consumers and to better bill the customers.

- **Internet of Things in agriculture Industry**

The Internet of Things has proven to be an invaluable asset to agriculture workers and farmers. [8]From Internet of Things enabled drones surveying the cultivated land and cattle, to dedicated sensors tracking livestock and crop health, the Internet of Things has brought about a new era in precision farming. Resources are utilized to the max while minimizing wastage.

- **Internet of Things in cryptocurrency**

Cryptocurrencies like Tael (WABI) and Waltonchain are relying on the Internet of Things for functions such as counterfeit mitigation and supply chain management. Several other Cryptocurrencies (like INTERNET OF THINGS) have been purposefully designed to integrate the Internet of Things.

Internet of Things enabled Cryptocurrencies allow a chain of Internet of Things based devices to freely trade in the open market. [7] These Cryptocurrencies present a situation where INTERNET OF THINGS connected devices and blockchain are working in sync, supporting and popularizing machine to machine (M2M) transactions and disrupting global markets.

III. Other Application of Internet of Things In Industries

1. **Production Visibility**
   Industrial Internet of Things can connect machines, tools, and sensors in the store floor to give process engineers and managers much-needed visibility into manufacturing. For instance, manufacturers can mechanically track parts as they move thru assemblies using sensors such as RFID and break beams. Furthermore, via connecting with the tools the operators use to perform their jobs and with the machines concerned in production, commercial Internet of Things applications can deliver supervisors and plant managers a real-time view of their teams' yield. This degree of visibility can be utilized by manufacturers to identify bottlenecks, locate the root cause of problems, and improve at a faster rate.
2. **Higher operator productivity**

industrial Internet of Things can increase the productivity of the manufacturing workforce in numerous ways. let's start with the operators. using Internet of Things enabled tools, operators can go through workflows faster without compromising quality. for example, pick-to-light devices can help operators locate the piece they need much more quickly and thus lessen their cycle time. Likewise, the usage of Internet of Things enabled tools such as torque drivers can accelerate work by automatically adjusting the device's settings according to the operation they need to do.

3. **Faster improvement cycles**

   Operators aren't the only ones who gain from Industrial Internet of Things. Process engineers (as well as manufacturing engineers, high-quality engineers, and in general all frontline engineers in the store floor) gain as well. Without Internet of Things, shop floor engineers must manually gather, aggregate, and analyse data. An Internet of Things enabled shop floor, on the other hand, gives them the ability to automate information collection so they have more time to spend improving processes.

4. **Reduce the cost of quality management systems**

   Quality management systems (QMS) are hard to implement and maintain. Industrial Internet of Things can assist reduce the costs associated with them by automating and streamlining the system control plan. The usage of sensors, manufacturers can automatically test variables that are essential to quality, therefore reducing the time and resources dedicated to the QMS. Rather than manually performing quality inspections, they can use Internet of Things sensors to streamline the manner.

5. **Improve quality through continuous monitoring**

   Environmental sensors can continuously monitor conditions crucial to quality and alert control when high-quality thresholds are crossed.[6] For example, in a pharmaceutical operation, temperature may be critical to fine. By using Internet of Things related temperature and humidity sensors, managers can screen those variables and be instantly alerted if they go outdoor the expected parameters.

6. **Increase machine utilization**

Industrial Internet of Things enables manufacturers to connect their machines to the net. This functionality lets manufacturers not only screen their machines, however additionally measure essential KPIs such as overall equipment effectiveness (OEE) and overall process effectiveness (OPE) in real-time. [5]Tracking these metrics lets manufacturers pick out and fix reasons of unplanned downtime, offer preventive maintenance to their equipment and as a consequence increase machine utilization throughout the shop floor. In truth, a latest McKinsey article reported that sensor data used to expect equipment failure in a manufacturing environment can reduce maintenance expenses by using as much as 40 % and reduce unplanned downtime in 1/2.

7. **Better facility management**

   Leveraging sensors in manufacturing facilities can enhance their management and therefore lessen the operational costs of a factory. as an instance, the use of sensors such as RFID tags to monitor facilities, manufacturers can gain insights to assist them optimize area usage. any other way in which Internet of Things enabled sensors can help manufacturers better manipulate their facilities is by using making sure environmental variables such as temperature, humidity or others, stay in the prescribed variety. [2]Ultimately, manufacturers can conserve energy, reduce costs, and increase operational efficiency by the use of sensors to monitor machinery and ensure they're running within their prescribed working environment.

8. **Supply chain optimization**

   Internet of Things enabled sensors to permit monitoring of events across a supply chain, providing access to real-time information with the aid of tracking inputs, equipment, and products. [2] RFID tags and different sensors may be used to track inventory as it moves around the supply chain. This provides manufacturers visibility into inventories and more sensible timelines for material availability, work in progress, and so on. the usage of this data, manufacturers can pick out interdependencies, map material flow, and track manufacturing cycle times. This data enables manufacturers predict issues. It additionally reduces inventory and potentially reduces capital requirements.[10]

IV. Survey

We conducted the survey to check how much the people are aware about the internet of things and how much they are ready to adopt it.

Here are the results of the survey and approx 100+ peoples have attempt this survey.
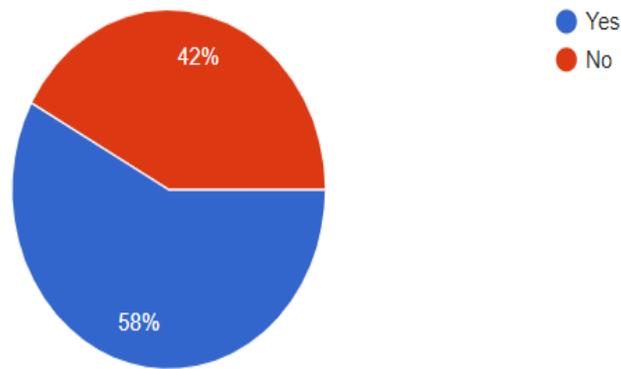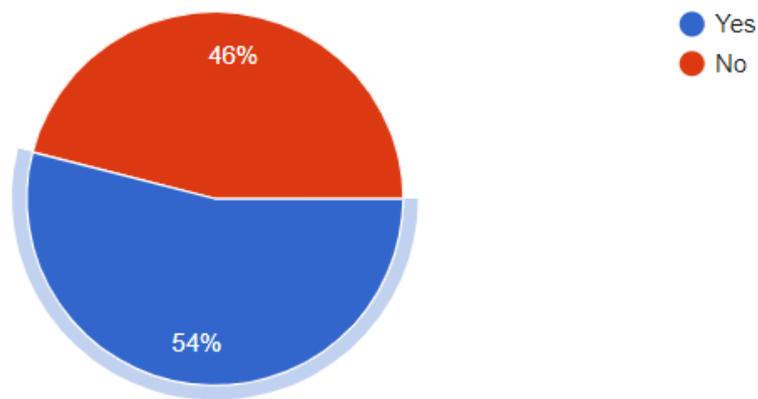

Figure 2.1 how many people are familiar with IOT

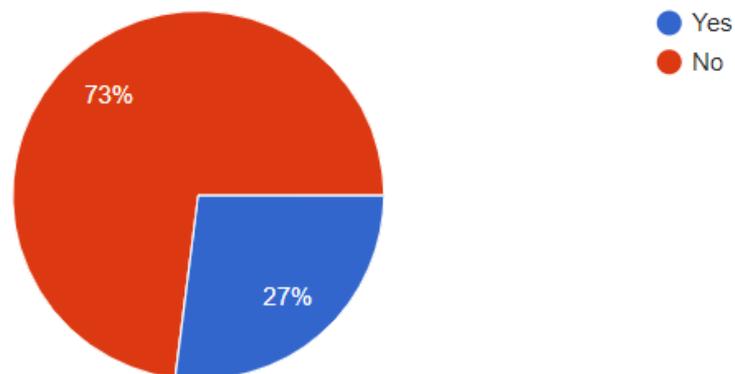Figure 2.2 people owning an IoT product
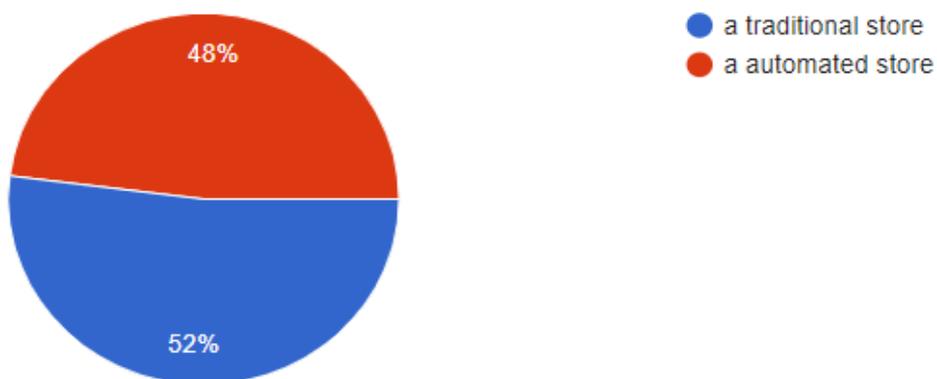
Figure 2.3 people who update router password

Figure 2.4 preference of store

Findings of survey

From the survey we see that in figure 2.3 only 27% people update their passwords regularly while in figure 2.4 one can see that majority of people are ready to accept the new way of human less fully automated shopping.

V. Disadvantages of Internet of Things

- **Compatibility**: As of now, there is no standard for tagging and monitoring with sensors. A uniform concept like the USB or Bluetooth is required which should not be that difficult to do.
- **Complexity**: There are several opportunities for failure with complex systems. For example, both you and your spouse may receive messages that the milk is over and both of you may end up buying the same. That leaves you with double the quantity required. Or there is a software bug causing the printer to order ink multiple times when it requires a single cartridge.
- **Privacy/Security**: Privacy is a big issue with Internet of Things. All the data must be encrypted so that data about your financial status or how much milk you consume isn't common knowledge at the work place or with your friends.
- **Safety**: There is a chance that the software can be hacked and your personal information misused. The possibilities are endless. Your prescription being changed or your account details being hacked could put you at risk. Hence, all the safety risks become the consumer's responsibility.

VI. The Future of Industrial Internet of Things

The rise of industrial Internet of Things will soon bring the factory of the future to reality. Material handling, manufacturing, product distribution and supply chain management will all be [8] automated to a degree in the years to come. To drive the digital transformation forward, however, executives will have to become involved in the process right from the start. The IT department alone will need such support when revolutionary decisions are being made about production processes.

The industrial internet of things, also known as industry 4.0, has already started the fourth industrial revolution. [9] More automation has already led to a 30 percent boost in productivity and the adoption of flexible production techniques. Predictive maintenance is reducing the cost even further by saving more than 12 percent on scheduled repairs and bringing breakdowns down by nearly 70 percent.

In the future, experts suggest that industrial Internet of Things will enhance production levels even further and become the driving force behind various types of innovation (including the utilization of innovative fuels). [3]The workforce itself will also be transformed as a part of the extensive automation process.

While an array of adoption challenges will still have to be overcome, predictive analysis suggests that the world will have 50 billion connected devices by 2020. It would be a pity for such a massive network to remain unutilized in attempts to enhance industrial processes. Remember that industrial Internet of Things is not about smart product development. Rather, it will help for a higher level of efficiency and predictive rather than reactionary interventions – a main problem industries across the world are struggling with today.

VII. Conclusion

While the Internet of Things is now being widely accepted in various industries and people being able to adapt to the technology it has a huge potential to increase the output and reduce the input that is making industries more efficient and effective. Internet of Things makes everything automated reducing the cost of labour to a very low level. It accepted by consumers for daily life making their life easier and simpler. But there are disadvantages too, if there is no proper awareness about the security measures the results can be disastrous and can cause a havoc in the economy also. As one can see in figure 2.3 only 27% people update their passwords regularly while in figure 2.4 one can see that majority of people are ready to accept the new way of human less fully automated shopping.

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