

STUDY OF USING BLOCKCHAIN IN SUPPLYCHAIN FOR MANUFACTURING INDUSTRIES

Submitted in partial fulfillment of the requirements for the award of

Master of Business Administration

by

VENUGOPAL.T.K

Register NO: 39410225



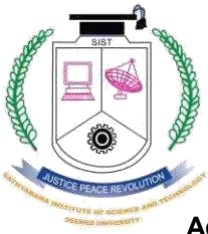
SCHOOL OF BUSINESS ADMINISTRATION

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE
Jeppiaar Nagar, RAJIV GANDHI SALAI, CHENNAI - 600 119**

April - 2021



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Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai – 600 119
www.sathyabama.ac.in**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **VENUGOPAL.T.K 39410225** who have done the Project work entitled "**STUDY OF USING BLOCKCHAIN IN SUPPLYCHAIN FOR MANUFACTURING INDUSTRIES**" under my supervision from January 2021 to March 2021.

Dr. DHIVYA SATHISH

Internal Guide

External Guide

Dr. BHUVANESWARI G.

Dean – School of Business Administration

Submitted for Viva voce Examination held on _____.

Internal Examiner

External Examiner

DECLARATION

I **VENUGOPAL.T.K 39410225** here by declare that the Project Report entitled, “**STUDY OF USING BLOCKCHAIN IN SUPPLYCHAIN FOR MANUFACTURING INDUSTRIES**” done by me under the guidance of **Dr.DHIVYA SATHISH** at **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI** is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

DATE:

PLACE: Chennai

VENUGOPAL TK

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(VENUGOPAL TK)

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ABSTRACT

It's incredibly difficult for customers or buyers to truly know the value of products because there is a significant lack of transparency in our current system. In a similar way, it's extremely difficult to investigate supply chains when there is suspicion of illegal or unethical practices. They can also be highly inefficient as vendors and suppliers try to connect the dots on who needs what, when and how. This project report suggests that the real time transparency and cost savings secured by blockchain technology improve the profitability and competitiveness of manufacturing firm and also explains the limitations of blockchain adapting to manufacturing industries.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The present world is marching towards the digital era, where it is easy for people to gather more information and knowledge about small companies located in the nooks and corners of the world. People are prone to numerous varieties and options in prices, models, quality, and brands in purchasing any product. With more connectivity and digitalization, awareness of people knowing about various companies and products they produce is on a rise. This eventually leads to a widened scope of business and heavy competition for sustainable competitive advantage. Managing the business with a motive to satisfy the changing customer needs now and then is a challenge most companies face. It takes a very little time frame for a change to happen. Yesterday's techniques and methods used seems less effective as technology and needs keep improvising, and so, today's methods and tools might not be sufficient in handling the constant change for the future to come. This establishes the idea for the industries to constantly adopt new methods and techniques to have an unceasing competitive advantage.

A promising company would aim at delivering products with high quality at low cost without compromising its profit margin and quality, satisfying the needs of the customers.

Managing supply chains nowadays is extraordinarily complicated as stakeholders have to maintain paper-based trails

The lack of transparency can cause cost and customer relationship issues, which can negatively influence a brand name.

With the help of Blockchain technology, one could easily find out where a product was made, by whom, and if the quality and condition of said product

1.1.1.BLOCKCHAIN

What is blockchain?

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system.

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is known as Distributed Ledger Technology (DLT).

Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature called a hash

1.1.2.History

The blockchain technology was described in 1991 by the research scientist Stuart Haber and W. Scott Stornetta. They wanted to introduce a computationally practical solution for time-stamping digital documents so that they could not be backdated or tampered. They develop a system using the concept of cryptographically secured chain of blocks to store the time-stamped documents.

In **1992**, Merkle Trees were incorporated into the design, which makes blockchain more efficient by allowing several documents to be collected into one block. Merkle Trees are used to create a 'secured chain of blocks.' It stored a series of data records, and each data records connected to the one before it. The newest record in this chain contains the history of the entire chain. However, this technology went unused, and the patent lapsed in 2004.

BLOCKCHAIN HISTORY

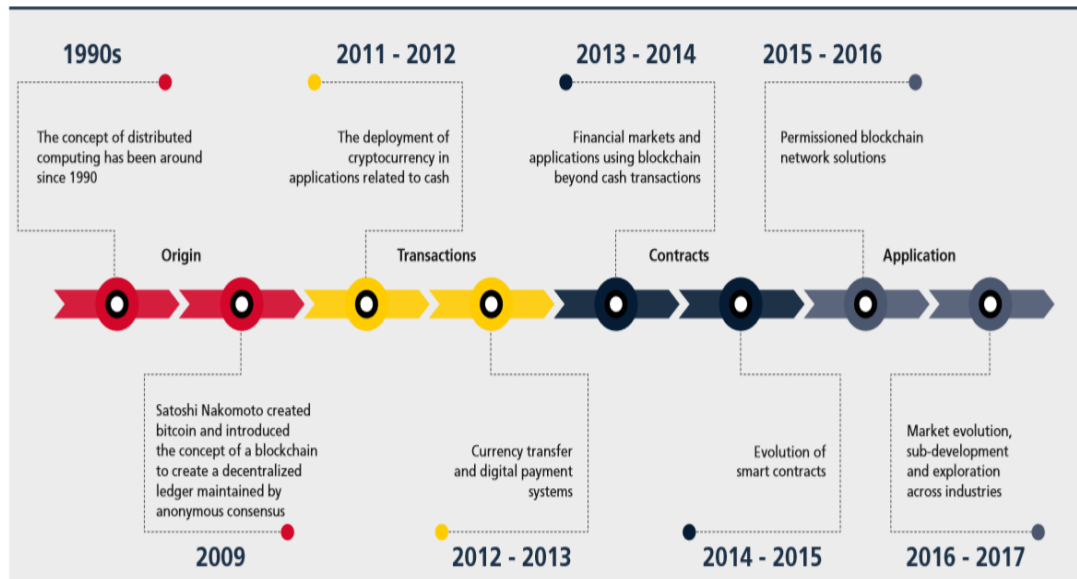


Fig 1.1.BLOCKCHAIN HISTORY

Further, in 2008, **Satoshi Nakamoto** conceptualized the theory of distributed blockchains. He improves the design in a unique way to add blocks to the initial chain without requiring them to be signed by trusted parties. The modified trees would contain a secure history of data exchanges. It utilizes a peer-to-peer network for timestamping and verifying each exchange. It could be managed autonomously without requiring a central authority. These improvements were so beneficial that makes blockchains as the backbone of cryptocurrencies. Today, the design serves as the public ledger for all transactions in the cryptocurrency space.

The evolution of blockchains has been steady and promising. The words block and chain were used separately in Satoshi Nakamoto's original paper but were eventually popularized as a single word, the Blockchain, by 2016. In recent time, the file size of cryptocurrency blockchain containing records of all transactions occurred on the network has grown from 20 GB to 100 GB.

1.1.3.How blockchain works?

Authentication

The original blockchain was designed to operate without a central authority (i.e. with no bank or regulator controlling who transacts), but transactions still have to be authenticated.

This is done using cryptographic keys, a string of data (like a password) that identifies a user and gives access to their “account” or “wallet” of value on the system.

Each user has their own private key and a public key that everyone can see. Using them both creates a secure digital identity to authenticate the user via digital signatures and to ‘unlock’ the transaction they want to perform.

Authorization

Once the transaction is agreed between the users, it needs to be approved, or authorised, before it is added to a block in the chain.

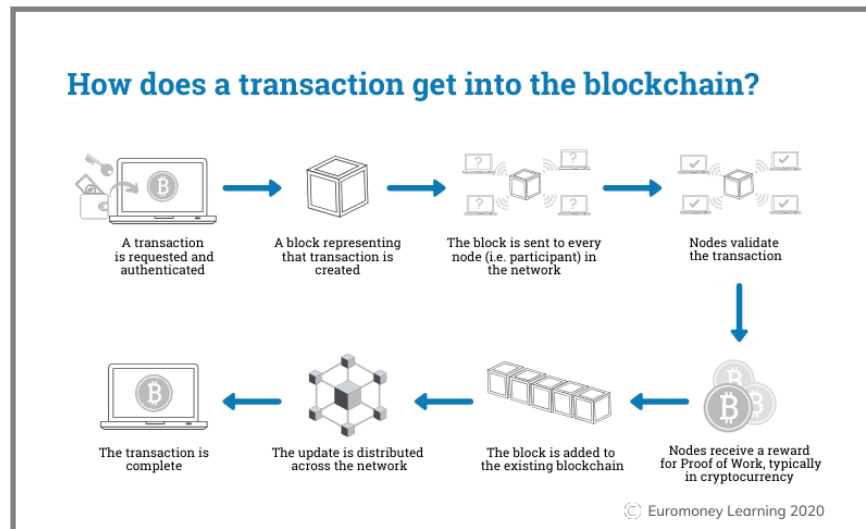
For a public blockchain, the decision to add a transaction to the chain is made by consensus. This means that the majority of “nodes” (or computers in the network) must agree that the transaction is valid. The people who own the computers in the network are incentivised to verify transactions through rewards. This process is known as ‘proof of work’.

Proof of Work

Proof of Work requires the people who own the computers in the network to solve a complex mathematical problem to be able to add a block to the chain. Solving the problem is known as mining, and ‘miners’ are usually rewarded for their work in cryptocurrency.

But mining isn’t easy. The mathematical problem can only be solved by trial and error and the odds of solving the problem are about 1 in 5.9 trillion. It requires substantial computing power which uses considerable amounts of energy. This

means the rewards for undertaking the mining must outweigh the cost of the computers and the electricity cost of running them, as one computer alone would take years to find a solution to the mathematical problem.



1.1.4. Blockchain in Supplychain

The very things that are necessary for reliability and integrity in a supply chain are provided by blockchain. Blockchain provides consensus—there is no dispute in the chain regarding transactions because all entities on the chain have the same version of the ledger. Everyone on the blockchain can see the chain of ownership for an asset on the blockchain. Records on the blockchain cannot be erased which is important for a transparent supply chain.

1.1.5. Applications of Blockchain in Supply Chain

Payments in Automotive Suppliers

Blockchain can be a very easy approach to businesses if they have a globalized supply chain. Tomcar, an Australian vehicle manufacturer, pays its suppliers through bitcoin. Other three partners in Israel and Taiwan have also accepted this mode for their automotives.

Tracing the Food/Meat

In terms of the food industry, Walmart uses blockchain to track its product to the end consumer. Walmart tracks its product pork meat from China where blockchain keeps a record of the piece of meat from the order placed to the date it is sold to

the consumer. Through this tracking function, the investigators can also find and remove the sources that provide food-borne diseases and list out those factories. Nestle, Unilever, and Tyson also use the blockchain for the similar purposes.

Monitoring Cold Chain

Food and pharmaceutical products need to put their products in cold/special storage. In this area, blockchain helps in recording the humidity, temperature, vibration, and other parameters and store those values on blockchain which are tamper proof and permanent.

If the storage condition changes from what has been agreed, then all the blockchain members will see it. Here, a smart contract comes into the frame to correct the situation.

Health Industry

The medical records of patients can be accessed from any part of the world by the patient. By giving the key access like patient fingerprints, the entire medical record can be seen and can alert the paramedic, who can help them identify the problem prescribe medication without the risk of any allergy reactions.

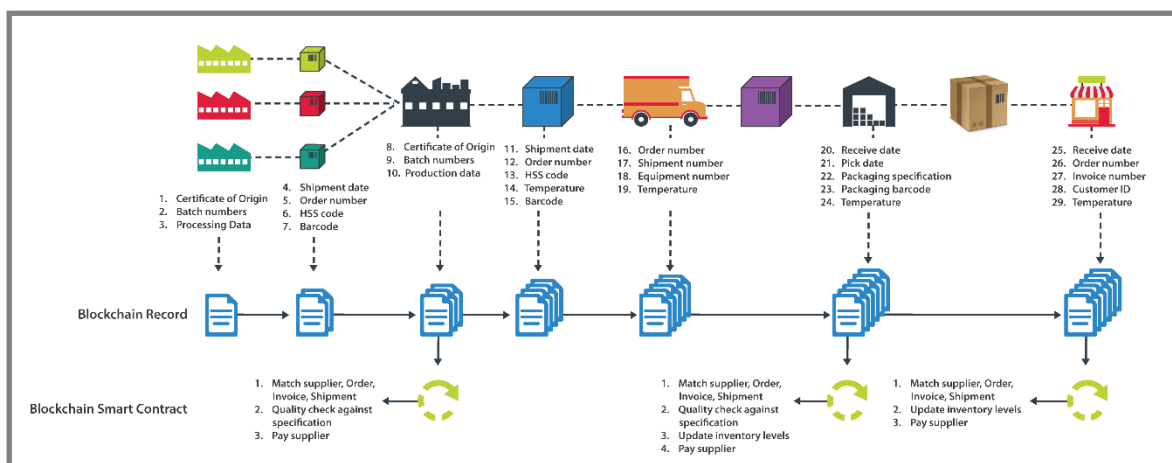


FIG 1.3. BLOCKCHAIN IN SUPPLYCHAIN PROCESS

1.2 INDUSTRY PROFILE

1.2.1.MANUFACTURING INDUSTRIES

Manufacturing sector is considered the backbone of development in general and economic development in particular mainly because Manufacturing industries not only help in modernizing agriculture, which forms the backbone of our economy, they also reduce the heavy dependence of people on agricultural income by providing them jobs in secondary and tertiary sectors.

Industrial development is a precondition for eradication of unemployment and poverty from our country. This was the main philosophy behind public sector industries and joint sector ventures in India. It was also aimed at bringing down regional disparities by establishing industries in tribal and backward areas.

Export of manufactured goods expands trade and commerce, and brings in much needed foreign exchange. • Countries that transform their raw materials into a wide variety of finished goods of higher value are prosperous. India's prosperity lies in increasing and diversifying its manufacturing industries as quickly as possible.

Over the last two decades, the share of manufacturing sector has stagnated at 17 per cent of GDP – out of a total of 27 per cent for the industry which includes 10 per cent for mining, quarrying, electricity and gas. This is much lower in comparison to some East Asian economies, where it is 25 to 35 per cent. The trend of growth rate in manufacturing over the last decade has been around 7 per cent per annum.

The desired growth rate over the next decade is 12 per cent. Since 2003, manufacturing is once again growing at the rate of 9 to 10 per cent per annum. With appropriate policy interventions by the government and renewed efforts by the industry to improve productivity, economists predict that manufacturing can achieve its target over the next decade. The National Manufacturing Competitiveness Council (NMCC) has been set up with this objective.

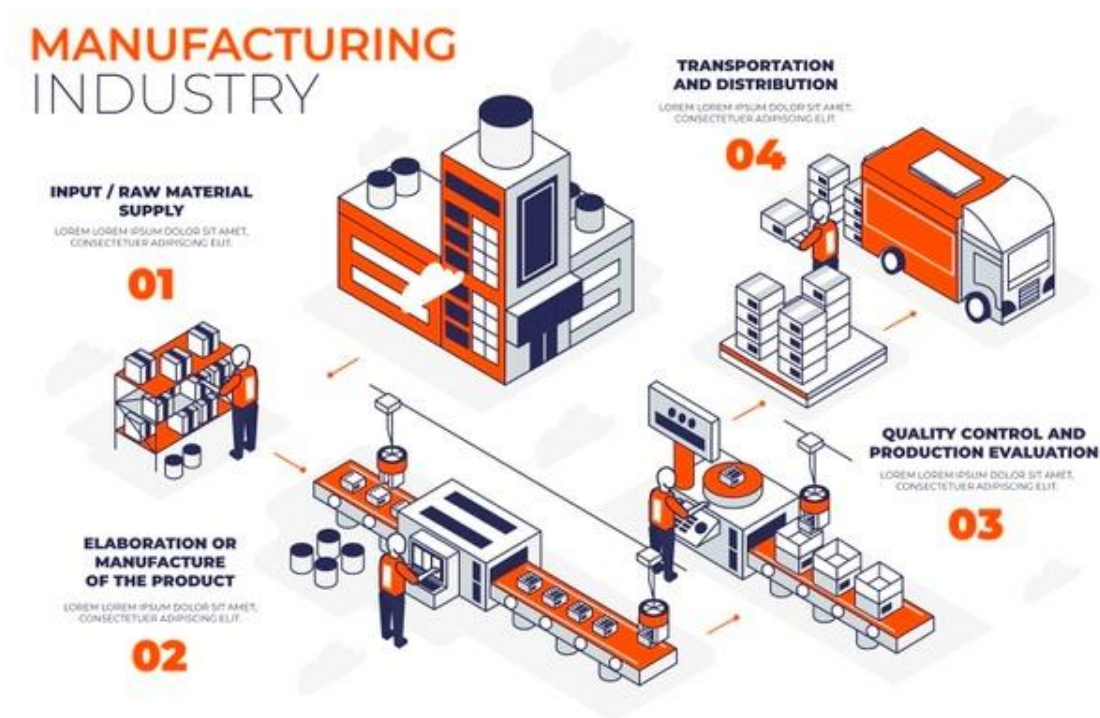


Fig.1.4 Manufacturing Process

1.2.2. CLASSIFICATION OF INDUSTRIES

List the various manufactured products you use in your daily life such as – transistors, electric bulbs, vegetable oil, cement, glassware, petrol, matches, scooters, automobiles, medicines and so on. If we classify the various industries based on a particular criterion then we would be able to understand their manufacturing better. Industries may be classified as follows: On the basis of source of raw materials used:

- **Agro based:** cotton, woollen, jute, silk textile, rubber and sugar, tea, coffee, edible oil.
- **Mineral based:** iron and steel, cement, aluminium, machine tools, petrochemicals.

- **Basic or key industries** are those which supply their products as raw materials to manufacture other goods e.g. iron and steel and copper smelting, aluminum smelting.

- **Consumer industries** that produce goods for direct use by consumers – sugar, toothpaste, paper, sewing machines, fans etc. On the basis of capital investment:

- A small scale industry is defined with reference to the maximum investment allowed on the assets of a unit.

This limit has changed over a period of time. At present the maximum investment allowed is rupees one crore. On the basis of ownership:

- **Public sector**, owned and operated by government agencies – BHEL, SAIL etc

- **Private sector** industries owned and operated by individuals or a group of individuals –TISCO, Bajaj Auto Ltd., Dabur Industries.

- **Joint sector industries** which are jointly run by the state and individuals or a group of individuals. Oil India Ltd. (OIL) is jointly owned by public and private sector.

- **Cooperative sector** industries are owned and operated by the producers or suppliers of raw materials, workers or both. They pool in the resources and share the profits or losses proportionately. Such examples are the sugar industry in Maharashtra, the coir industry in Kerala. Based on the bulk and weight of raw material and finished goods:

- **Heavy industries** such as iron and steel

- **Light industries** that use light raw materials and produce light goods such as electrical goods industries.

1.2.3. INDIAN MANUFACTURING INDUSTRY PROFILE

The Indian economy is firmly on the path of steady growth. Even during the last decade when other countries were in the grip of a massive slowdown, India continued to enjoy a comfortable economic position. This recent spurt in growth is propelled by radical reforms such as the removal of restrictions on foreign investment and industrial de-licensing. Tailoring the EXIM policy to promote exports and aligning the import duties to meet WTO commitments further contributed to this development. This trend is expected to continue over the next five years, driven by a favourable business policy environment in terms of tax cuts, broadening tax base, and reduced interest rates.

The liberalization of the economy has opened new windows of opportunity for manufacturing sector. Increasingly the success of manufacturing industries is dependent on innovations, research and development. It is critical not only to remain competitive but also, significant advantages can be gained by developing and commercializing new technologies. With a size of US \$ 22 billion, the engineering sector exports stood at US \$ 6.6 billion in 2001-02 and imports at US \$ 4.9 billion the same year. Indian engineering manufacturing sector employs over 4 million skilled and semi-skilled workers. The engineering manufacturing sector comprises of heavy engineering (70%) and light engineering (30%). India's growing integration with the global economy and the government's recognition that infrastructure needs to be overhauled are likely to ensure that the trend rate of growth increases in the next decade.

1.3.Need for the study

On a global scale, many industries are shifting towards new technology to improve supply chain efficiency and gain profit, where the emerging technology blockchain will have major part in future markets. The successful implementation of Blockchain is a hard thing to accomplish in most industries, especially in India.

This study aims to understand the reason why industries should adapt blockchain and its benefits and limitations while implementing the blockchain technology. This will allow many industries to revisit their strategies and review whether Blockchain technology should be adopted or not.

1.4.Scope and Significance of Study

This project aims to get understand about using the blockchain technology in manufacturing industries and make people aware about emerging technology and its various benefits in various sectors.

1.5. OBJECTIVES OF THE STUDY

1.5.1.Primary Objective

- A study on using Blockchain in supply chain for Manufacturing Industries

1.5.2.Secondary Objective

- To analyze the impact of blockchain in supply chain
- To study the different aspects of Blockchain
- To study impact of blockchain in various sectors
- To study impact of Blockchain in Indian Markets

1.6.LIMITATIONS OF THE STUDY

- It is difficult to check the accuracy of information provided
- The way things are measured may change over time.
- Due to time constrained only 120 numbers of respondents were considered

CHAPTER 2

REVIEW OF LITERATURE

Anna Roy (2020): Blockchain technology has the potential to revolutionize interactions between governments, businesses and citizens in a manner that was unfathomable just a decade ago. Though very often grouped with technologies such as artificial intelligence (AI) or IoT (Internet of Things), the technology is unique in its foundational nature. Unlike other technologies, which have the potential to deliver completely new services to citizens and other stakeholders alike, blockchain has the potential to revamp currently existing processes to unlock new sources of efficiency and value

Vincenzo Morabito (2017): Technological advancements and innovation is constantly evolving and growing at such a fast rate that everyone is required to stay abreast of these advancements and innovations. The paradigm change of Blockchain is not left out from this evolution. The technological concept behind the Blockchain is interestingly closely identical to that of a database. However, it is clearly one of the key concepts that needs to be understood for the future.

Matthias Heutger (2018): Despite all the hype surrounding blockchain today, we believe that the logistics industry needs to leverage new technologies and embrace ways of rethinking old processes in the digital era. While there are still many challenges to overcome, we invite you to explore with us the opportunities that blockchain presents. By joining forces, we can create the right foundations for successful industry adoption of blockchain and we can ultimately unlock new value in logistics.

Gavin Smith (2018): We've seen distributed ledger technology move out of the lab and onto the C-suite agenda of our clients, from startups to multinational giants with centuries of transactions behind them. While perspectives are many and varied, the overwhelming view is that distributed ledger technology has the power to shift economies, businesses and behaviors. Whichever side of the ledger they're on, businesses need to understand how the technology works and its potential applications, and how it interacts with existing legal frameworks.

Businesses that are investing in, or considering using, any variant of this technology, must be able to assess the associated risks and benefits.

Anders V Hua (2017) Blockchain being a technology that ensures a trusted, secure and transparent technology has the potential to fix some of the current problems with supply chains today. An example is an blockchain implementation that registers all transactions of goods on a blockchain: The parties involved, date, price, location, state and quality of the product and other information that is relevant to management of the supply chain.

Nakamoto's (2008) research, which introduced an algorithm for blockchaintechnology, was followed by many studies on the technology.

Mougayar's (2016) and Drescher's (2017) books provide introductory explanations of the algorithm and thecurrent state of blockchain technology for readers without advanced knowledge of computers.book, *The Business Blockchain: Promise, Practice, andApplication of the Next Internet Technology*, discusses the potential use of blockchaintechnology in businesses.

Drescher (2017) clarifies the basic procedures throughwhich blockchain technology works. In addition, Kossow and Dykes (2018) and Iansitiand Lakhani (2017) offer a well-organized discussion of the recent state of blockchain technology, its various applications, and its limitations. These works provide substantialinsights into blockchain technology.

Catalini and Gans (2016) review blockchain technology's mechanism for enabling cost savings. They provide more specificity around the vague arguments for blockchain technology's cost savings by dividing the cost reduction effects of blockchain technology into two categories: verification costs and networking costs.

Yermack (2017) investigates the potential effects of blockchain technology on corporate governance. He suggests that investors (i.e., shareholders) can increase their profits through the improved liquidity and lower costs achieved via blockchain technology. Moreover, the real-time transparency of blockchain technology allows investors to more easily supervise managers, and markets can form more efficient prices, as information asymmetries among managers, investors, and other market participants are resolved.

Ryan and Donohue (2017) describe blockchain technology's uses for trading securities, discuss the limitations of blockchain technology applications and suggest guidance for corporate lawyers assisting corporations that are willing to transact securities over a blockchain platform.

Walker and Venables (2017) devise a specific application of blockchain technology to securities exchange, which they call SETLcoin, and Hallam et al. design a network payment system for securities settlement using blockchain technology.

Tanner and Valtanen (2017) explain the applicability and usefulness of blockchain technology in various fields of manufacturing industry. Abeyratne and Monfared (2016) also suggest the applications of blockchain technology to supply chains in the manufacturing industry. They describe the positive effects of blockchain technology on the transparency of a supply chain and the quality of products.

Mondragon, and Coronado (2018) specifically examine the trade of composite materials in the manufacturing industry using a blockchain platform, emphasizing that the quality of products can be secured through blockchain technology.

Tian (2016) designs a method of combining blockchain technology with radio-frequency identification (RFID) to improve the quality of agri-food, focusing on Chinese agri-food markets, which has a complicated and often fraudulent supply chain system. Korpela,

Hallikas, and Dahlberg (2017) also discuss about the digitalization of supply chain system through blockchain technology. Based on the studies of Mougayar (2016) and Yermack (2017), we elicit the logic of the effects of blockchain technology on the sustainability of manufacturing firms.

Mougayar (2016) suggests that large banks should actively employ blockchain technology in their businesses, supporting the active implementation of blockchain technology to avoid ceding profits to start-up financial companies.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

My research design will be descriptive followed by partially exploratory because the entire project will be based on the data collected from reports, journals and analysis so that the detailed and clear description will be there in the project, so there is a mix of explanation and description design.

It will cover all the major information about Blockchain and will give a clearer view to the reader how it works .

3.2 Sampling Technique

3.2.1 Convenience sampling method

A convenience sampling is one of the main type of non-probability samplings methods, a convenience sample is made up of people who are easy to reach.

3.3 SOURCES OF DATA

3.3.1 PRIMARY DATA

The source of information in my project will be through data collected by taking survey through Questionnaire from people working in manufacturing industries in Chennai and the sample size is 120.

3.3.2 Secondary Data sources

Secondary data refers to data that was collected by someone other than the user. Common sources of secondary data for Journal, Books, Websites, organisational records and data that was originally collected for other research purposes.

3.4 STRUCTURE OF QUESTIONNAIRE

There are two broad types of questions open ended or open questions, and closed ended or closed questions. Open questions enable respondents to answer as they wish. Closed questions provide respondents with a list of options from which they choose

3.5 Sample Size

The sample size is 120.

3.6 PERIOD OF STUDY

The period of study is from January 2021 to March 2021.

3.7 Analytical Tools

The data collected from the employee's during the survey are analyzed using various tools. Some of the statistical tools applied in study are

- Percentage method
- Chi-Square
- Correlation

.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

4.1. PERCENTAGE ANALYSIS

Table 4.1.1. Table showing Gender of the respondents

S.No.	Particulars	Respondents	Percentage %
1	Male	109	90.8
2	Female	11	9.2
Total		120	100

(Source: Primary data)

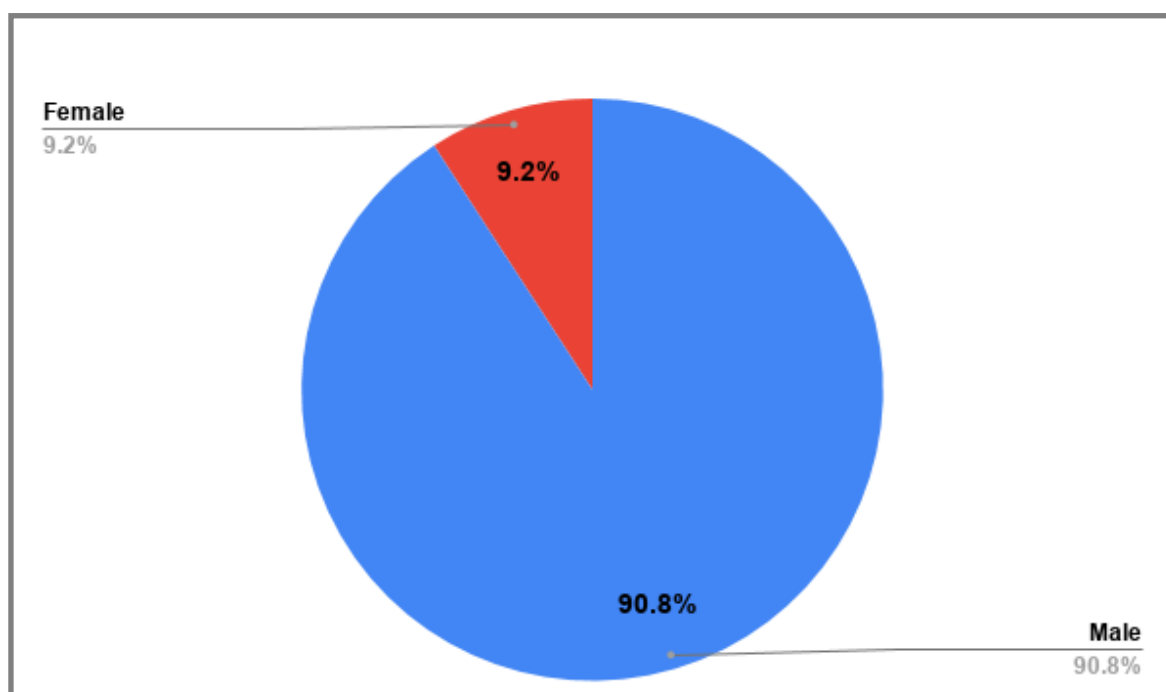


Chart 4.1. GENDER OF RESPONDENTS

Interpretation

From the above table it is interpreted that the number of Male respondent is 90.8% and Female respondent is 9.2%.

Inference

Majority (90.8%) of the respondents are Male.

Table 4.1.2. Table showing age of the respondents

S.NO	Particulars	Respondents	Percentage%
1	18-25	20	16.7
2	25-35	7	76.7
3	35-45	92	5.8
4	Above 45	1	0.8
Total		120	100

(Source: Primary data)

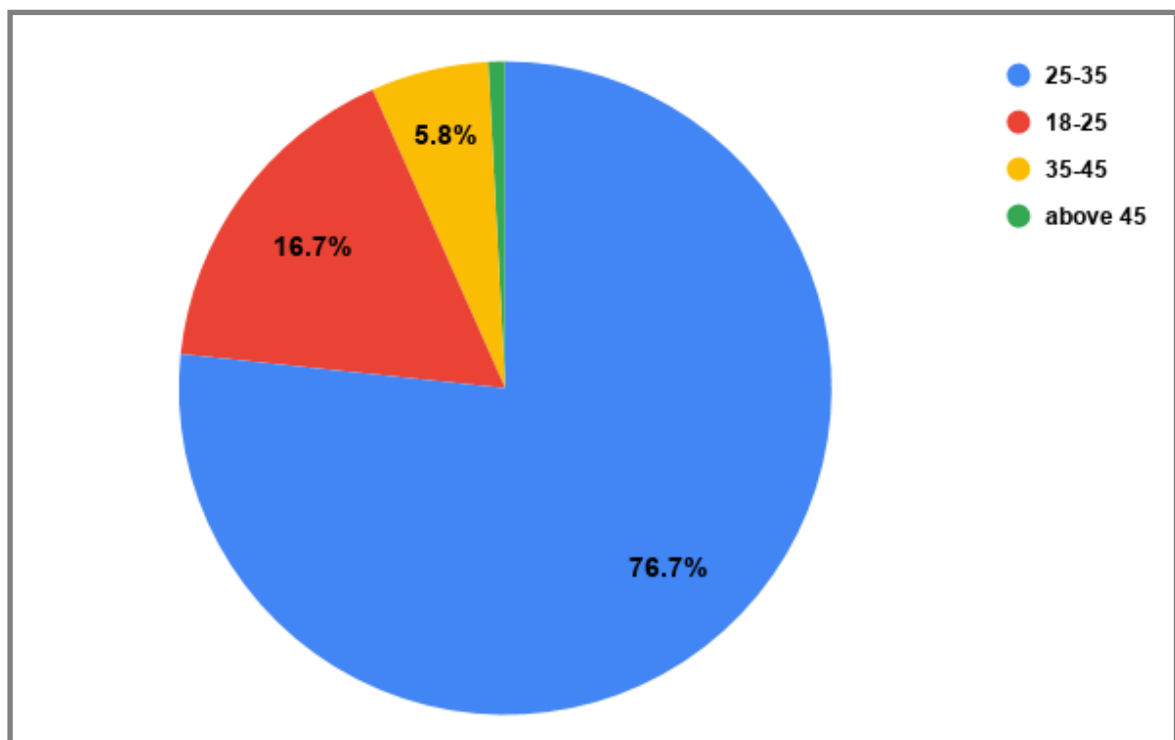


CHART 4.1.2. AGE OF RESPONDENTS

Interpretation

From the above table it is interpreted that the number of respondents between 18-25 is 16.7%, 25-35 is 76.7%, 35-45 is 5.8%, above 45 is 0.8%.

Inference

Majority (76.1%) of the respondents fall in the age category of 25 to 35 years

Table 4.1.3. Table showing type of industry respondents working in

S.NO	Particulars	Respondents	Percentage%
1	Electrical & Electronics	76	63.3
2	Clothing & Textiles	7	5.8
3	Food Industry	12	10
4	Metal Manufacturing	14	11.7
5	Automobile Industry	11	9.2
Total		120	100

(Source: Primary data)

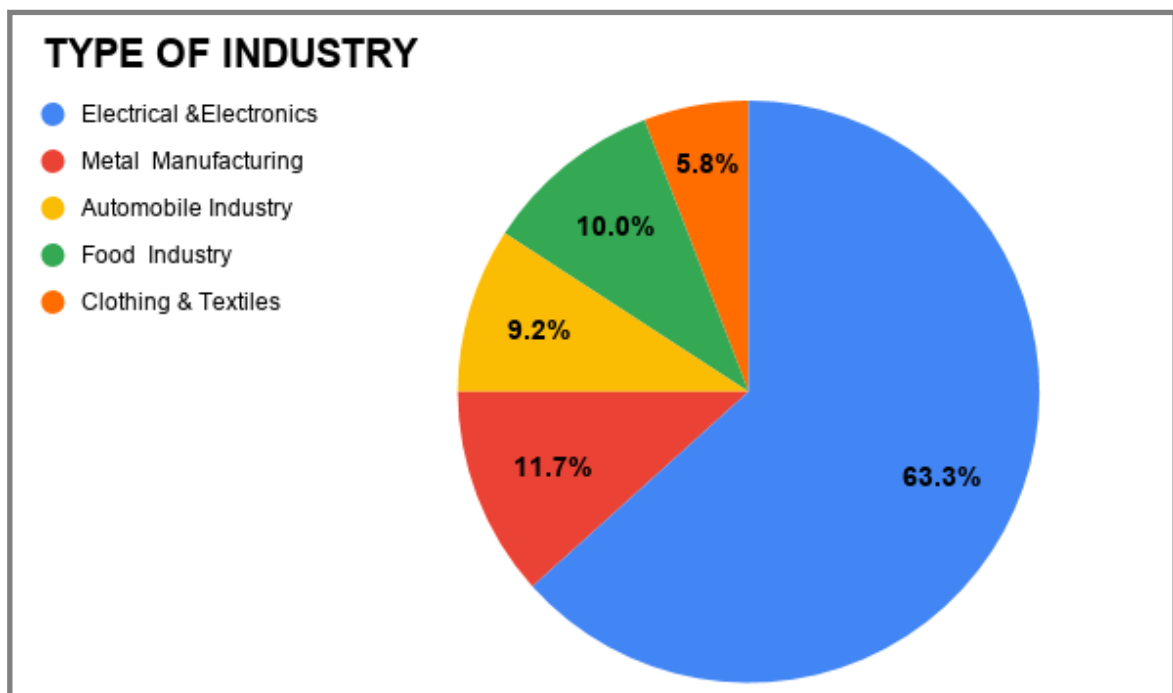


CHART 4.1.3. TYPE OF INDUSTRY RESPONDENTS WORKING IN

Interpretation

From the above table it is represented that the number of respondents were 63.3% in Electricals & Electronics Industry, 5.8 % in Clothing & Textiles, 10% in Food Industry, 11.7% in Metal Manufacturing Industry, 9.2% in Automobile Industry.

Inference

Majority(63.3%) of respondents are working in Electrical & Electronics Industry.

Table 4.1.4. Table showing location of organization respondents working.

S.NO	Particulars	Respondents	Percentage%
1	METRO	2	1.7
2	CITY	48	40
3	TOWN	70	58.3
4	VILLAGE	0	0
Total		120	100

(Source: Primary data)

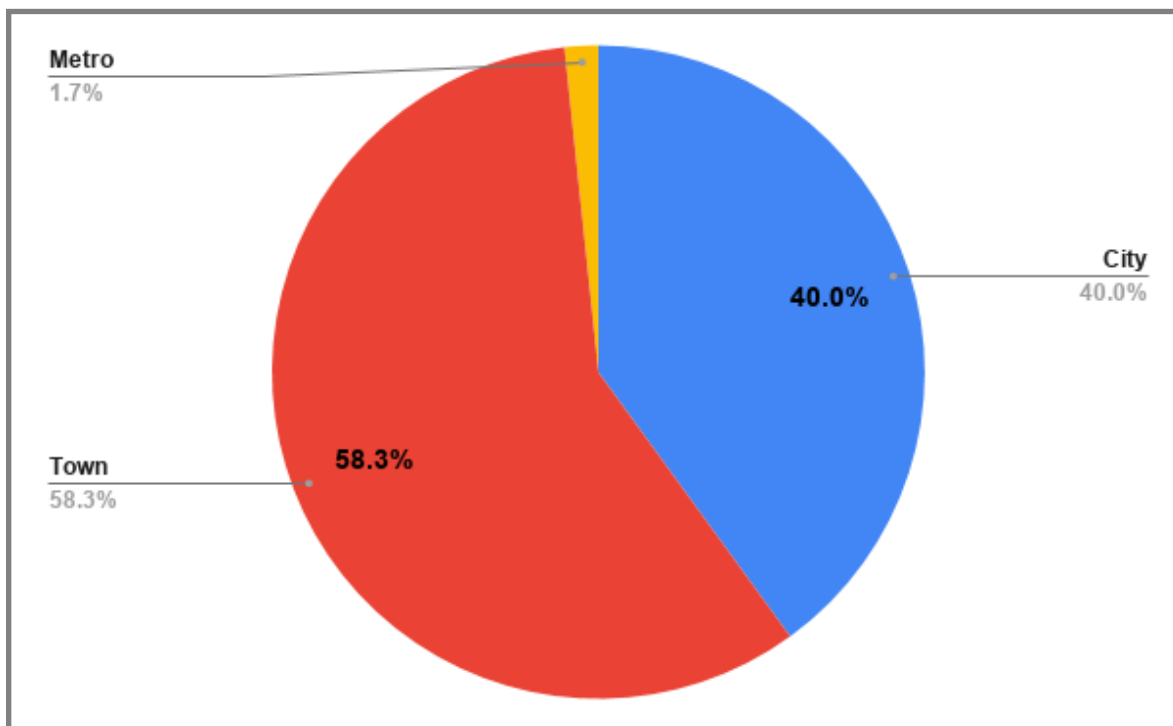


CHART 4.1.4 LOCATION OF ORGANIZATION

Interpretation

From the above table it is represented that respondents work organization were 1.7% in Metro, 40% in City, 58.3% in town.

Inference

Majority (58.3) of respondents working organization was Located in Town .

Table 4.1.5 Table showing age of Company

S.NO	Particulars	Respondents	Percentage%
1	0-10	2	1.7
2	11-20	26	21.7
3	21-50	57	47.5
4	50+years	35	29.2
Total		120	100

(Source:Primary data)

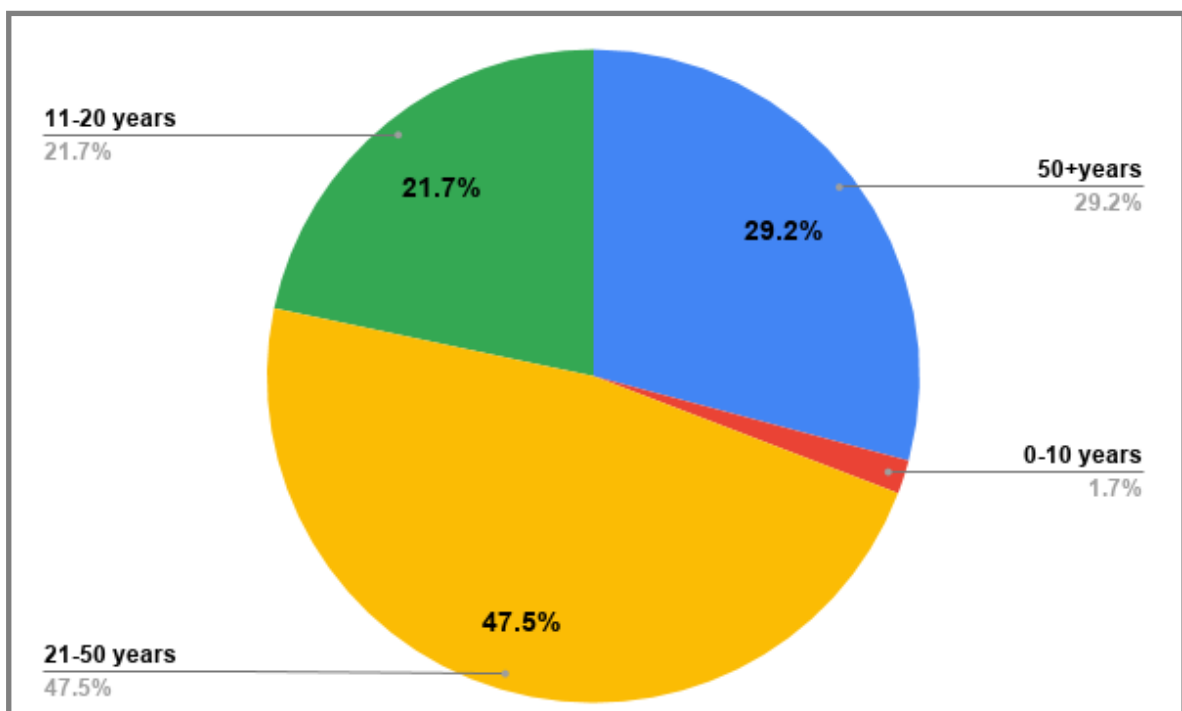


CHART 4.1.5.AGE OF THE COMPANY

Interpretation

From the above table it is interpreted that 1.7% of respondents say age of their working organization is between 0-10 years, 21.7% say between 11- 20 years, 47.5% say 21-50 years, 29.2% say 50+ years.

Inference

Majority(47.5%) of respondents age of their working organization is 21-50 years.

Table 4.1.6 Table showing size of the company

S.NO	Particulars	Respondents	Percentage%
1	Micro (less than 10 persons employed)	1	0.8
2	Macro (10 to 50 persons employed)	13	10.8
3	Medium sized industry(50 to 250persons employed)	28	23.3
4	Maximum sized industry(250 or more persons employed)	78	65
Total		120	100

(Source:Primary data)

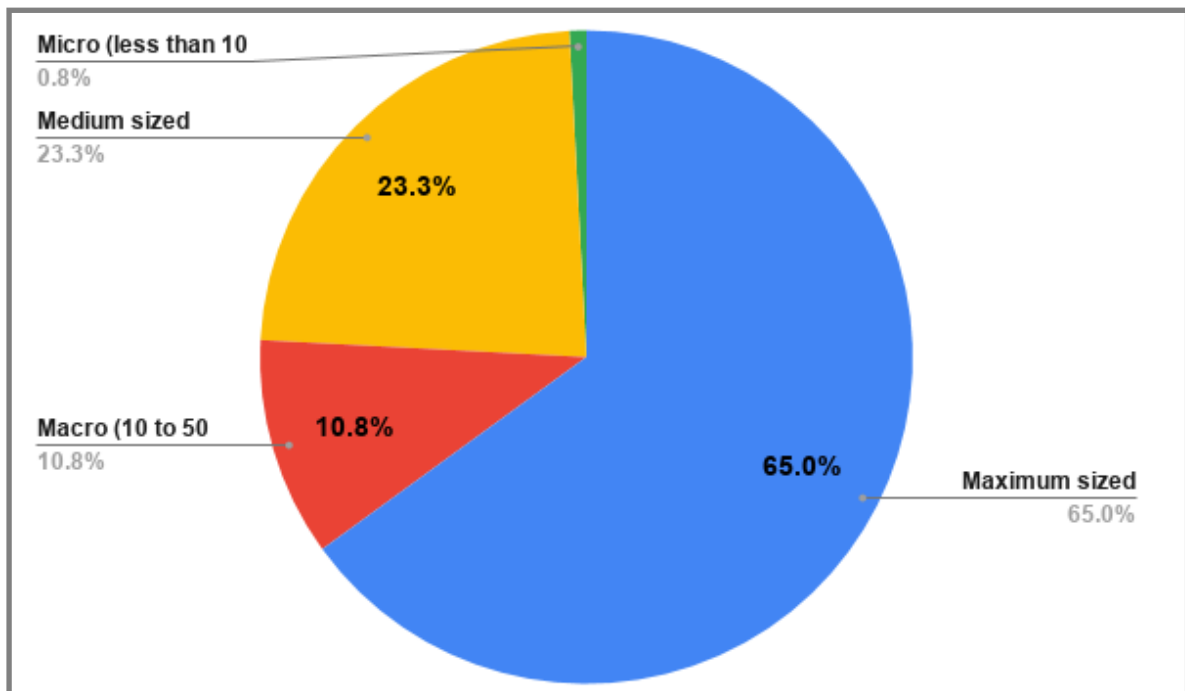


CHART 4.1.6.SIZE OF THE COMPANY

Interpretation

From the above table it interpreted that respondents size of their working company were 0.8% in Macro Industry, 10.8% in Macro Industry, 23.3% in Medium Sized Industry, 65% in Maximum Sized Industry.

Inference: Majority(65%) of respondents size of their working company is Maximum Sized Industry.

Table 4.1.7. Table showing respondents about IOT (Internet of Things)

S.NO	Particulars	Respondents	Percentage%
1	I haven't heard about it	17	14.2
2	Yes I know about it	84	70
3	Our company is doing some project about it	19	15.8
Total		120	100

(Source: Primary data)

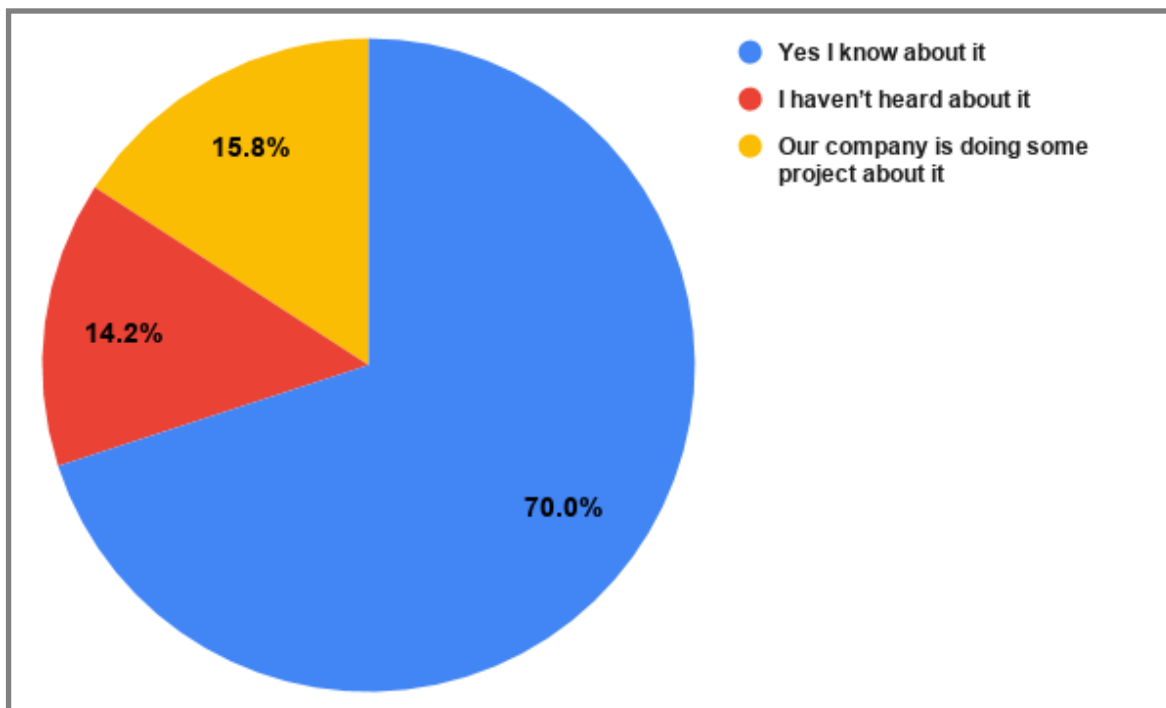


CHART 4.1.7. RESPONDENTS ABOUT IOT (INTERNET OF THINGS)

Interpretation

From the above table it is interpreted that as 14.2% of respondents haven't know about IOT, 70% say they know about IOT, 15.8% respondents say their company is doing project about IOT

Inference

Majority(70%) of respondents know about IOT.

Table 4.1.8. Table showing respondents view on benefit of IOT.

(Respondents is considered as those who responded yes for previous question ie.104)

S.NO	Particulars	Respondents	Percentage%
1	Cost Savings	58	55.8
2	Increased Efficiencies	8	7.7
3	Time Saving	38	36.5
Total		104	100

(Source:Primary data)

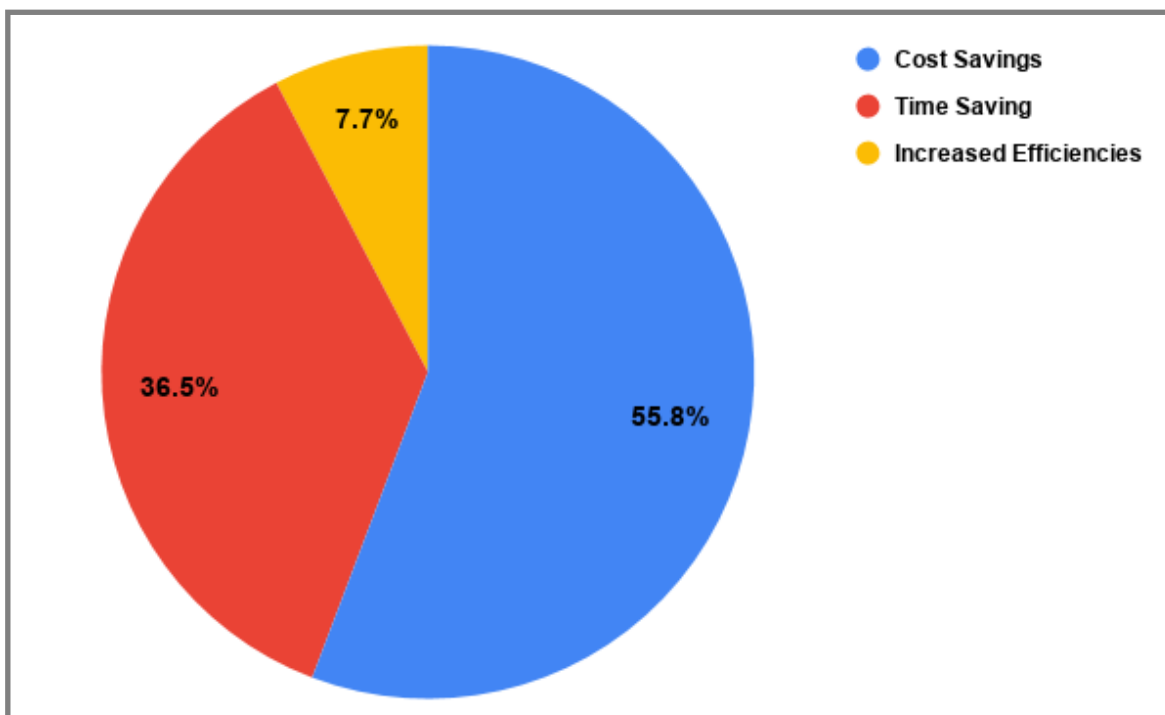


CHART 4.1.8. RESPONDENTS VIEW ON BENEFIT OF IOT

Interpretation

From the above table it is interpreted that as 55.8% of respondents say IOT has benefit of Cost Savings, 8% say Increased Efficiencies, 36.5% say Time Saving.

Inference

Majority (55.8%) say IOT has benefit of time saving that's why Businesses are investing in development of IOT.

Table 4.1.9 Table showing respondents knowledge about Cryptocurrencies

S.NO	Particulars	Respondents	Percentage%
1	Never Heard of it	30	25
2	Heard of it	82	68.3
3	I know about it and understand how it works	8	6.7
Total		120	100

(Source:Primary data)

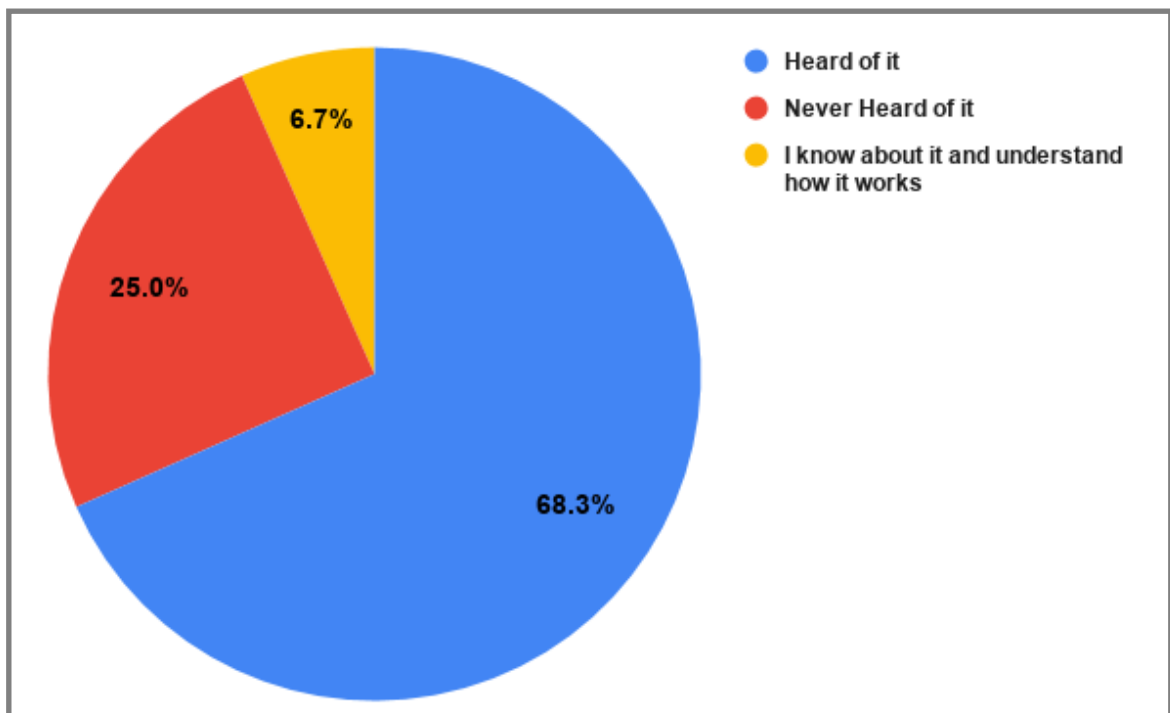


CHART4.1.9. RESPONDENTS KNOWLEDGE ABOUT CRYPTOCURRENCY.

Interpretation

From the above table it is interpreted that as 25% of respondents say they never heard of Bitcoin, 68.3% say they heard about Bitcoin, 6.7% say they completely know about it and understand how it works.

Inference

Majority(68.3%) of respondents say that they heard of Cryptocurrency.

Table 4.1.10. Table showing respondents view on how they came to know about Blockchain Technology

S.NO	Particulars	Respondents	Percentage%
1	Social medias	11	9.2
2	Friends & Relatives	3	2.5
3	Workplace	16	13.3
4	Internet	90	75
Total		120	100

(Source: Primary data)

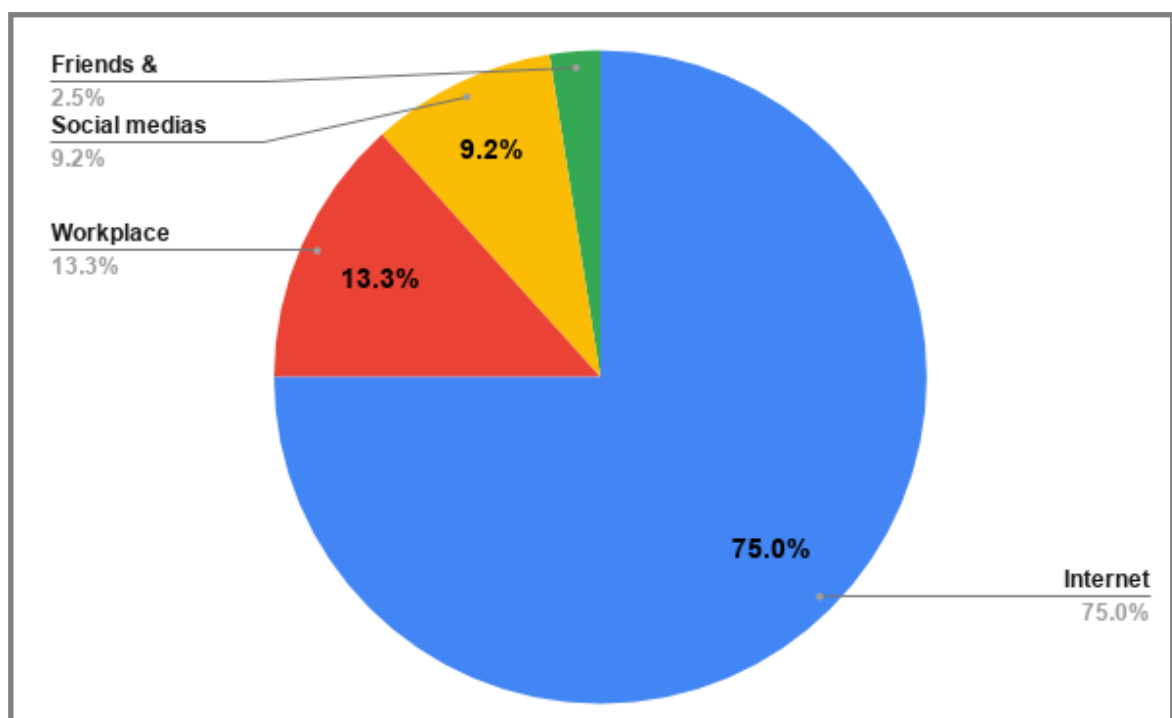


CHART 4.1.10. CHART SHOWING FROM WHICH SOURCES RESPONDENTS CAME TO KNOW ABOUT BLOCKCHAIN

Interpretation

From the above table it is interpreted that as respondents came to know about blockchain technology were 9.2% through Social medias, 2.5% through Friends & Relatives, 13.3% through Workplace, 75% through Internet.

Inference

Majority (75%) of respondents came to know about Blockchain Technology through Internet.

Table 4.1.11. Table showing Organizations status on Blockchain implementation

S.NO	Particulars	Respondents	Percentage%
1	Implemented	3	2.5
2	Planning to Implement	1	0.8
3	Currently No	116	96.7
Total		120	100

(Source: Primary data)

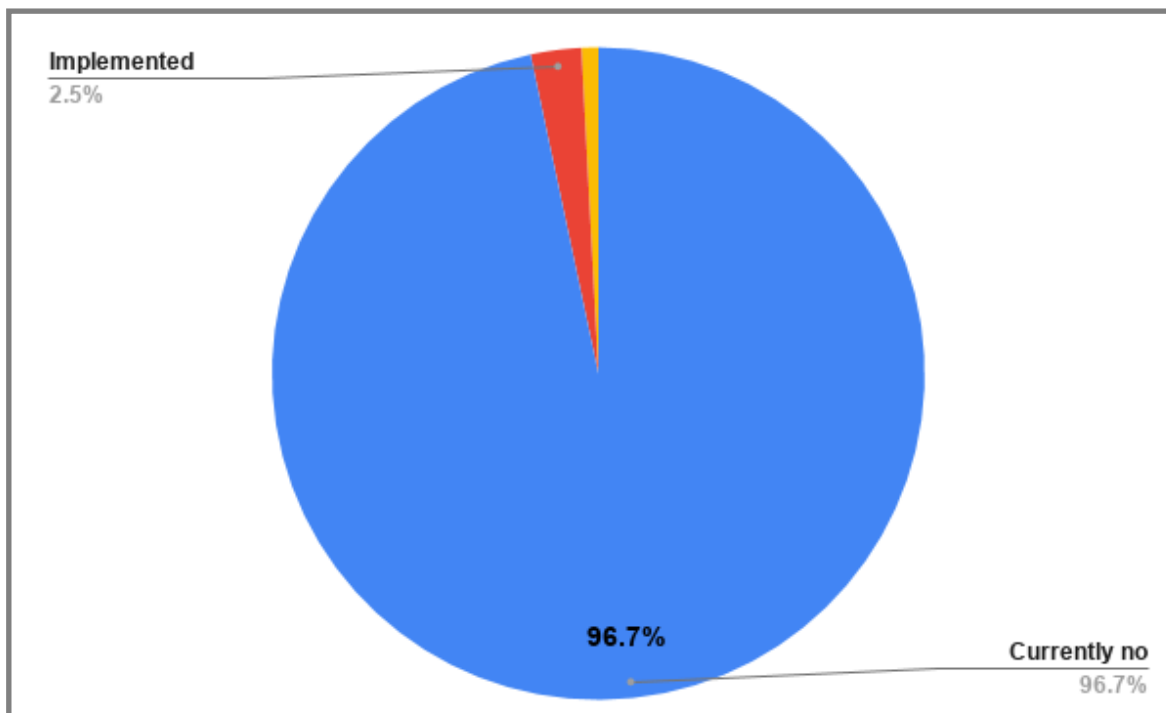


CHART 4.1.11. Organizations status on Blockchain Implementation

Interpretation

From the above table it is interpreted that as 2.5% of respondents say their organization has implemented blockchain technology, 0.8% say they are planning to implement, 96.7% say Currently No.

Inference

Majority (96.7%) of respondents organizations are not implemented with Blockchain Technology nor planning to implement.

Table 4.1.12. Table showing respondents satisfactory level on Insufficient Funds is one of the challenges while implementing Blockchain

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	74	61.7
2	Agree	43	35.8
3	Disagree	3	2.5
Total		120	100

(Source:Primary data)

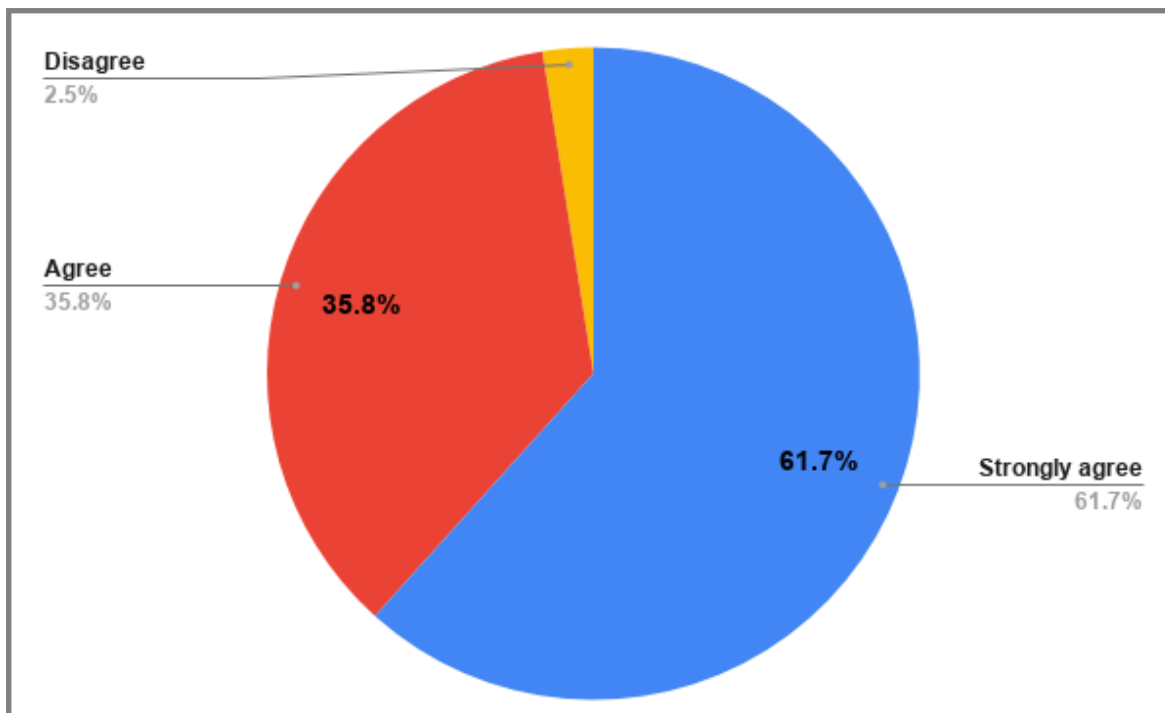


CHART 4.1.12 INSUFFICIENT FUNDS

Interpretation

From the above table it is interpreted that the 61.7% of respondents say Strongly agree , 35.8% say Agree, 2.5% say Disagree in Insufficient funds.

Inference

Majority (61.7%) Strongly agree that Insufficient Funds is one of the challenges Industry faces while implementing or they plan to implement Blockchain.

Table 4.1.13. Table showing respondents satisfactory level on Insufficient Time is one of the challenges while implementing Blockchain

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	72	60
2	Agree	34	28.3
3	Disagree	14	11.7
Total		120	100

(Source:Primary data)

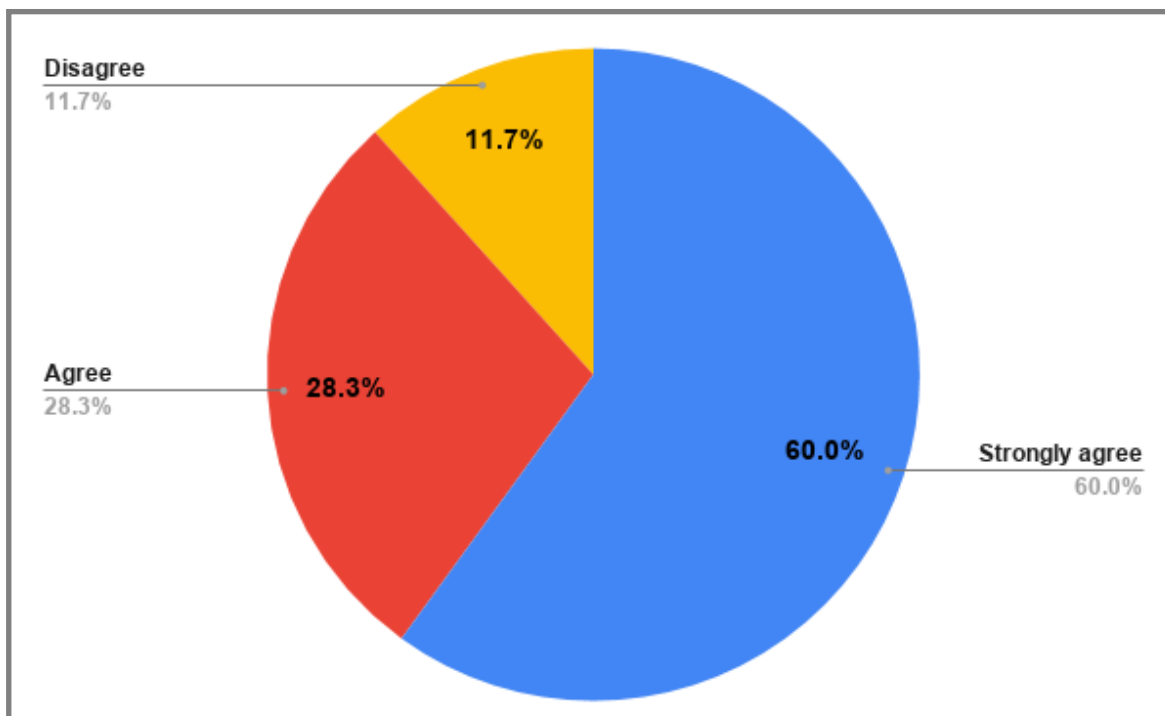


CHART1.1.13.INSUFFICIENT TIME

Interpretation

From the above table it is interpreted that the 60% of respondents Strongly agree in Insufficient time, 28.3% say Agree, 11.7% say Disagree in Insufficient time.

Inference

Majority (60%) Strongly agree that Insufficient time is one of the challenges Industry faces while implementing or they plan to implement Blockchain.

Table 4.1.14. Table showing respondents satisfactory level about not having knowledge about latest digitalization.

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	95	79.2
2	Agree	19	15.8
3	Disagree	4	3.3
4	Strongly Disagree	2	1.7
Total		120	100

(Source: Primary data)

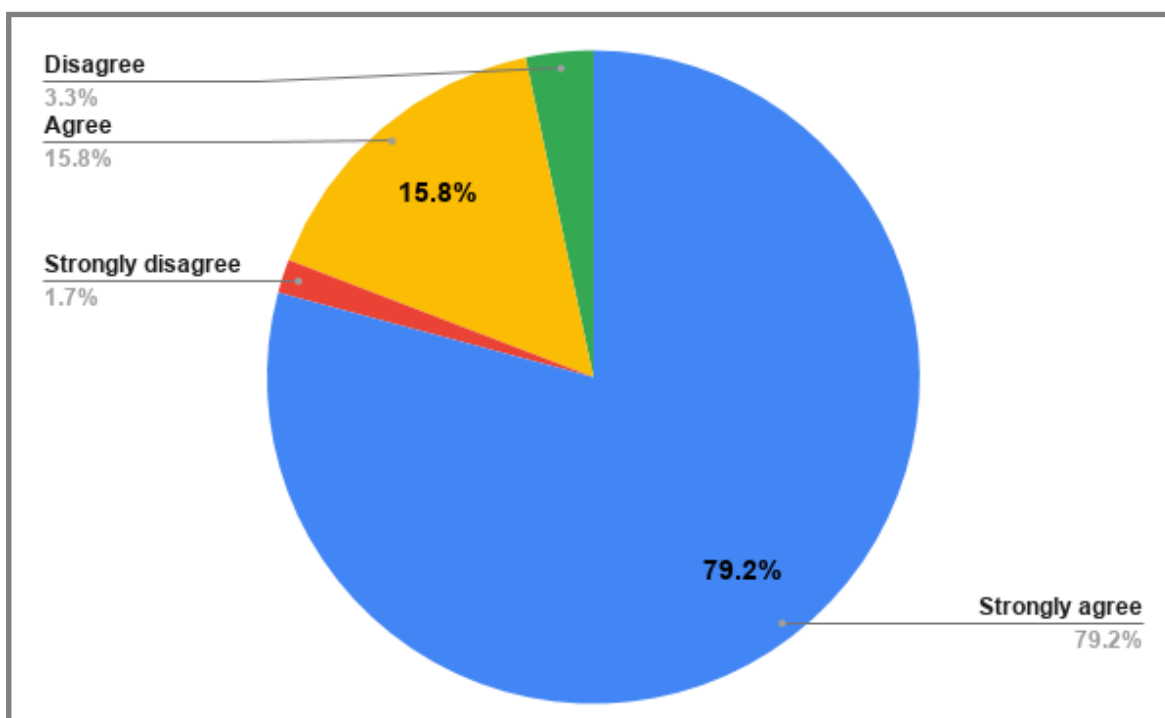


CHART 4.1.14. NOT HAVING KNOWLEDGE ABOUT LATEST DIGITALIZATION

Interpretation

From the above table it is interpreted that the 79.2% of respondents Strongly agree in not having knowledge in latest digitalization, 15.8% say Agree, 3.3% say Disagree.

Inference

Majority (79.2%) Strongly agree that not having knowledge in latest digitalization is one of the challenges Industry faces while implementing they plan to implement Blockchain

Table 4.1.15. Table showing respondents satisfactory level about not having skills/qualified staff for using Blockchain

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	99	82.5
2	Agree	18	15
3	Disagree	2	1.7
4	Strongly Disagree	1	0.8
Total		120	100

(Source:Primary data)

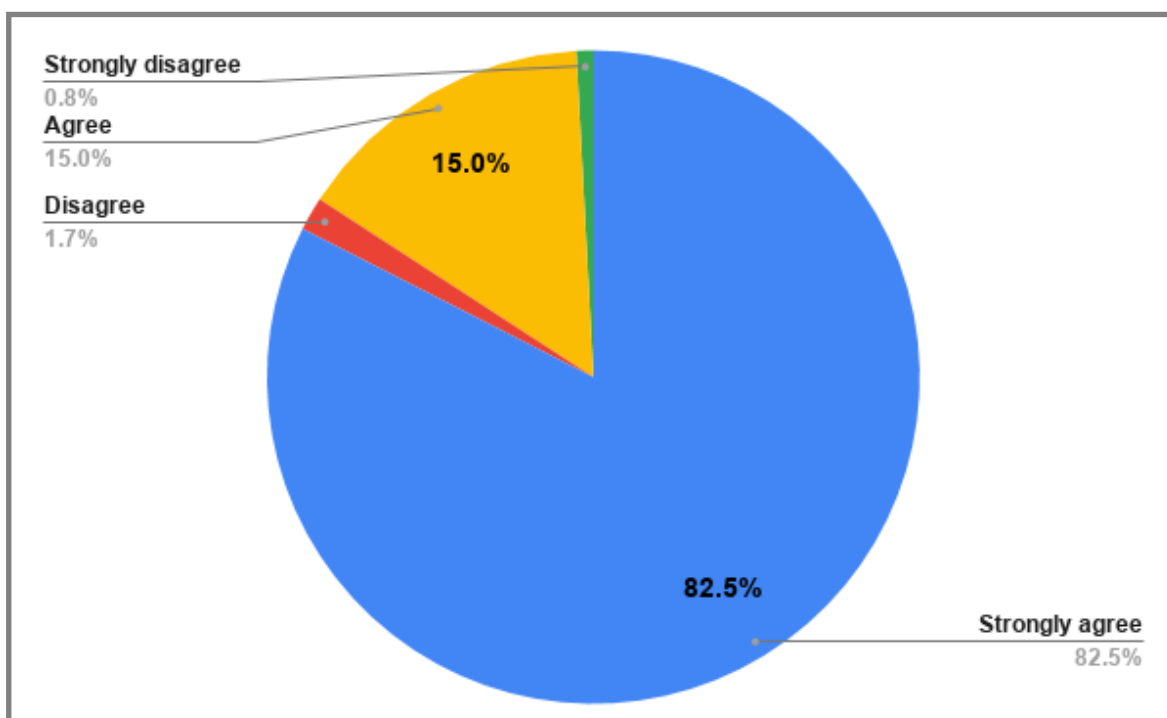


Chart 4.1.15. Not having skill/qualified staff for using blockchain

Interpretation

From the above table it is interpreted that the 82.5% of respondents Strongly agree in not having skills/qualified staff for using Blockchain, 15.% say Agree, 1.7% say Disagree, 0.8% say Strongly Disagree

Inference

Majority (82.5%) Strongly agree that not having skills/qualified staff for using Blockchain is one of the challenges Industry faces while implementing or they plan to implement Blockchain.

Table 4.1.16. Table showing satisfactory level of respondents for Greater Security is the advantage of blockchain.

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	82	68.3
2	Agree	36	30
3	Strongly Disagree	2	1.7
Total		120	100

(Source:Primary data)

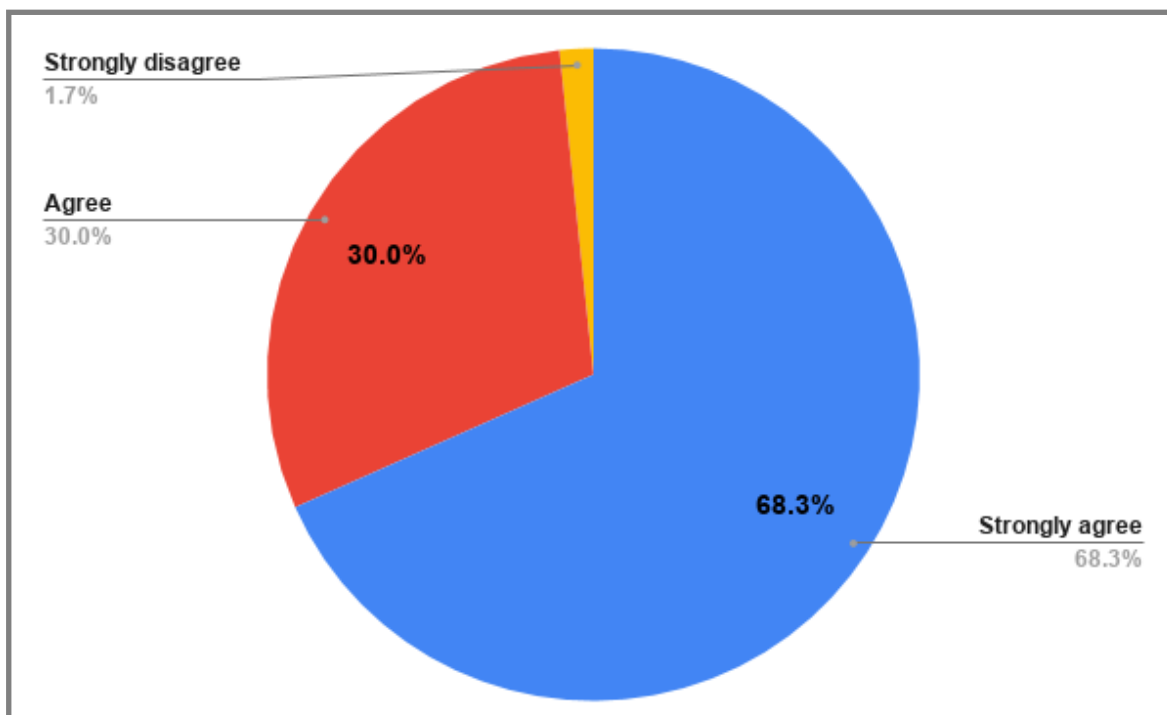


CHART4.1.16.GREATER SECURITY

Interpretation

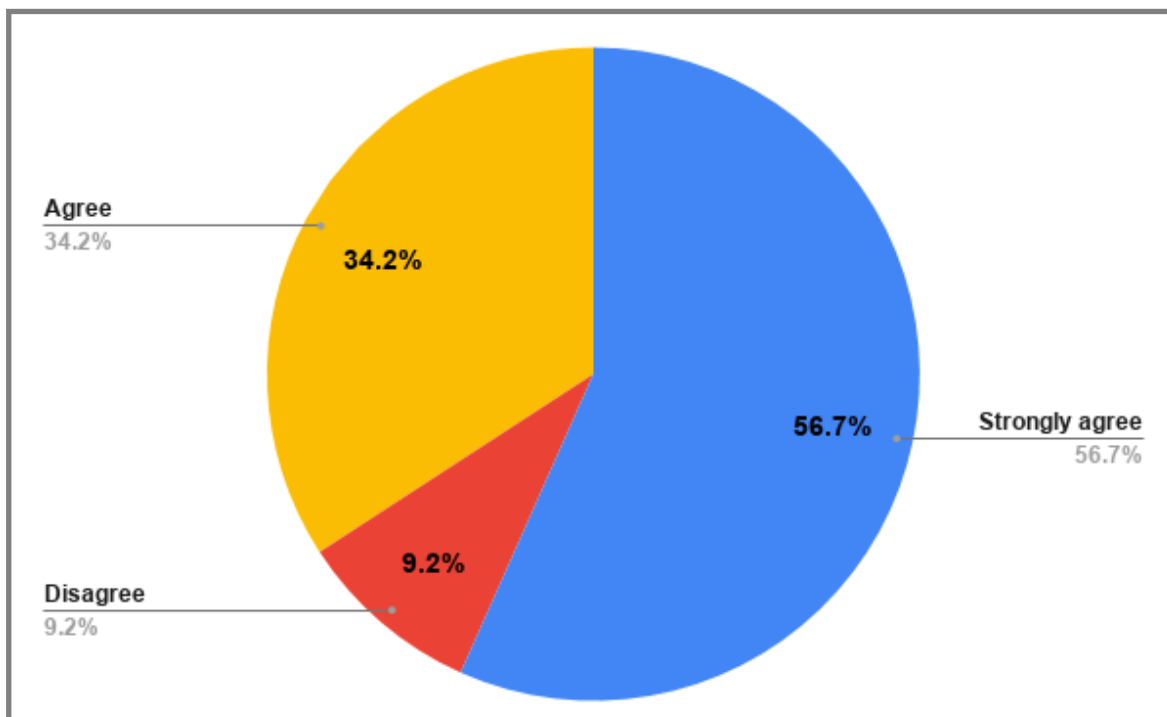
From the above table it is interpreted that the 68.3% of respondents Strongly agree in Blockchain has advantage of greater security, 30% say Agree, 1.7% say Strongly Disagree.

Inference: Majority (68.3%) Strongly agree that Blockchain has advantage of Greater Security.

Table 4.1.17. Table showing satisfactory level of respondents for greater speed is the advantage of blockchain.

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	68	56.7
2	Agree	41	34.2
3	Disagree	11	9.2
4	Strongly Disagree	0	0
Total		120	100

(Source:Primary data)



. CHART4.1.17.GREATER SPEED

Interpretation

From the above table it is interpreted that the 56.7% of respondents Strongly agree in Blockchain has advantage of greater speed, 34.2% say Agree, 9.2% say Disagree.

Inference

Majority (56.7.%) Strongly agree that Blockchain has advantage of Greater Speed

Table 4.1.18. Table showing satisfactory level of respondents for greater Transparency is the advantage of blockchain.

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	90	75
2	Agree	17	14.2
3	Disagree	13	10
4	Strongly Disagree	0	0
Total		120	100

(Source: Primary data)

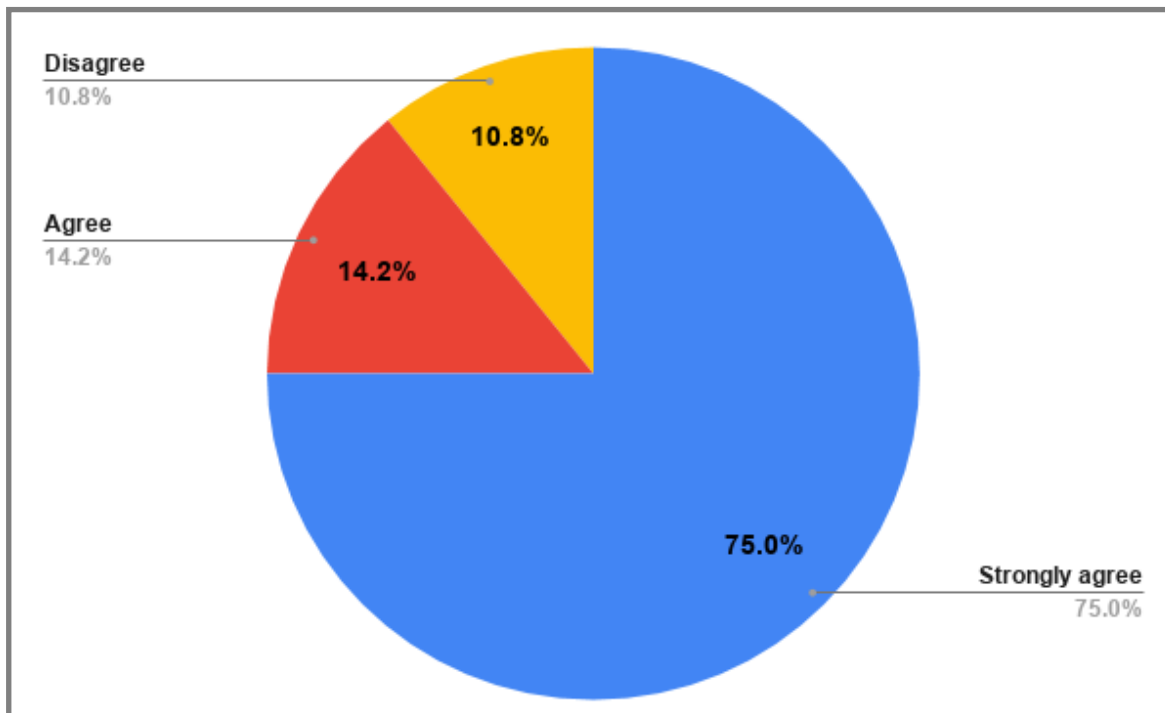


CHART 4.1.18. GREATER TRANSPARENCY

Interpretation

From the above table it is interpreted that the 75% of respondents Strongly agree in Blockchain has advantage of greater Transparency where 14.2% say Agree, 10% say Disagree.

Inference

Majority (75%) Strongly agree that Blockchain has advantage of Greater Transparency

Table 4.1.19. Table showing satisfactory level of respondents for fraud reduction is the advantage of blockchain

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	102	85
2	Agree	7	5.8
3	Strongly Disagree	11	9.2
Total		120	100

(Source:Primary data)

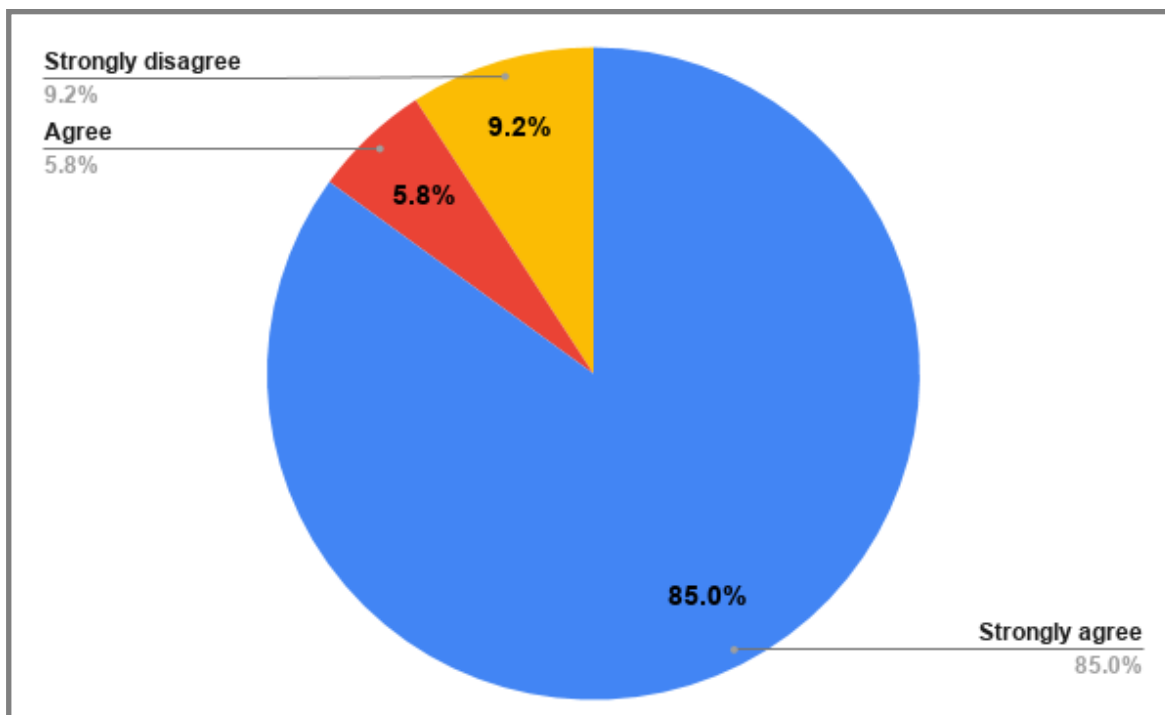


CHART4.1.19.FRAUD REDUCTION

Interpretation

From the above table it is interpreted that the 85% of respondents Strongly agree in Blockchain has advantage of fraud reduction where 5.8% say Agree, 9.2% say Strongly Disagree.

Inference

Majority (85%) Strongly agree that Blockchain has advantage of Fraud reduction.

Table4.1.20.Table showing which has major benefit in using blockchain in supplychain

S.NO	Particulars	Respondents	Percentage%
1	Improved business efficiency	2	1.7
2	Increase transaction speed	8	6.7
3	Time saving	9	7.5
4	Reduction of counterfeiting	64	53.3
5	High security	37	30.8
Total		120	100

(Source:Primary data)

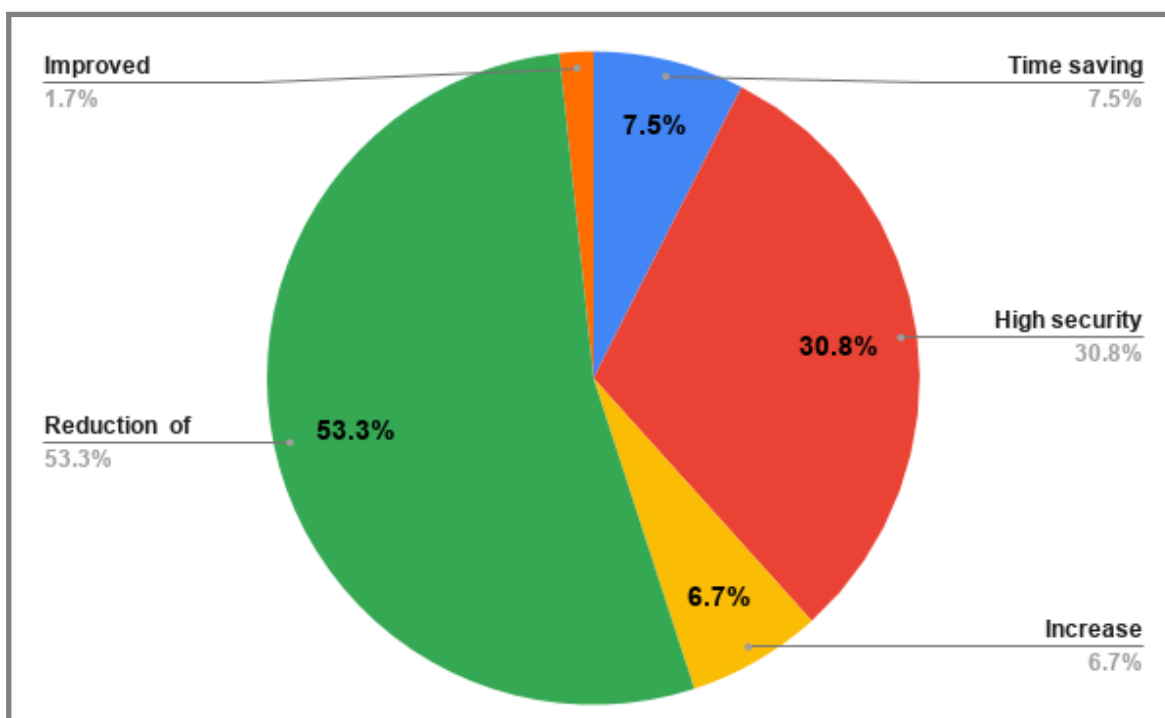


CHART4.1.20.MAJOR BENEFIT IN USING BLOCKCHAIN IN SUPPLYCHAIN

Interpretation

From the above table it is interpreted that 1.7% say improved business efficiency, 6.7% say increase transaction speed, 7.5% say time saving, 53.3% say reduction of counterfeiting and 30.8% say high security for major benefit in blockchain

Inference:

Majority (53.3%) respondents say Reduction of counterfeiting is the major benefit in using Blockchain in Supplychain.

4.1.21. Table showing satisfactory level for using blockchain in supplychain provides enhancement towards more touchless business

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	70	58.3
2	Agree	37	30.8
3	Neutral	2	1.7
4	Disagree	8	6.7
5	Strongly Disagree	3	2.5
Total		120	100

(Source:Primary data)

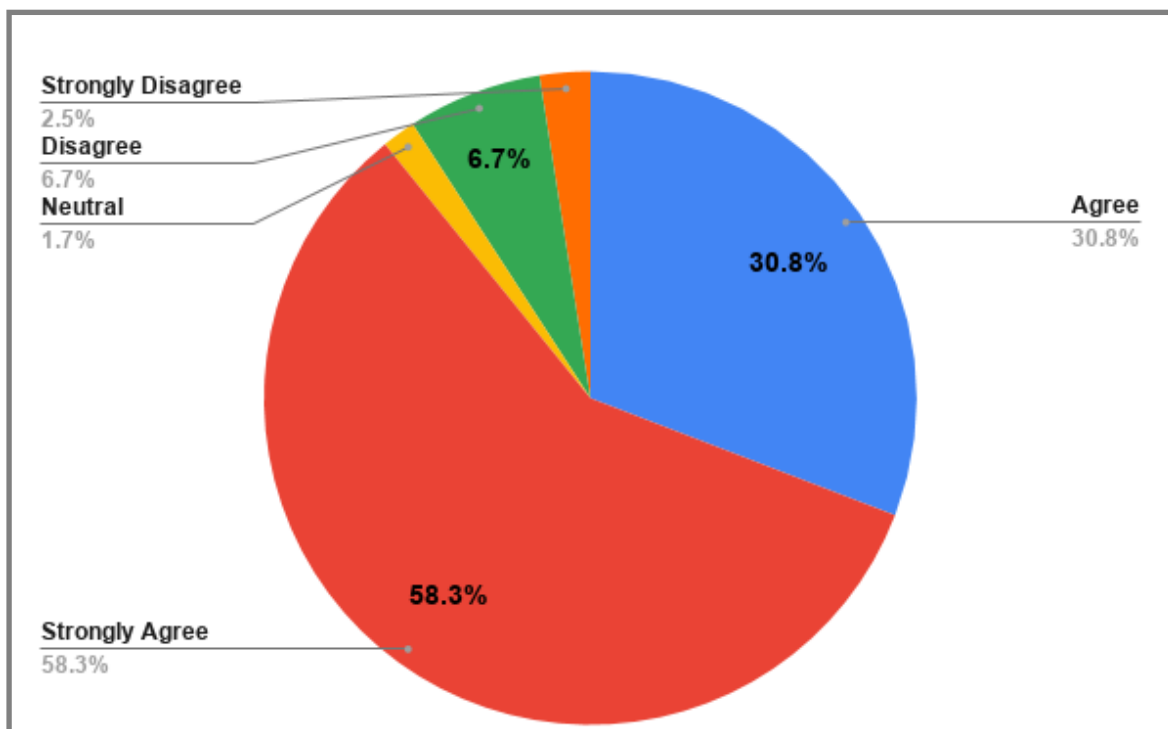


CHART4.1.21. Enhancement towards more touchless business process

Interpretation

From the above table it is interpreted that 58.3% strongly agree, 30.8%, agree, 1.7% say neutral, 6.7% disagree, 2.5% strongly disagree for enhancement towards more touchless business process.

Inference

Majority (58.3%) Strongly agree that using Blockchain in Supplychain enhance towards more touchless business process.

Table.4.1.22. Table showing satisfactory level for Blockchain Tracking and Information Transparency increase trust in Supplychain

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	85	70.8
2	Agree	31	20.8
3	Disagree	1	0.8
4	Strongly Disagree	3	2.5
Total		120	100

(Source:Primary data)

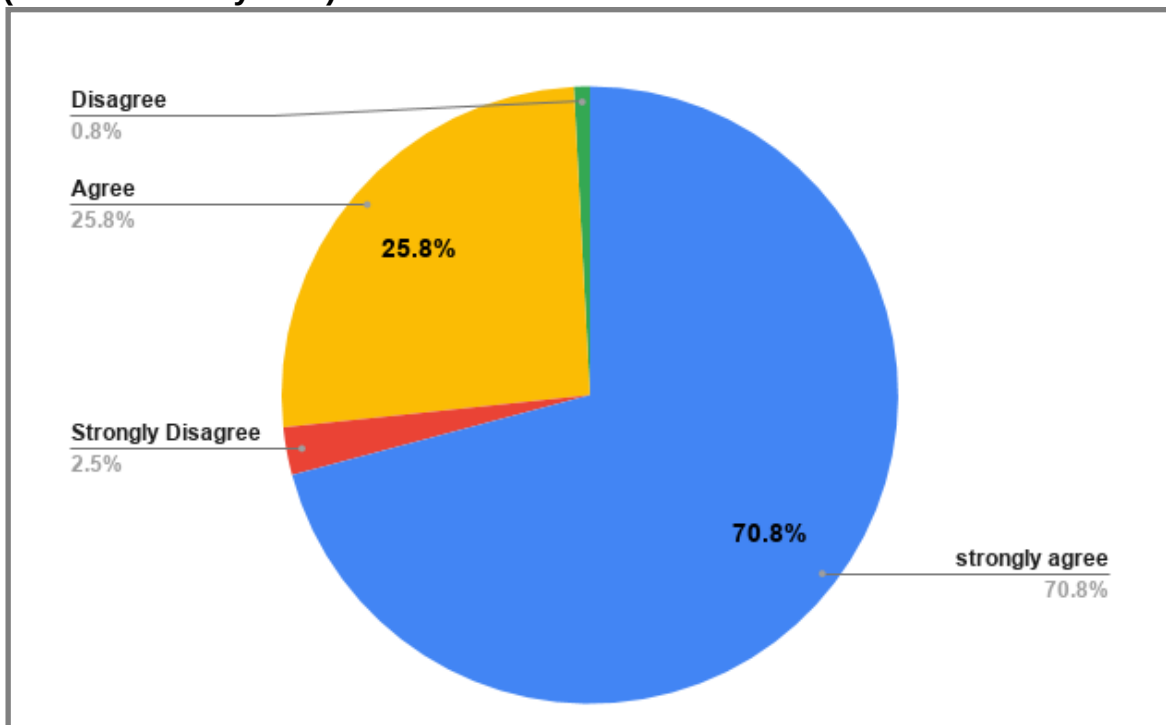


CHART4.1.22. Blockchain Tracking and Information Transparency increase trust in Supply chain

Interpretation

From the above table it is interpreted that 70.8% strongly agree, 20.8%, agree, 0.8% disagree, 2.5% strongly disagree for Blockchain Tracking and Information Transparency increase trust in Supplychain

Inference

Majority(70.8%) Strongly agree that Blockchain Tracking and Information Transparency increase trust in Supplychain.

Table.4.1.23.Table showing satisfactory level for using blockchain in supplychain reduces cost and time

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	90	75
2	Agree	28	23.3
3	Strongly Disagree	2	1.7
Total		120	100

(Source:Primary data)

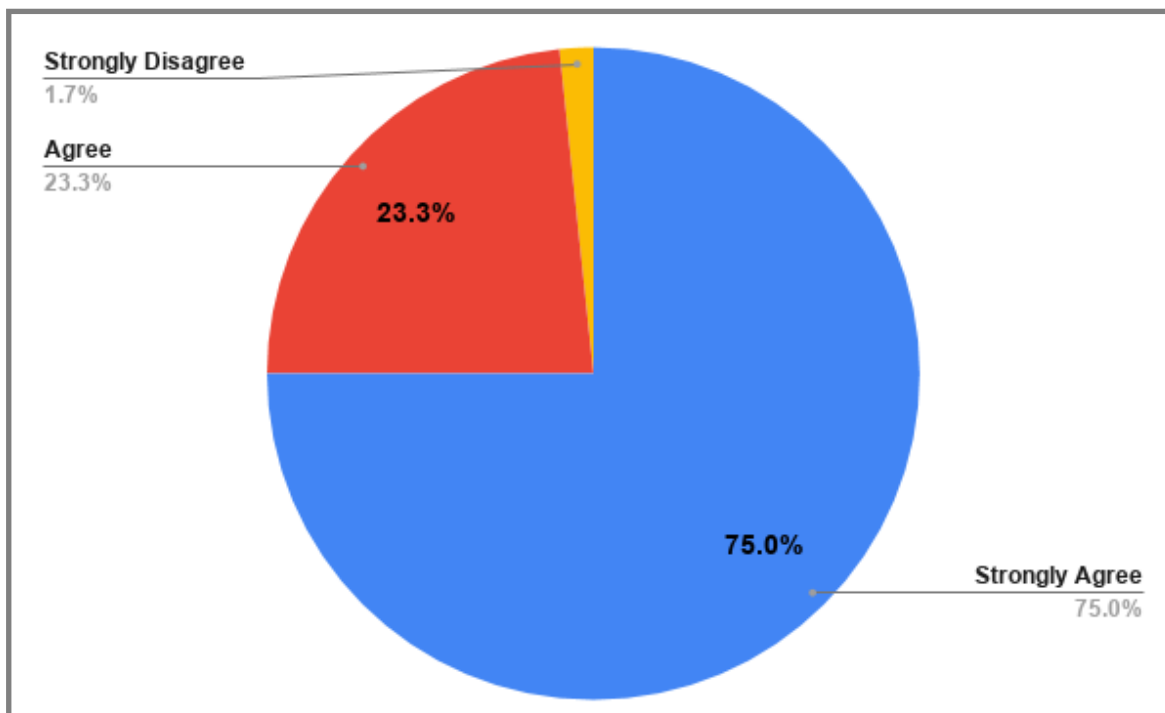


CHART4.1.22.USING BLOCKCHAIN IN SUPPLYCHAIN REDUCES COST AND TIME

Interpretation

From the above table it is interpreted that 75% strongly agree, 23.3%, agree, 1.7% strongly disagree for using blockchain in Supplychain reduces cost and time

Inference

Majority(75%) Strongly agree that Blockchain Tracking and Information Transperency increase trust in Supplychain.

Table 4.1.24. Table showing in which sector does blockchain has significant

S.NO	Particulars	Respondents	Percentage%
1	Manufacturing	5	4.2
2	Supplychain& Logistics	82	68.3
3	Banking	2	1.7
4	Healthcare	3	2.5
5	Food	28	23.3
Total		120	100

(Source:Primary data)

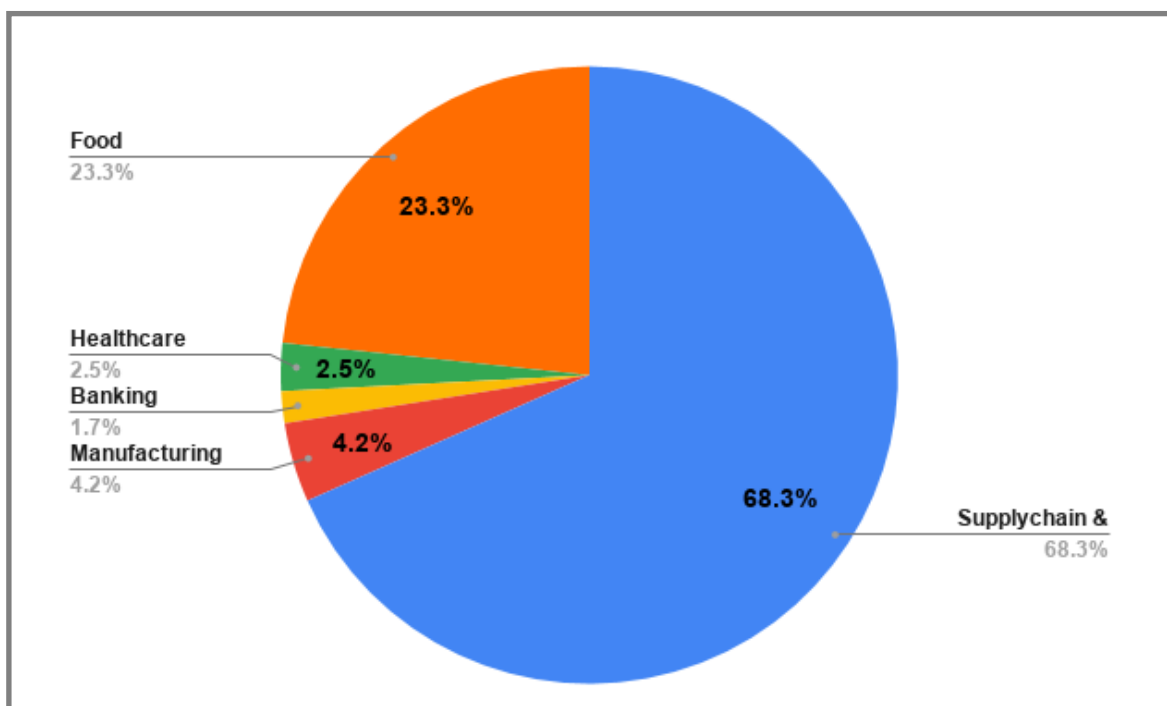


CHART 4.1.23. CHART SHOWING IN WHICH SECTOR DOES BLOCKCHAIN HAS SIGNIFICANT IMPACT.

Interpretation

From the above table it is interpreted that 4.2% respondent say Manufacturing, followed by 68.3% in Supplychain& Logistics, 1.7% in Banking, 2.5% in Healthcare, 23.3% in Food sector.

Inference

Majority(68.3%) respondents say that in Supplychain& Logistics sector blockchain has significant impact.

Table 4.1.25. Table showing whether adopting Blockchain technology will disrupt the industry.

S.NO	Particulars	Respondents	Percentage%
1	Yes it will disrupt	71	59.2
2	No it doesn't disrupt	31	25.8
3	Too early to tell	18	15
Total		120	100

(Source: Primary data)

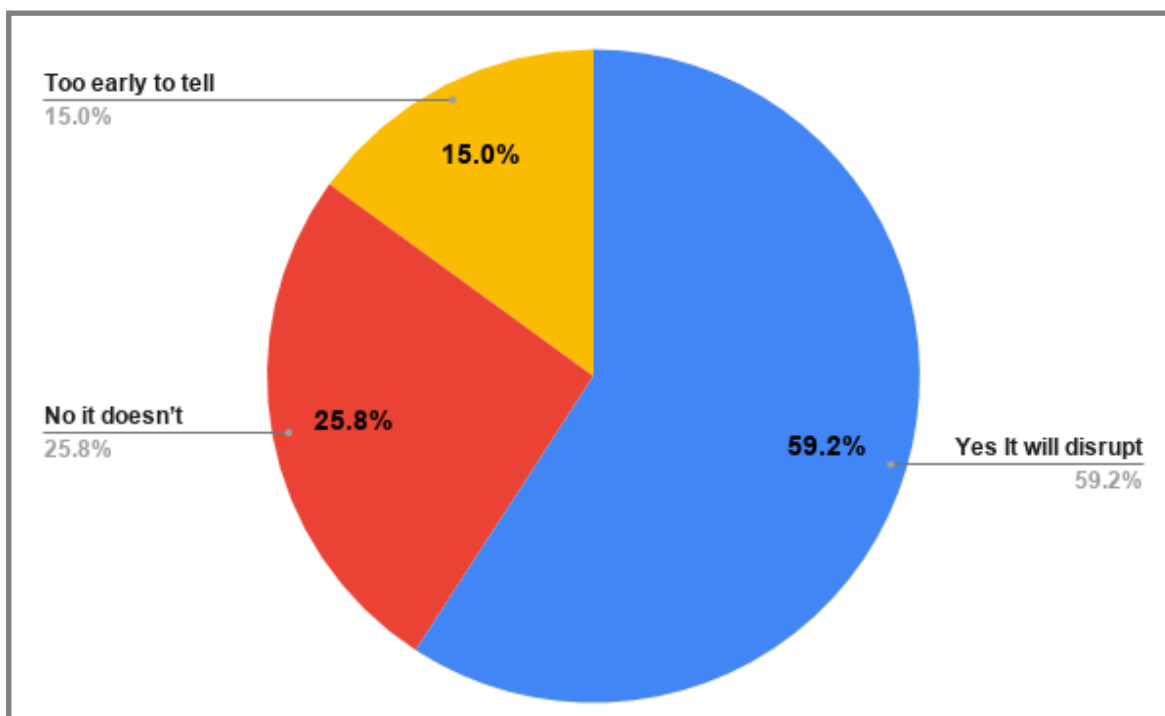


Chart 4.1.25. CHART SHOWING WHETHER ADOPTING BLOCKCHAIN TECHNOLOGY WILL DISRUPT THE INDUSTRY

Interpretation

From the above table it is interpreted that 59.2% of respondents say yes it will disrupt, 25.8% say no it doesn't disrupt, 15% say too early to tell.

Inference

Majority (59.2%) respondents say that adopting blockchain technology will disrupt the Industry.

Table 4.1.26. Table showing respondents satisfactory level on whether adopting Blockchain Technology improve Indian Markets

S.NO	Particulars	Respondents	Percentage%
1	Strongly Agree	106	88.3
2	Agree	12	10
3	Disagree	2	1.7
Total		120	100

(Source: Primary data)

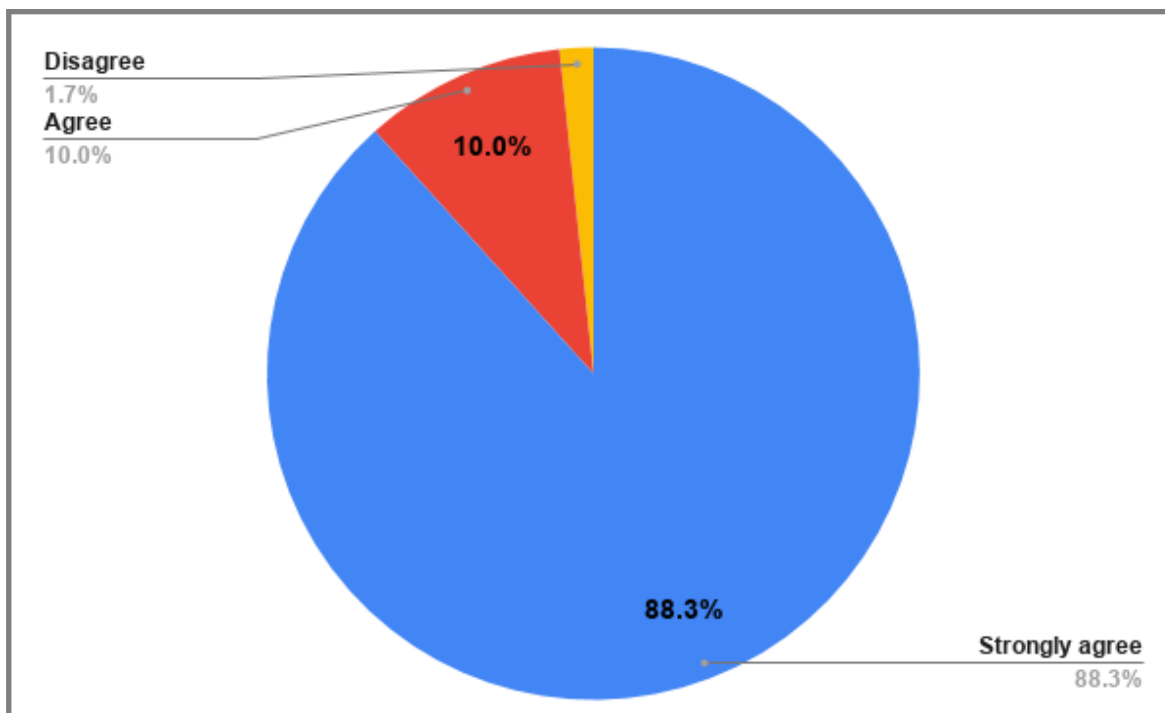


CHART.4.1.26. ADOPTING BLOCKCHAIN TECHNOLOGY IMPROVE INDIAN MARKETS

Interpretation

From the above table it is interpreted 88.3% of respondents Strongly agree, 10% Agree, 1.7% Disagree that adopting Blockchain Technology improve Indian Markets.

Inference

Majority (88.3%) of respondents Strongly agree that Blockchain will improve Indian Markets

Table 4.1.27. Table showing respondents who ranked most significant advantage of using blockchain in supply chain.

RANK ORDER

Statement	Rank1	Rank 2	Rank 3	Rank 4	Rank 5
Create Transparency	86	4	10	7	13
Cost savings	3	89	5	17	6
Traceability	8	7	101	3	1
Time saving	3	20	3	91	3
Customer Engagement	20	0	1	2	97
Total respondents	120	120	120	120	120

Result

Total	Overall Rank	Statement
503	1	Create Transparency
426	2	Cost Savings
378	3	Traceability
119	5	Time Savings
204	4	Customer Engagement

Interpretation

From above table it has been interpreted that most significant advantage of using blockchain is that it creates transparency.

4.2.CHI SQUARE TEST

To test the significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets

SIZE OF INDUSTRY					
Satisfactory level	Micro Industry	Macro Industry	Medium sized Industry	Maximum sized Industry	Total
Strongly Agree	1	10	23	72	106
Agree	0	2	5	5	12
Disagree	0	1	0	1	2
Strongly Disagree	0	0	0	0	0
Total	1	13	28	78	120

Null Hypothesis (H0):

There is no significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets

Alternative Hypothesis(H1):

There is significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets

Chi-square Test

$$\text{Chi-square} = \sum (O - E)^2 / E$$

Expected Frequency

O _i	E _i	(O - E) ²	(O - E) ² /E
1	0.883	0.027	0.03
10	11.48	2.19	0.19
23	24.7	2.89	0.11
72	68.9	3.1	0.04
0	0.1	0.01	0.1
2	1.3	0.7	0.5
5	2.8	2.2	0.7
5	7.8	7.84	1.0
0	0.016	0.211	13.1
1	0.21	0.624	2.97
0	0.466	0.193	0.41
1	1.3	0.09	0.06
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
			19.21

Calculated value is 19.21

For table value,

d.f or r=(r-1)(c-1)

d.f = 9

Tabulated value of X² 0.05 at 5% level of significance is 16.919

Inference:

Since the calculated value is greater than the tabulated value, Therefore H_0 is rejected.

So we conclude that there is significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets.

4.3.CORRELATION ANALYSIS

Table showing the significance difference between the Type of industry respondents working and their assumption on whether blockchain technology improve Indian markets

H0: There is no significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets.

H1: There is a significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets.

Correlations			
		Type of industry	Satisfactory level in whether blockchain improve indian markets
Type of industry	Spearman Correlation	1	0.15
	p-value Sig.(2-tailed)		0.11
	N	120	120
Satisfactory level in whether blockchain improve indian markets	Spearman Correlation	0.15	1
	p-value Sig.(2-tailed)	0.11	
	N	120	120

Interpretation:

Since the spearman correlation is between -1 and +1, we accept H1 and reject H0. Therefore there is a significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets.

CHAPTER 5

FINDINGS, SUGGESTIONS AND CONCLUSION

5.1 FINDINGS OF THE STUDY

- Majority (90.8%) of the respondents are Male.
- Majority (76.1%) of the respondents fall in the age category of 25 to 35 years.
- Majority(58.3) of respondents working organization was Located in Town
- Majority(47.5%) of respondents age of their working organization is 21-50 year
- Majority(65%) of respondents size of their working company is Maximum Sized Industry.
- Majority(70%) of respondents know about IOT.
- Majority(55.8%) say IOT has benefit of time saving that's why Businesses are investing in development of IOT
- Majority(68.3%) of respondents say that they heard of Cryptocurrency.
- Majority(75%) of respondents came to know about Blockchain Technology through Internet.
- Majority (96.7%) of respondents organizations are not implemented with Blockchain Technology nor planning to implement.
- Majority (61.7%) Strongly agree that Insufficient Funds is one of the challenges Industry faces while implementing or they plan to implement Blockchain.
- Majority (60%) Strongly agree that Insufficient time is one of the challenges Industry faces while implementing or they plan to implement Blockchain.
- Majority (79.2%) Strongly agree that not having knowledge in latest digitalization is one of the challenges Industry faces while implementing they plan to implement Blockchain.
- Majority (82.5%) Strongly agree that not having skills/qualified staff for using Blockchain is one of the challenges Industry faces while implementing or they plan to implement Blockchain.

- Majority (68.3%) Strongly agree that Blockchain has advantage of Greater Security.
- Majority (56.7.%) Strongly agree that Blockchain has advantage of Greater Speed
- Majority (75%) Strongly agree that Blockchain has advantage of Greater Transperency
- Majority (85%) Strongly agree that Blockchain has advantage of Fraud reduction.
- Majority(53.3%) respondents say Reduction of counterfeiting is the major benefit in using Blockchain in Supplychain.
- Majority (58.3%) Strongly agree that using Blockchain in Supplychain enhance towards more touchless business process.
- Majority(70.8%) Strongly agree that Blockchain Tracking and Information Transperency increase trust in Supplychain
- Majority(75%) Strongly agree that Blockchain Tracking and Information Transperency increase trust in Supplychain.
- Majority (68.3%) respondents say that in Supplychain& Logistics sector blockchain has significant impact.
- Majority (59.2%) respondents say that adopting blockchain technology will disrupt the Industry.
- Majority (88.3%) of respondents Strongly agree that Blockchain will improve Indian Markets
- The most significant advantage of using blockchain is that it create transparency.
- There is significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets.
- There is a significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets.

5.2.SUGGESTIONS

Since the blockchain is emerging technology, it requires some time to implement in industry across india. Due to lack in skills about IOT many of the employees don't know about latest digitalization ,Organization should train about IOT. Automation in smart manufacturing depends on many parties in the supply chain and distribution networks. A smart manufacturer needs to track the location and state of materials from its suppliers and products to its customers/distributors to manage the corresponding production schedule. The need for such information can be fulfilled by the use of Industrial Internet of Things IOT devices installed at each respective places. However, even though all industry may trust one another, they have confidential data produced by the IOT devices that are not allowed to be shared with other parties, or only allowed to be exchanged with certain parties. Even though the data are not confidential, they may still be required to share partial data based on the needs of each party.

On the other hand, all industries have their independent systems that differ from each other, which leads to complex integration. Regarding those situations, a private-blockchain-based IIoT is promising to bridge the need for product and material tracking information exchange between parties while maintaining the respective confidentiality. From the survey we came to know that blockchain has many advantages in supplychain if it adapted in Manufacturing industries

5.3.CONCLUSION

Blockchain technology is proven that it has many significant advantages like Time saving, Cost reducing, Transparency, Security etc. But in Indian manufacturing companies, most of the established organizations have set up their factories during the second industrial revolution. Due to infrastructure cost and implementation cost many industries are still in between 2nd and 3rd revolution. This is one of the limitations where we need to have more research to bring out more understanding on blockchain. From results and findings we can understand that using blockchain will disrupt the industry because it is an emerging technology and many employees are not knowing about latest digitalization and lack of skills in using it, but using it effectively bring out profit to organization and helps to improve Indian markets. Furthermore research has to be done on other industries to study the exceeding impacts of blockchain.

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APPENDIX – I (Questionnaire)

1. Gender

- Male
- Female

2. Age group

- 18-25
- 25-35
- 35-45
- Above 45

3. What type of industry you are working in?

- Agro based Industry
- Mineral Industry
- Electrical & Electronics
- Clothing & Textiles
- Food Industry
- Metal Manufacturing
- Automobile Industry
- Other_____

4. What is the size of your company?

- Micro (less than 10 persons employed)
- Macro (10 to 50 persons employed)
- Medium sized industry(50 to 250 persons employed)
- Maximum sized industry(250 or more persons employed)

5. Are you aware of IOT(internet of things)?

- I haven't heard about it
- I heard about it but not know much about it
- Yes I know about it
- Our company is doing some project about it

6. If yes what do you think are the main reason that businesses are investing in development of IOT?

- Cost Savings
- Increased Efficiencies
- Market share growth
- Time Saving

7. How familiar are you with cryptocurrencies (i.e.Bitcoin)

- Never Heard of it
- Heard of it
- I know about it and understand how it works

9. From which source you came to know about blockchain?

- Social medias
- Friends & Relatives
- Workplace
- Internet

8. Is your organization currently implementing or does it plan to implement Blockchain technology?

- Implemented
- Planning to implement
- Currently no

9. If no what are the challenges does your company faces in implementing blockchain?

	Strongly agree	Agree	Disagree	Strongly Disagree
• Insufficient funds				
• Insufficient Time				
• Not having Knowledge about latest digitalizations				
• Not having skills/qualified staff for using it				
• IOT are too difficult to be integrated in existing company infrastructure				

10. If planning to implement what do you think blockchain has advantage of?

	Strongly agree	Agree	Disagree	Strongly Disagree
Greater Security				
Greater Speed				
Greater Transperency				
Fraud Reduction				

11. What benefits specific to your industry do you hope to obtain from using blockchains?

- Improved business efficiency
- Increase transaction speed
- Time saving
- Reduction of counterfeiting
- High security

12. Blockchain can enhance towards more touchless business process?

1 2 3 4 5
Strongly agree ☐ ☐ ☐ ☐ ☐ Strongly disagree

13. Blockchain Tracking and information transparency increase trust in supply chain

1 2 3 4 5
Strongly agree ☐ ☐ ☐ ☐ ☐ Strongly disagree

14. Blockchain reduces Cost an Time.

	1	2	3	4	5	
Strongly agree	☐	☐	☐	☐	☐	Strongly disagree

15 . In which sector do you think blockchains has most significant impact?

- Manufacturing
- Supplychain& Logistics
- Banking
- Healthcare
- Government
- Retail
- Food
- Other_____

16. Do you think that adopting blockchain technology will dramatically disrupt the industry?

- Yes It will disrupt
- No it doesn't disrupt
- Too early to tell

17. If yes what are the biggest adoption challenges your industry face to utilize it?

(Please rank the most significant)(1- more significant, 4-less significant)

Note: You cannot able to give same rank . please rank from 1,2,3,4.

	1	2	3	4
• Blockchains are still an emerging technology	☐	☐	☐	☐
• Lack of experts skilled in blockchaintechnology	☐	☐	☐	☐
• Regulatory constraints	☐	☐	☐	☐
• Lack of understanding what blockchain is good for	☐	☐	☐	☐

18. Please rank the most significant advantage of using blockchain in supplychain (1-more significant, 5-less significant)

1 2 3 4 5

- | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| • Create transparency | ☐ | ☐ | ☐ | ☐ | ☐ |
| • Cost savings | ☐ | ☐ | ☐ | ☐ | ☐ |
| • Traceability | ☐ | ☐ | ☐ | ☐ | ☐ |
| • Time saving | ☐ | ☐ | ☐ | ☐ | ☐ |
| • Customer engagement | ☐ | ☐ | ☐ | ☐ | ☐ |

19. Blockchain Technology can improve Indian markets?

- Strongly agree
- Agree
- Strongly disagree
- Disagree

20. Do you have any other thoughts on blockchain whether in general or pertaining to your organization's initiatives? _____

APPENDIX- II (ARTICLE)

STUDY OF USING BLOCKCHAIN IN SUPPLYCHAIN FOR MANUFACTURING INDUSTRIES

Dr. R. Dhivya Sathish, MBA., M.Phil., Ph.D - Assistant Professor, School of Management Studies, Sathyabama Institute of Science and Technology.
(dhivya.sathish05@gmail.com)

T .K .Venugopal, MBA Student, Sathyabama Institute of Science and Technology.
(venu291998@gmail.com)

Abstract

The present world is marching towards the digital era, where it is easy for people to gather more information and knowledge about small companies located in the nooks and corners of the world. It's incredibly difficult for customers or buyers to truly know the value of products because there is a significant lack of transparency in our current system. In a similar way, it's extremely difficult to investigate supply chains when there is suspicion of illegal or unethical practices. They can also be highly inefficient as vendors and suppliers try to connect the dots on who needs what, when and how. This project suggests that the real time transparency and cost savings secured by blockchain technology improve the profitability and competitiveness of manufacturing firm and also explains the limitations of blockchain adapting to manufacturing industries. This study tried to unveil the areas of blockchain and its' benefit with various other parameters through a structured and customized market research technique. The study has been conducted in the Chennai (India) region among a group of 120 employees of different age group, Types of industry with equal breakup of male and female. The methodology adopted has helped in concluding certain factors with high level of authenticity of relevant support data and information with statistical significance. The conclusion for this study has been derived, after validating the data collected and then processing the same with certain key statistical tools including chi-square test and correlation analysis.

Keywords: blockchain, supplychain, disruption, IOT, manufacturing, proof of work, real-time transparency,time saving , cost saving.

I Introduction

Manufacturing sector is considered the backbone of development in general and economic development in particular mainly because Manufacturing industries not only help in modernizing agriculture, which forms the backbone of our economy, they also reduce the heavy dependence of people on agricultural income by providing them jobs in secondary and tertiary sectors. A promising company would aim at delivering products with high quality at low cost without compromising its profit margin and quality, satisfying the needs of the customers.Managing supply chains nowadays is extraordinarily complicated as stakeholders have to maintain paper-based trails.The lack of transparency can cause cost and customer relationship issues, which can negatively influence a brand name.With the help of Blockchain technology, one could easily find out where a product was made, by whom, and if the quality and condition of said product.

The very things that are necessary for reliability and integrity in a supply chain are provided by blockchain. Blockchain provides consensus—there is no dispute in the chain regarding transactions because all entities on the chain have the same version of the ledger. Everyone on the blockchain can see the chain of ownership for an asset on the blockchain. Records on the blockchain cannot be erased which is important for a transparent supply chain. This provides high security and transparency which will increase trust among customers

II Review of literature

Anna Roy: Blockchain:The India Strategy-Blockchain technology has the potential to revolutionize interactions between governments, businesses and citizens in a manner that was unfathomable just a decade ago. Though very often grouped with technologies such as artificial intelligence (AI) or IoT (Internet of Things), the technology is unique in its foundational nature. Unlike other technologies, which have the potential to deliver completely new services to

citizens and other stakeholders alike, blockchain has the potential to revamp currently existing processes to unlock new sources of efficiency and value.

Mougayar, W. 'The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology' book provide introductory explanations of the algorithm and the current state of blockchain technology for readers without advanced knowledge of computers. The book, *The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology*, discusses the potential use of blockchain technology in businesses. He suggests that large banks should actively employ blockchain technology in their businesses, supporting the active implementation of blockchain technology to avoid ceding profits to start-up financial companies.

Catalini and Gans: 'Some Simple Economics of the Blockchain' has stated that blockchain technology's mechanism for enabling cost savings. They provide more specificity around the vague arguments for blockchain technology's cost savings by dividing the cost reduction effects of blockchain technology into two categories: verification costs and networking costs.

Matthias Heutger: 'Blockchain in Logistics': Despite all the hype surrounding blockchain today, we believe that the logistics industry needs to leverage new technologies and embrace ways of rethinking old processes in the digital era. While there are still many challenges to overcome, we invite you to explore with us the opportunities that blockchain presents. By joining forces, we can create the right foundations for successful industry adoption of blockchain and we can ultimately unlock new value in logistics.

Abeyratne, S.A and Monfared, R.P: 'Blockchain ready manufacturing supply chain using distributed ledger' suggest the applications of blockchain technology to supply chains in the manufacturing industry. They describe the positive effects of blockchain technology on the transparency of a supply chain and the quality of products. Extending this discussion, Mondragon, Mondragon, and Coronado (2018) specifically examine the trade of composite materials in the manufacturing industry using a blockchain platform, emphasizing that the quality of products can be secured through blockchain technology.

III Objectives

A study on using Blockchain in supplychain for Manufacturing Industries

To analyze the impact of blockchain in supplychain

To study impact of Blockchain in Indian Markets

IV METHODOLOGY

Research Design

My research design will be descriptive followed by partially exploratory because the entire project will be based on the data collected from reports, journals and analysis so that the detailed and clear description will be there in the project, so there is a mix of explanation and description design.

Participants

The target population consists of employees who are working in manufacturing industries in Chennai. A total of 150 respondents has participated in research to share their views about blockchain technology. The respondents are based on various age groups of 18-25, 25-35, 35-45 and above 45years and the industry they are working and gender of both male and female.

Measures

A set of questionnaire was prepared which include Demographic variables ,Industry type, Age of industry and respondents knowledge about blockchain and its factors, sectors in which blockchain has significant impact has been asked in the questionnaire and also I have added the video about blockchain for those who don't have any knowledge about it.

Procedure

The questionnaire was spread across to the employees working in Manufacturing industries in Chennai region. From the survey a detailed database has generated from the respondents. The researcher explained the purpose of the study to the respondents. The respondents were assured of their anonymity and confidentially

of any information being provided. The respondents completed the questionnaires and out of the 150 copies of the administered questionnaire, all of it were collated and analyzed statistically using percentage analysis, Correlation test and Chi-square test.

V RESULTS AND DISCUSSIONS

From the analysis of the data collected, the following results were obtained:

- Majority (68.3%) respondents say that in Supplychain& Logistics sector blockchain has significant impact.
- Majority (59.2%) respondents say that adopting blockchain technology will disrupt the Industry.
- Majority (88.3%) of respondents Strongly agree that Blockchain will improve Indian Markets
- There is significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets. Reject H0
- There is a significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets.Reject H0

Hypothesis 1

- The null hypothesis H0 is is rejected so we conclude that there is significance difference between Size of Industry and Satisfactory level in whether Blockchain can improve Indian Markets. The result depicts that the size of industry determines the improvement of Indian markets when they adapted to blockchain technology because of insufficient funds small and medium industry can't able to adapt to blockchain technology.

Hypothesis 2

- Since the spearman correlation is between -1 and +1, we accept H1 and reject H0. Therefore there is a significance difference between the type of industry and Satisfactory level in whether Blockchain can improve Indian Markets. The result depicts that Type of industry play a Significant role role in determining the improvement of Indian markets when it uses blockchain.

Correlations			
		Type of industry	Satisfactory level in whether blockchain improve indian markets
Type of industry	Spearman Correlation	1	0.15
	p-value Sig.(2-tailed)		0.11
	N	120	120
Satisfactory level in whether blockchain improve indian markets	Spearman Correlation	0.15	1
	p-value Sig.(2-tailed)	0.11	
	N	120	120

VI Suggestions

Since the blockchain is emerging technology it requires some time to implement in industry across india. Due to lack in skills about IOT many of the employees don't know about latest digitalization ,Organization should train about IOT. On the other hand, all industries have their independent systems that differ from each other, which leads to complex integration. Regarding those situations, a private-blockchain-based IIoT is promising to bridge the need for product and material tracking information exchange between parties while maintaining the respective confidentiality. From the survey we came to know that blockchain has many advantages in supplychain if it adapted in Manufacturing industries

VII Conclusion

Blockchain technology is proven that it has many significant advantages like Time saving, Cost reducing, Transparency, Security etc. But in Indian manufacturing companies, most of the established organizations have set up their factories during second industrial revolution. Due to infrastructure cost and implementation cost many industries are still in between 2nd and 3rd revolution. This is one of the limitations where we need to have more research to bring out more understanding on blockchain. From results and findings we can understand that using blockchain will disrupt the industry because it is an emerging technology and many employees are not knowing about latest digitalization and lack of skills in using it, but using it effectively bring out profit to organization and helps to improve Indian markets. Furthermore research has to be done on other industries to study the exceeding impacts of blockchain.

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