SCIENCE, TECHNOLOGY AND SOCIETY: A SOCIOLOGICAL APPROACH

Naveen Gaur
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Published by: Alexis Press, LLC, Jersey City, USA
www.alexispress.us

First Published 2022

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication Data

Includes bibliographical references and index.

Science, Technology and Society: A Sociological Approach by *Naveen Gaur, Shama Loknath, Ankur Dev*

ISBN 978-1-64532-425-6

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CHAPTER 1

PROTECTION OF GEOGRAPHICAL INDICATIONS IN INDIA

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ABSTRACT: ***In the past few cases it has been observed that there is sprint between two states to get Geographical Indications. Whether it be for "Basmati Rice" or "Rosogolla" states had been in clash with each other to get Geographical Indication. However, it has been observed in few cases that some traditional knowledge needs more than the GI tag. For instance, getting into battle field only for GI tag has no advantages until and unless that GI is getting more popular amongst consumers. Geographical Induction is nothing but a sign showing the origin of the product. In addition to that it also assures some quality and characteristic of products associated with the place of origin. Thus, it can be said that there lies connection between the product and its place of origin. In this paper researcher will discuss in brief about meaning and nature of Geographical Indication, why GI is to be protected as an Intellectual Properties, international conventions pertaining to Geographical inductions, connection with the traditional knowledge, procedure for registration and effects of registration, and certain GI which is prohibited from getting registered.***

KEYWORDS: ***Geographical Indications, Place of Origin, Traditional knowledge.***

1. INTRODUCTION

John Lock's "labor theory" is one of the most prominent and acceptable theory of intellectual property. It states that Man is always looking for fruits for their own labor. In case, of intellectual property being the product of human mind, man always expects that its mental labor should be awarded. In return, the inventor or creator contributes for welfare of society at large. As the time passes, the importance of human creation and inventions were realized. In the 21st century the commercialization of these human creations gets trigger and intellectual property gets worldwide recognition. A new set of law as Intellectual Property Law was enacted to protect all the possible human creations or inventions. Broadly this Intellectual Property was divided in two categories Copyright and Industrial Properties. Industrial Properties was further sub-divided in 6 main categories, of which the most prominent are Patents, Copyrights, Geographical Indications, and Trademarks. Geographical Indications is the section of the Intellectual Property which denotes the origin of the product associated with some quality and characteristic due to its place of origin. For example, "Banaras Brocades and Sarees" from Banaras have value in the market because of its weaving pattern using gold and silver threads [1]–[5].

Meaning and Nature

As per the definition given by the WIPO,

- GI is considered as signed used on product
- It denotes the geographical origin of the product
- That origin refers some qualities and reputation, essentially due to the place of origin

In case of Geographical Indications, it is not as explicitly defined as compared to other section of Intellectual Property. Like, the word Appellation of Origins and Indication of Source are commonly used as synonymous to Geographical Indication. However, all these terminologies differ in their characteristics. Taking GI and Appellations of Origin, the basic

difference between them is that the connection with the place of origin must be stronger in the case of an appellation of origin. It can be said that Appellations of Origin is special kind of GI. In case of appellation of origin, the quality or characteristic of the goods must be exclusively attributed to the geographical origin. However, in the case of GI there is no such hard and fast rule and even a reputation or even short link to geographical origin can also be sufficient.

On the other hand, if we can take geographical indications and Indication of source, in such case an indication of source refers only the origin of the product and does not intend to highlight any quality or characteristic attributed to that origin. However, on the other hand Geographical Indications refers that presence of any particular quality or characteristics or reputation is only due the fact that product is attributed to its place of origin. For example, we have observed many products in our daily life which refers the source of indication like "Made in India", "Product of China" etc., [6]–[8].

2. DISCUSSION

Why GI rights to be protected?

1. *Labor Theory:*

As explained by John Locke Labor Theory that natural resource is available to everyone, and if any person puts his labor to establish a new product it will brings moral obligation upon others to respect their products. Similarly, the originator of goods associated with any place of origin deserved right to be recognized and respected.

2. *Reward Theory:*

The reward theory believes in praising the inventor or creator for their time and effort they are putting to produce or create some goods or material. The people are always in hunt of appraisal or reward for their work. This theory is in favor of granting protection to GI, as a reward to the producers of goods.

3. *Utilitarian Theory:*

Utility theory of Bentham believes in the 'greatest happiness of the greatest number' i.e., social benefit. Granting protection to GI certainly adds value to social and economic benefits.

International Conventions

Geographical Indication is not a new concept; it has its origin in medieval and colonel period. For instance, during 15th centuries, Christopher Columbus wants to take back Europe rich cargoes of silks and spices from India which forced him to find new short route to India. Other notable age-old examples which indicate the origin of the products are Dhaka muslin (of Bangladesh), Kashmiri Carpets, Indian rubber. However, it was legally recognized by Paris Convention in1883. All the international conventional treaties are discussed below:

1. *Paris Convention, 1883*

It was the first legal framework which recognizes Geographical Indications. However, as per Article 1(2) of the Convention it does not explicitly mentions Geographical Indication, rather it includes "indications of source or appellations of origin" in the preview of intellectual property.

2. *The Madrid Agreement, 1891*

This agreement also deals with indication of source and not Geographical Indication specifically. It was the first agreement which dealt with "False or Deceptive Indications of Source".

3. *The Madrid Agreement Concerning the International Registration of Marks, 1891*

Interestingly, in some countries Trademark law also provides the protection to Geographical Origin. However, Indian Trademark Act 1999 expressly mentioned under section 9 of the TM Act that Geographical Origin is absolute ground for refusal of registration. The Madrid Agreement also provides protection to Geographical Origin under trademark law as collective marks, certification marks. However, GI as a trademark can only be protected where *sue generis* law for the protection of GI is not available and Trademark laws provided protection to GI as certification or collective mark.

4. *The Lisbon Agreement, 1958*

The main objective of enacting the Lisbon Agreement is for the Protection and international registration of Appellations of Origin. Article 2(1) of the Agreement defines the appellation of origin as:

- Geographical name of a country, region, or locality
- Refers the origin of the product
- Qualities or characteristic of the products are essentially due to the place of origin their geographical environment, including natural and human factors.

However, the agreement does not use Geographical Indication word anywhere in the agreement. Article 1 of the Agreement lays down two essentials for an appellation of origin to be protected, they are as follows:

- It should be protected in its country of origin, and
- It should be registered at the IBIP of WIPO

Thus we can conclude that an appellation of origin to be protected under the agreement had to be geographical denomination and the quality and characteristics of such appellation of origin should be essentially linked to the geographical environment.

5. *TRIPS Agreement, 1995*

This is the first time when any international convention specifically deals with Geographical Indication. However, it is primarily based on the LISBON Agreement. The definition of GI is given under Article 22 of the TRIPS Agreement.

After the implementation of the TRIPS Agreement GI have attracted policymakers, producers and lawyers and economists across the world. It may be the reason that signatory to TRIPS Agreement are obliged to follow the minimum standard lays down in the Agreement.

In addition to definition of GI, the Agreement under Article 23 provides additional protection against any use of GIs for wines and spirits. Along with minimum standard to follow the Agreement under Article 24 also lays down certain minimum exceptions to the protection of geographical indications.

Geographical Indication And Traditional Knowledge

It has been observed that products getting GI tag are often the result of "traditional knowledge" which has been transferred from ages. Traditional Knowledge is basically "knowledge that is developed, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity". India fought three times in protecting Indian Traditional Knowledge. For instance, patent granted to Turmeric by U.S. to University of Mississippi Medical Center for their wound healing property was objected by

the Indian Council for Scientific and Industrial Research (CSIR). Similarly, patent for Neem, was filed by U.S. in EPO was opposed by the India. Ultimately, both the patent was revoked by the authority. However, in case of Basmati Rice, the patent granted to Rice Tec. was not revoked and thus it is the classic example which arose the question of protecting our Traditional Knowledge through proper legal framework.

At present, when protection of traditional knowledge has gained momentum some of existing legal framework can help in protecting Traditional Knowledge of which the most prominent protections lie under the GI framework. It should be noted that geographical indications do not directly protect a product associated with traditional knowledge that remains in the public domain in a traditional IP system. However, geographic indications can be used to indirectly contribute to their protection. Other possible protection can be availed under the Copyright over unpublished works and Trade Secret (since most of the Traditional Knowledge are only limited to some tribes or communities).

Legal Framework and Registration of GI

In India GIs is regulated under the Geographical Indications of Goods (Registration and Protection) Act, 1999. However, that does not mean that before the enactment of act there so no legal protection or remedies available to Geographical Indications. Before the Act it can be possible to avail remedies under Consumer Protection Laws, Passing-off Action or through Certification Trademarks (it only focused on recognized and protecting indication of source). A Geographical Indications Registry is set up under Section 5, in Chennai for the administration of the Act i.e. registration and better protection of geographical indications relating to goods.

A total of 370 (Three Hundred and Seventy) Geographical Indications (GIs) have been registered since 28th September, 2020. The Registry along with the administration of the act also organizes “Awareness Programmes” in whole India to promote registration of the Indian GIs. The sectors being focused on are tea, coffee, spices, agriculture & horticulture products, handloom products, handicrafts, textiles, processed food items, dairy products, natural goods, spirits and wines.

In the GI Act definition of geographical indications is given under Section 2(e) which can be simply put as:

- It is only associated with the goods, and not services
- It is considered as an indication
- Identifies Goods as: Agricultural, Natural, and Manufactured
- Originating or manufactured in territory, region and locality
- Where it is geographically attributed to their origins in respect of given quality, reputations and characteristic

Procedure for registration of geographical indication

As enumerated under Section 11of the Act any associations of person or producers or any organization who are willing to register goods (fulfilling the criteria of GI as mentioned under Section 2(e) as Geographical Indication shall apply in writing to Registrar for the registration of Geographical Indications. The application must contain details about how the goods qualified as geographical indication, it’s brief history associated with the origin of place, geographical area, territorial map, and additional representation sheet containing the

processing and preparations of goods and can also submit newspaper article, texts, literatures in support of goods qualifying as Geographical Indications.

Section 13 explained the advertisement procedure, where after an application for registration of geographical indication has been accepted, the Registrar shall immediately advertise the application. After advertisement the Registrar may allow any amendment or error in the application, if any.

As Trademark and Patent Application, the Opposition is also allowed in the geographical Indication application. As per Section 14, any person can within 3 months of advertisement may oppose the registration of Geographical Indication. The Registrar shall serve the copy of Opposition to applicant. After that both the parties are allowed to submit the evidence in support of their arguments and then Registrar shall allow or reject the Geographical Indication application based on the arguments and evidence presented before the Registrar.

Section 15 of the act provides that Registrar may before or after the acceptance of the application for registration may allow for correcting or amending application as he deem fit.

Section 16 of the act provides that when the application has not been opposed and time for notice of opposition expired or if opposed and decided in favors of applicant, Registrar shall register the goods as Geographical Indication.

Further, Section 17 provides that any person claiming to be producers of Goods in respect of which GI has been registered may apply in writing for an authorized user of such Geographically Indication.

Section 18 talks about duration, renewal, removal and restoration of Registration. According to Section 18 duration for registered GI is 10 years which can be renewed from time to time for a period of 10 years at a time.

Effect of registration of GI

It is explained in negation under Section 20 that there does not lay any action for infringement of Unregistered Geographical Indications. Simply put, it means registered GI may file infringement suits. Further Section 21 laid down right conferred by registration of Geographical Indication. It says that registered user or applicant can get remedies in case of infringement; they have exclusive rights to the use of the GI.

Ip Annual Report 2018-19 And Geographical Indications

It was observed that Registry started receiving GI Application after 3 years in 2003 though only six in numbers. However, in the next year this number rises to 29 and thereafter not so much changes are observed until 2011-12. In the year 201-12 huge number of application (148) was filed in the Registry. However, the number does not remain constant and in the very next year (2012-13) it was fall down to 24. In the year 2018-19 total 32 applications was filed in the registry.

It was observed from the Annual Report (2018-19) that area where most of the GI Application was filed is Handcraft (295) followed by the Agricultural (157), Manufactured (146), Foodstuff (40) and Natural (07). If we analyze state-wise registration of GI we could find from Annual Report (2018-19) that Karnataka (41) has highest number of GI registered in their name, followed by, Maharashtra (30), Tamil Nadu (30), Kerala (27) and Uttar Pradesh (26). It is also observed that some multi-states registration was also acquired by many states. In the past few cases it has been observed that there is sprint between two states to get Geographical Indications. Whether it be for “Basmati Rice” between Punjab and

Madhya Pradesh or for "Rosogolla" between Bengal and Odisha, states had been in clash with each other to get Geographical Indication. Further a total 14 foreign GI was registered in India. As far as authorized user is concern total 5,382 applications were filed out of which 1,601 are registered authorized users as on 31stMarch, 2019 (Figure 1).

Year	No. of Applications
2003-04	6
2004-05	29
2005-06	16
2006-07	33
2007-08	37
2008-09	44
2009-10	40
2010-11	27
2011-12	148
2012-13	24
2013-14	75
2014-15	47
2015-16	17
2016-17	32
2017-18	38
2018-19	**32**

Figure 1: Year-wise breakup of GI Applications filed as on 31st March, 2019 (Image Source: IP ANNUAL REPORT 2018-19)

Geographical indications which cannot be protected

Section 9 of the Act lays down certain Geographical Indication which is prohibited from registration. The following GI are prohibited from registration are, the use of which:

- Deceive or cause confusion
- Is contrary to any law
- Contains scandalous or obscene matter
- Likely to hurt the religious susceptibilities
- Disentitled to protection in court of law
- Are generic names
- Falsely represent to the persons that the goods originate in another territory, region or locality

4. CONCLUSION

Here in this review paper after discussing the three terminologies i.e., Geographical Indication, Appellation of Indications, and Indication of Source it can be concluded that Appellation of Indication is highly attributed to the place of origin in respect of quality or characteristics of products than the other two terminologies. Secondly the indication of Source has nothing to do with any quality or characteristic of products it only refers the source of Origin of the product. The Geographical Indication specifically refers to the kind of quality or characteristic or reputation of product associated with its place of origin. Secondly, we have observed that the GI was specifically recognized after the TRIPS Agreement. Before that application or origin, indication of source has been used in all the international conventions. We have further discussed the theory in support of protecting Geographical

Indication. Whether it be John Lock's Labor theory or Bentham Utilitarian Theory it is economically and socially beneficial to grant protection to Geographical Indication. We have further observed that how the GI helps us in protecting our Traditional Knowledge.

We have seen that Registry started receiving application after three years of the enchantment of the Act. Further the number of applications filed each year is also not very satisfactorily. To enhance the number of GI, Registry and Department for Promotion of Industry and Internal Trade (DPIIT) needs to organize more awareness programs amongst community or tribal to encourage them to come forward and register their Goods associated with their community, tribe, area, locality, region or territory under Geographical Indication.

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CHAPTER 2

AUTOMATED PASSENGER COUNTER FOR A DESTINATION SYSTEM FOR PASSENGER VEHICLES

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ABSTRACT: ***As the technology is advancing in each and every matter. With this technology there is immense revolution in the automatic automobiles and digitalization in payment systems whether it is related to bill payment, ticket booking, food ordering etc. With the use of the technology many researchers have proposed for the Automated Far Collection (AFC) system in which the fare of passenger can be paid in the bus through online mode using smart cards based on Radio Frequency Identification (RFID) system by either prefilling the details of the journey or using the card twice, firstly at the start of the journey and secondly at the end of the journey at a particular station. In this research paper study has been done more to further enhance/refine their system of AFC and combining it with generation of data that how many passengers on the board are going for a particular destination, so that on reaching of the passenger vehicle at that particular location it can tell how many passengers are going to de-board the vehicle so that a fair system can be established. This will help the examiner of the vehicle to ensure that passengers on board are going for their destined location and no one is using unfair means to travel and it will also help the passengers to remind them of their destination.***

KEYWORDS: ***Automated, Digitalization, Geographical Positioning System (GPS), Fare, Passenger, RFID, Smart card, Unified Payment Interface.***

1. INTRODUCTION

The public transport in India had been relying for a long period on manual paper-based ticketing system in which tickets are given by a conductor to the passengers in the form of paper against the fare provided by the passengers for a particular destination. Delhi metro was the first in the country to implement such contactless AFC system[1]. AFC has improved the efficiency of fare box collection and made the journey convenient for the commuters. Such system can also be implemented for other public transports like bus, cabs, auto etc. For metro it is limited to just the metro but there is need of an integrated system which enables seamless travel and transfer from one public transport to another. This kind of multi modal ticketing is already popular in many cities like London, Singapore, Hong-Kong etc. There are a number of technologies involved in this system like GPS, RFID, Smart Card module, e-cash system, android applications etc. GPS system is used to provide the real time location of the vehicle so that the passengers can be aware of the location their bus or any other public transport in which they are travelling. RFID is used for the ticket generation using the smart cards. Android application is used for the various updates regarding the destination, location of the vehicle, online e-ticket etc.

RFID is the abbreviation for Radio Frequency Identification [2], which means the devices using this technology works on the radio frequency signals. The RFID scheme comprises an RFID reader and a marker that is used to identify and trace items [3].The use of this technology can be been in use at a number of places like in warehouses, supermarket, libraries; all of them uses a barcode scanner which can be advanced to this RFID technology. RFID also can combine a specific identification code for all items similar to such barcode

method, but the additional benefits differ from the sight control line of the barcode device, meaning that the system can identify RFID tags within its vicinity. It is also worth mentioning that no person is required to look for the barcode as well as to point to the barcodes. In automation, this capability should also be used and human interaction can be certified and when the RFID reader is accessed, the tag can be checked and eventually billed. RFID door and RFID door locks are now very common. RFID technique is used in toll plazas, libraries for scanning pile of books in one go, hotels for operating the door locks, at homes. Figure 1 shows the schematic flow diagram of the system encompassing all the components.

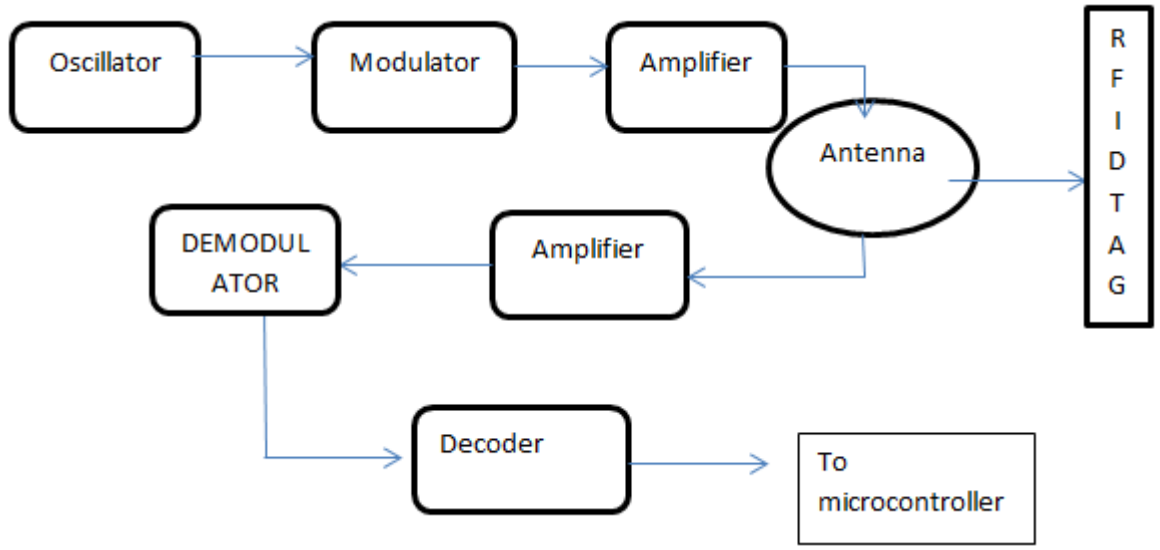

Figure 1: Shows the schematic diagram for the transfer of the information to the RFID tag and microcontroller

Global Positioning System is abbreviated to GPS which is most commonly used word in everyone's daily life because it has become a part of to search for unknown places, unknown paths due to its ability to work on a global navigation satellite system which provides location, time synchronization and velocity. GPS is everywhere; Like in car, smartphones and watches. GPS helps to travel from one place A to another place B.

1.1 Working of GPS:

GPS is a satellite navigation system which includes programmes or algorithms to synchronise the air, sea and land travel position, speed and time data. The Satellite fleet consists of 24 satellites in centred orbital planes with four satellites orbiting 13,000 miles in diameter are moving 8700 miles per hour. The fourth telescope is also used to verify evidence from the other three satellites in order to find an object on either the surface of the Planet. The fourth satellite fuses into the physical realm for the calculation of a device's altitude[4].

1.2 Elements of GPS:

GPS comprises of three different components known as segments that work together to provide to locate an object. The three segments of GPS are:

1.2.1. Space (Satellites):

The satellites revolving around the Earth, transmits the signals to the users on geographical position and time of day.

1.2.2. Ground control

This section consists of Earth-based tracking stations, control stations and antenna on the ground. Control operations include space satellite detection and operation and space transmitting monitoring. Monitoring stations in North & South America, Uganda, France, Australia are located on all continents worldwide.

GPS transmitters and receivers comprise objects such as watches, smartphones, GPS cars and telematics equipment. It is based on the trilateration methodology. The position, speed and altitude are calculated using the satellite signal and the output is provided as location information. The triangulation is used to calculate the angles not the width, and this technique may be misunderstood. Satellites across the planet Earth relay signals to a GPS system situated on earth for read and interpretation. A GPS system must receive a signal from a minimum of four satellites in order to determine the position. Any rotating satellite rotates twice a day by the earth, and each satellite sends out a specific signal, orbital criteria and time. Signals from six or more satellites can sometime be read on a GPS system. A single satellite broadcasts a GPS signal to measure the distance from the phone to the satellite, which is received from a GPS device. So a GPS system contains data on how far a satellite can go, so that a single satellite can find an object alone. Satellites don't even have angle knowledge, so the position of GPS devices may be anywhere else on the earth's spherical surface.

When a satellite brings attention, a circle with radius from the GPS to the satellite is created. It generates a second circle with the insertion of the second satellite and the location is restricted at one or two points to the intersection of the circles. The device's position at the intersection of all three circles will then be eventually calculated with a third satellite, since more than two lines converge at a common point. It is also possible to say that we reside in a 3D universe, that is to say any satellite creates a sphere, not a circle. Two crossing points are made by the convergence of three triangles, thereby selecting the closest point on earth. Here is a satellite range illustration: The radius (distance to the satellite) varies as a device passes. New areas are formed as the radius varies, which gives a new location. This data can be used to measure velocity, the path to our target and ETA in combination with the time frame from the satellite.

1.3 Uses of GPS:

In many industries GPS serves a lot and industries are very much dependent on GPS, it is a powerful tool for them. A lot of people working as surveyors, boat captains, pilots, workers working in mining and agriculture use the GPS on a daily basis. GPS allows them to make exact charts, maps with correct measurements, positioning and navigation positions. It works often and under almost every conditions of the season. Five main GPS functions are available:

- Location - spot determination
- navigation - moving from one place to another
- Tracking – object monitoring or personal travel
- maps making world maps
- timing – to calculate time accurately

Agriculture, SAVs, manufacturing and support activities, military connectivity, mobile communication, safety.

2. LITERATURE REVIEW

Aman Kaushik et al. in their research proposed a system for a passenger to generate a ticket and checking of the ticket through IOT[5]. By this there will be no confusion of fares among the passengers and also there will be check on the corruption. It ensures that the door of the bus will open only when the passenger will be having a ticket for the bus. With this system passengers need to carry money for the fare but their research paper does not provide data for the number of passengers going for a particular destination because passengers may sometime skip their destination and some may misuse the ticket for another destination. So, to ensure that in this research paper that limitation has been fulfilled.

Mr.D.Baskaran et al. in their research paper smart card system has been proposed for the passengers travelling in the bus from one place to another. This smart card is linked to their bank account for the deduction of money for the fare due to which the passengers need to carry the paper money. Smart card system works on the RFID technology and this system also provides the information about the filled and vacant seats[6]. It also proposes that the bus would not move of the number of passengers are more than the number of seats but in reality this does not really happens. Secondly this system provide the count of passengers for a particular destination so that passengers should get alert on reaching their destination because sometimes they may miss their destination and misuse the ticket so this paper lacks in that system as proposed in this current paper.

In its research paper Vinayak Nair, Amit Pawar et al. suggested facts about the paper in real time and a simple way to buy the ticket. For this purpose they suggested an android application that displays where the bus is now, punching bus passes with QR code, ticketing on time with an e-wallet or cash Bluetooth printing to generate tickets [7]. But this paper does provide the information about the count of the passengers for a particular destination, vacant seats. So, in this current research paper this limitation has been overcome. Ms. Sharmilla. P, Skanda Gurunathan R et al. in their research proposed a bus pass and ticket automation system in which their will automatic generation of the bus pass for the students, passengers eligible for the pass[8]. This system also gives alert to the bus pass holders for their renewal. This paper also proposes for the automatic ticket generation system. But this research also lacks in the same system which has been overcome in the current research making the system a fair system for the welfare of both the passengers and transport providers. Sunitha Nandhini.A et al. also proposes the same AFC system through RFID technology as proposed in the previous research and also lacks in the same system and fails to provide a complete fair system for the convenience of the passengers[9].

Research Question

- What is use of counting the number of passengers going for a particular destination?
- What if number of passengers displayed on the display by AFC system is more than the actual numbers of persons de-board for that particular location?
- Is not there any technique if examiner is not there to count the passengers de-boarding the vehicle

3. METHODOLOGY

With the AFC system installed on the passenger vehicle, fare ticket can be generated automatically by the passengers using their smart card, debit card, credit card or using Unified Payment Interface (UPI) method. Smart cards can be recharged using debit cards, credit cards or using UPI apps like paytm, google pay etc. Smart cards can also be recharged from some outside recharging points for the public transport. For this the passenger's

boarding location can be detected automatically by the AFC system and the destination location will be filled by the passenger itself. When a passenger generates the ticket for a particular location, another passenger generates the ticket for the same location and other passengers also generates the tickets for their destined location, then the system will automatically sort out the passengers for the same destination irrespective of their boarding location. Then the AFC system will automatically display the number of passengers going to de-board the vehicle so that it can be a fair system. The location of the vehicle can be determined by the AFC system using the GPS installed (Figure 2).

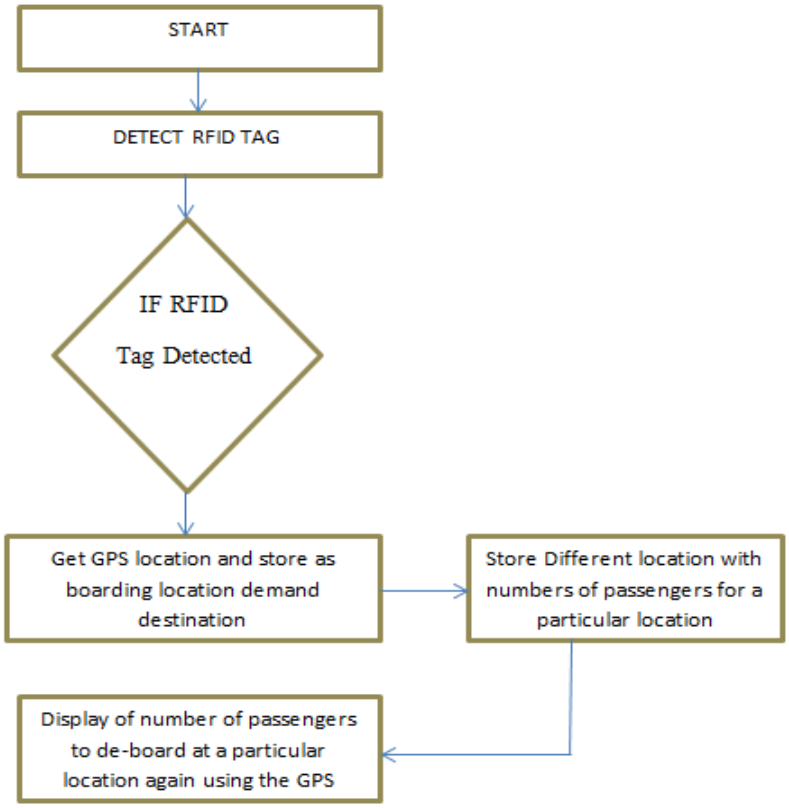

Figure 2: Shows the flow diagram of AFC and counter of passengers for a particular destination

4. RESULTS AND DISCUSSION

As the technique described in Figure 2 shows that how the counter will automatically store the data for the passengers going for a particular destination. The location of boarding and destination reached can be obtained by the AFC system using the GPS. When the vehicle will reach a particular destination, then the AFC system will display on the display installed in the vehicle that how many passengers are going to de-board the vehicle. Now the question arises what is the use of this information. Firstly, this information will be helpful for the passengers going for a particular location. Secondly the examiner or the conductor of passenger vehicle will be aware about the number of passengers going to de-board the vehicle so that no one can miss his/her destination and no one can use the same ticket for a different location. For this a counter can also be used on de-boarding gate of the vehicle like in a bus where in and out gates are available. If any case it happens that displayed number shows different number of passengers and actual de-board passengers are different then examiner can check the tickets otherwise there is no need to check and the system can go on automatic. An announcement regarding the same can also be made.

5. CONCLUSION

As it is very much helpful for the passengers to travel without carrying extra money for their fare which may sometime in large amount and it is risky of being stolen and it is easy to carry just a card and all the fare problems can be solved like sometimes there is need of change. The technique of using the counter is useful for the fair system to be followed while travelling because for a single examiner it is not always possible and it is quite tiresome to keep check on large number of persons boarding and de-boarding the vehicle. The technique used is very simple and there is no requirement of a separate system if AFC system is already present in the vehicle because it will be just a programming that needs to be change for the AFC system as can be seen in the flow diagram.

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CHAPTER 3

AUTOMATIC CHECKER AND ANALYZER SYSTEM FOR PASSENGER ON BOARD AND PASSENGER WITHOUT TICKET

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ABSTRACT: ***With the increase in population and transport system there is huge rush in the public transport. There is requirement of technology to be implemented in the transport system to counter and meet the requirements of the public. With huge rush on the public transport there is purchase of large amount of tickets daily. For that Automatic Fare Collection (AFC) system has been adopted and proposed in research done by many researchers. Through AFC fare is collected from the passenger who generates the ticket but not for those who did not generate the ticket. So, there is lack of research. For that in this research paper a system has been proposed by using the counter at the boarding gate of the vehicle so that number of passengers boarded the public transport can be calculated automatically and number of passengers who generated the ticket can be compared so that a check can made by the examiner from that report otherwise if the both the count od ticket generated and the number of passengers boarded are the same then there is no need to check. This system will be very much useful for the public transport authorities to keep check on the passengers travelling without the ticket.***

KEYWORDS: ***Analyzer, Checker, Counter, Fare, Passenger, Public transport, Ticket.***

1. INTRODUCTION

The public transport in India had been relying for a long period on manual paper based ticketing system in which tickets are given by a conductor to the passengers in the form of paper against the fare provided by the passengers for a particular destination. Delhi metro was the first in the country to implement such contactless AFC system[1]. AFC has improved the efficiency of fare box collection and made the journey convenient for the commuters. Such system can also be implemented for other public transports like bus, cabs, auto etc. For metro it is limited to just the metro but there is need of an integrated system which enables seamless travel and transfer from one public transport to the another. This kind of multi modal ticketing is already popular in many cities like London, Singapore, Hong-Kong etc.

There are a number of technologies involved in this system like GPS, RFID, Smart Card module, e-cash system, android applications etc. GPS system is used to provide the real time location of the vehicle so that the passengers can be aware of the location their bus or any other public transport in which they are travelling. RFID is used for the ticket generation using the smart cards. Android application is used for the various updates regarding the destination, location of the vehicle, online e-ticket etc. Figure 1 shows the schematic flow diagram of the system encompassing all the components.

- The term RFID refers to the radio frequency identification, as the name specifies the radio frequency signal activity of the unit. The RFID systems have an RFID reader and even a tag usually used to identify and trace items [2][3]. Let's see the uniqueness of this innovation and its overall use before discussing more about RFID. Bar codes are nowadays in the majority of cases used for identification of an object with a barcode scanner in warehouses and/or supermarkets. Like barcodes, the RFID also gives all things a specific identifier number, but the additional benefit is that the device detects RFID tags within its proximity range, in contrast to the barcode system

sight line. This means that an individual is not required to look for the barcode only point to the barcode scanner. This function will mostly simplify the device and eliminate human interference by automatically scanning and charging a tag as it hits the RFID reader. RFID door as well as RFID door locks are indeed very common and many hotels offer their customers the RFID sticker to lock and open the door.

- A people counter is an electronic device that is used to measure the number of people traversing a certain passage or entrance. Examples include simple manual clickers, smart-flooring technologies, infrared beams, thermal imaging systems, Wi-Fi trackers and video counters using advanced machine learning algorithms. They are commonly used by retail establishments to judge the effectiveness of marketing campaigns, building design and layout, and the popularity of particular brands [4].

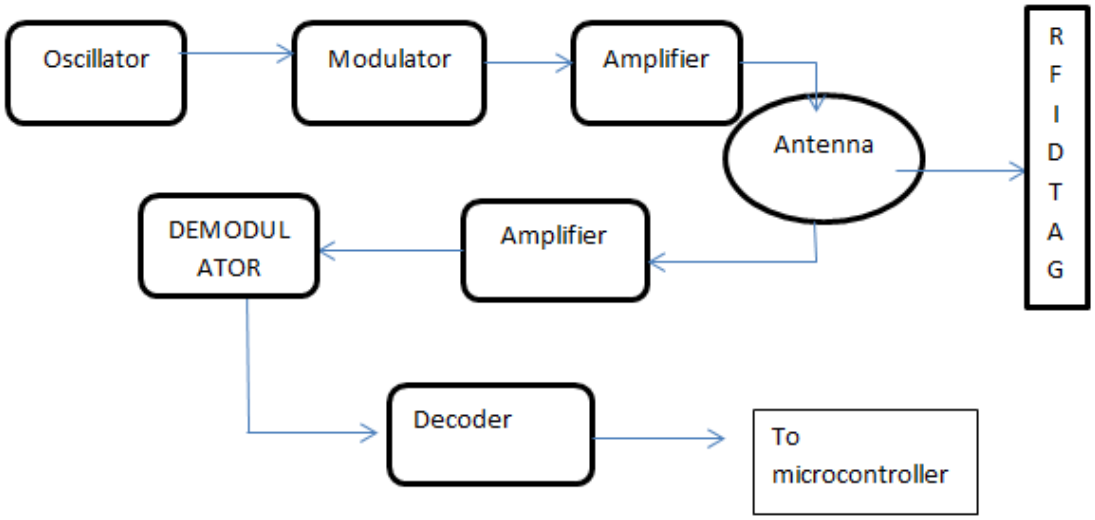

Figure 1: Shows the schematic diagram for the transfer of the information to the RFID tag and microcontroller

Individual counters are used to calculate various company metrics. While the number of people counter categories varies and each model is provided in various metrics, most counters give any or more of the following effects. Sample estimates of footfall that count visitors on a given day

1.1.Footfall

The number of individuals entering a store or company in a certain time frame is measured by the footfall. The decline also is averaged over time spans like days or weeks when assessing patterns.

1.2.Conversion rate

The turnover rate is the proportion of buyers entering a shop combined with the amount of people passing by. The number of customers who stroll by a store can be estimated via Wi-Fi. Video counting, however, is a more precise procedure. The number of customers passing through a store also represents the store's capacity, while the window change rate is determined by considerations such as the attractiveness of the appearance of the shop windows and the success of advertisement strategies.

1.3.Visit duration

The length of a visit is the number of visitors to a location. With Wi-Fi, owners can monitor the time an individual is entering and leaving the site.

1.4.Bubble map/heat map

This metric tracks the commitment of the consumer per compound district, portion and court. The bubble map or heat map helps users to analyse the percentage of the whole compound for a certain duration. Similarly, bubble maps / heat maps function, the only distinction is view methodology. A colder color reflects the degree of interaction with higher colours, while a bubble map displays the percentage level and the contour of the drawing of the bubble.

1.5.Zone counting/traffic flow

Similar to the bubble map and now the heat map, this metric helps users to view the traffic flow in coffee shops that determine rate of participation. The mall operator can decide with the traffic flow diagram which district is the most common and can rent their rental areas on request [4].

1.6.Outside traffic

Measuring external transport enables stores to identify how many visitors come into the retail shop each day and how many possible clients a place will pull in. It is also possible to measure external traffic.

1.7.Returning customers

This measured the number of those who had visited the shop, using a smartphone to map the special Wi-Fi signal ID.

Types of counters for persons:

- 1st generation: counters with infrared beams
- 2nd generation: thermal counters
- 3rd generation: counting of video and Wi-Fi

2. LITERATURE REVIEW

Aman Kaushik et al. in their research proposed a system for a passenger to generate a ticket and checking of the ticket through IOT[5]. By this there will be no confusion of fares among the passengers and also there will be check on the corruption. It ensures that the door of the bus will open only when the passenger will be having a ticket for the bus. With this system passengers need to carry money for the fare but their research paper does not provide data for the number of passengers on board and the number of passengers travelling with or without ticket, as it affects the revenue generation So, to ensure that in this research paper that limitation has been fulfilled.

Mr.D.Baskaran et al. in their research paper smart card system has been proposed for the passengers travelling in the bus from one place to another. This smart card is linked to their bank account for the deduction of money for the fare due to which the passengers need to carry the paper money. Smart card system works on the RFID technology and this system also provides the information about the filled and vacant seats[6]. It also proposes that the bus would not move of the number of passengers are more than the number of seats but in reality, this does not really happen. But their research paper does not provide data for the number of passengers on board and the number of passengers travelling with or without ticket, as it affects the revenue generation. In its research paper Vinayak Nair, Amit Pawar et al. suggested facts about the paper in real time and a simple way to buy the ticket. For this purpose they suggested an android application that displays where the bus is now, punching

bus passes with QR code, ticketing on time with an e-wallet or cash Bluetooth printing to generate tickets [7]. But their research paper does not provide data for the number of passengers on board and the number of passengers travelling with or without ticket, as it affects the revenue generation so, in this current research paper this limitation has been overcome. Ms. Sharmilla. P, Skanda Gurunathan R et al in their research proposed a bus pass and ticket automation system in which their will automatic generation of the bus pass for the students, passengers eligible for the pass[8]. This system also gives alert to the bus pass holders for their renewal. This paper also proposes for the automatic ticket generation system. But their research paper does not provide data for the number of passengers on board and the number of passengers travelling with or without ticket, as it affects the revenue generation. Sunitha Nandhini.A et al also proposes the same AFC system through RFID technology as proposed in the previous research and also lacks in the same system and fails to provide a complete fair system for the convenience of the transport authorities and revenue generation[9].

Research Question

- How is it possible to count the number of passengers on board?
- How it is possible to count the number of persons is having tickets?
- When the examiner will come to know to check the tickets?

3. METHODOLOGY

This is a very sophisticated system to keep check on the number of passengers and the passengers who are without the ticket on board automatically. As shown in Figure 2 flow diagram for the same. There are two systems working in conjunction with each other. First one is the AFC system and second one is the counter system. AFC system generates the tickets for the passengers who are going from the boarding location to their final destination.

Final destination can be prefilled in the AFC system or it can be detected by the touch of smart card carried by the passenger for the ticket generation as per system that varies from system to system because in some systems destination has to be filled during the generation of the ticket by the passenger and in some systems destination is decided by the system and accordingly fare is calculated by the system when the passenger again touches the smart card with AFC system.

But in this research, we used first system in which the destination is prefilled because this system is better than the second one because it known to a passenger already where he/she wants to go so it is wise to fill the destination during ticket generation.

Now the ticket generated number is stored by the AFC system say n and the numbers of passengers on board are already counted by the counter installed on the entry of the passengers into the vehicle. A counter can also be installed at the exit of the vehicle because with this the total number of passengers on the board can also be counted. Now suppose the number of passengers on board are N.

The value of both N & n will be compared in comparator installed in the system. If the N>n, then there is need for the examiner to check the tickets of the passengers to ensure if all the passengers are having tickets and to find out the passenger without the ticket. But if N=n or N<n, then there is no need to check the tickets because number of passengers on board are equal to the number of passengers having tickets and also the number of passengers on board are less than the number of persons having tickets which means passengers have de-boarded the bus prior to their destination due to any of the reasons (Figure 2).

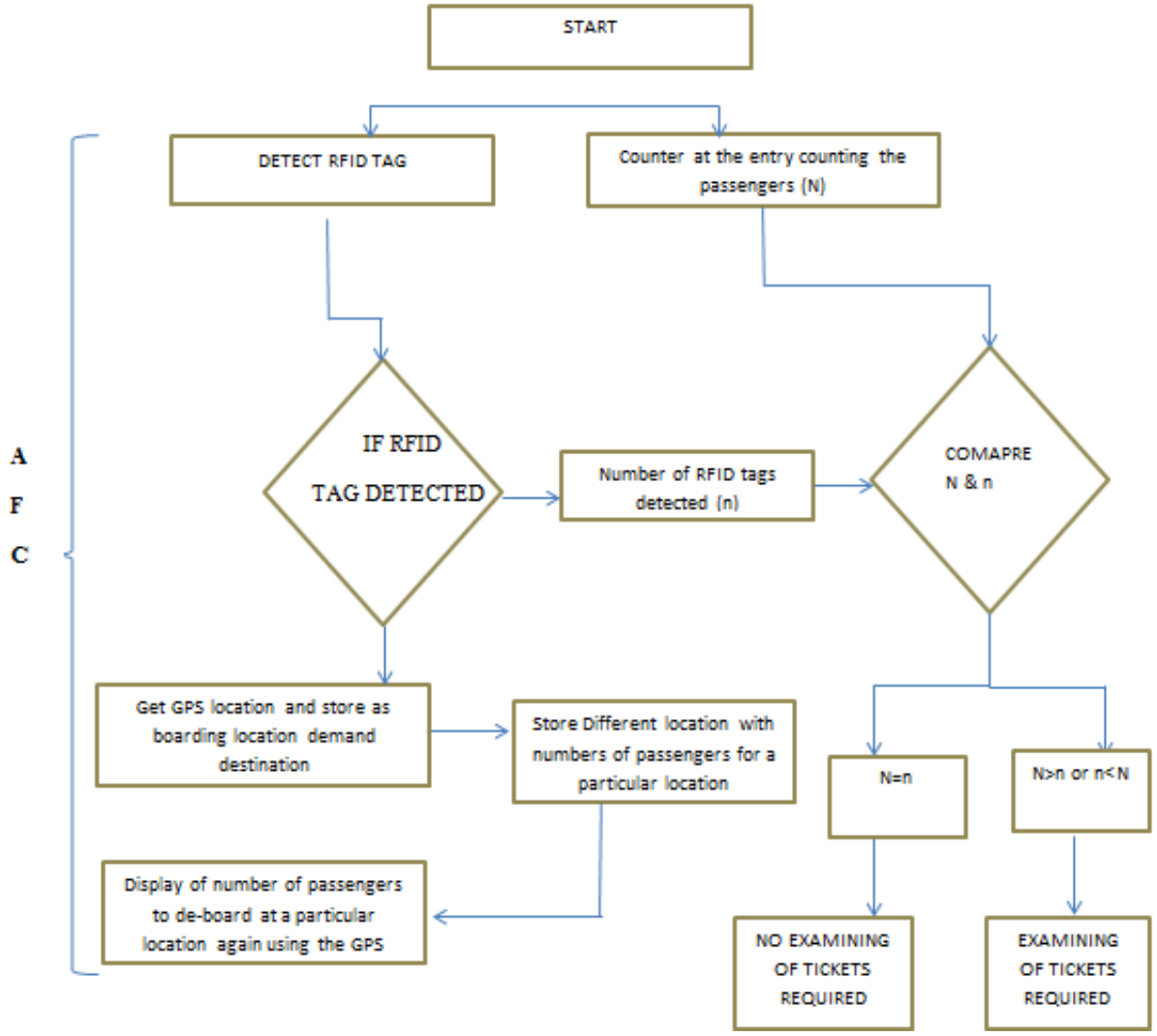

Figure 2: Shows the flow diagram for AFC system with Analyzer system for passenger on board and passenger with/without tickets

4. RESULTS AND DISCUSSION

The person counter installed at the entry of the boarding gate will store the count to compare it with the number of passengers who took the ticket from the AFC system. The person counter can be of any type like it can IR based, thermal counter, and video of Wi-Fi counting. AFC system shows the number persons generated the ticket. This data can also be sorted further on the basis of current location of the bus/vehicle and the location in the real time can be found with the use of GPS system installed in the vehicle. With the location of the vehicle and the passengers remaining for the forward journey can be determined and the number of person on board as counted by the person counter can be compared. Thus the examiner is real time aware about the passengers and if any discrepancy, the examiner will check the tickets and will found out the passenger who are travelling without the ticket. Those travelling without the ticket will be penalized with the rules of the transportation for the persons travelling without the ticket. This is a very sophisticated system with automatic sorting of the passengers with or without the ticket. This system will help to reduce the manpower required for the examining of the tickets because the conductor or co-pilot travelling with the driver/Pilot of the vehicle can manage the system of examining and there is no need of separate examining team as usually can be seen while travelling.

5. CONCLUSION

This system of automatic sorting of passengers with or without tickets is a very sophisticated method with no chances of failure. It is based on a very simple technique of comparison of the data of the person counter installed in the vehicle with the data of the number of passengers generating the ticket through AFC. This system is contactless as the ticket generation is automatic firstly and secondly the person counter is also contactless. This system will also help the transport authorities to maintain a data for the number of passengers travelling through the different transports and in turn this report can also be used by the transport ministry of the Government of India for the number of passengers' daily basis transit data. With the check on the passengers travelling without ticket, there will be increase in the revenue of the transport business whether it is public or private transport system and also there will be a check on the corruption in the transport system. Thus it can be said installation of this will not be convenient for passengers, transport authorities but also this system will have the economic as well as the social consequences.

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CHAPTER 4

A REVIEW ON ELECTRIC VEHICLES

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ABSTRACT: ***The world is gaining interest in electric battery driven vehicles. This pattern has been influenced by numerous factors such as air and noise pollution and fossil fuel dependency. The key downside of the electric vehicle of today is that it has a restricted range and long battery charge time. Substantial progress has been made in recent years to speed up the charge times of batteries by pulse charging instead of providing constant current and / or voltage. The emphasis would be on estimating the electrical battery parameters in the electric vehicle, the key factor in obtaining information about potential driving ranges available. In order to know battery behavior, different battery output parameters need to be identified.***

KEYWORDS: ***Battery Management, AC-DC Converter, DC-AC Converter, Fast Charging, Pulse Charging.***

1. INTRODUCTION

Electric vehicles (EVs) are currently being introduced as a solution for the problem of dependency on fossil fuels, increasing carbon dioxide (CO_2) emissions, and other environmental issues. Road transport contributes to nearly one-fifth of the EU's total emissions of CO_2, the main greenhouse gas (European Commission, 2012). Furthermore, CO_2 emissions from road transport increased by approximately 23% between 1990 and 2010 and are still rising within the EU. Light-duty vehicles – cars and vans (often called passenger cars) – are a major source of greenhouse gas emissions, producing around 15% of the EU's CO_2 emissions (European Commission, 2012). The majority of these cars currently in traffic are owned by private individuals. Citing the importance of taking action on climate change, many governments have initiated policies for reducing CO_2 emissions by stimulating the production, introduction and adoption of EVs. The share of EVs in the overall number of vehicles sold is still small considering the alleged positive environmental effects of electrification of the lightweight vehicle fleet. In 2011, of 51,1 million lightweight vehicles sold in the EU, the US and main Asian markets, the market share for EVs amounted to just 0.06 per cent. One interpretation of these modest adoption figures is that the mass acceptance of electronic devices primarily depends on the views of the users. It is necessary to understand how consumers view EVs and what the potential drivers are for and obstacles to consumer EV adoption in order to encourage EV adoption. That is, we must know what factors affect the intention of consumers to buy electric vehicles [1].

The electric hybrid gasoline–EV is very promising for the future because it can minimize fuel consumption and GHG emissions from 30% to 50% without having to change vehicle class. The more common use of EV's remains restricted by the limited battery capacity that allows for crossing ranges B and C. The plug-ins of the PHEV are among the AFVs that can reduce emissions of GhG.

As a result, a developing literature needs an outline to point to potential directions for study. Since the early 2000s, commercially available non-loadable EVs (mostly regarded as hybrid electric vehicles) have released a large number of market opinions. Since however these car styles can be regarded as cars with greater fuel efficiency, with an unlike standard vehicles,

the main emphasis is on cars that demand a different customer behavior (i.e. plugging the car in to the grid for charging) [2]. These cars are generally known as hybrid plug-ins (PEVs).

1.1.Network Design And Bi-Level Model

It is the NDP that modifies a transport system by installing new or enhancing existing connections to mitigate overall system costs involving the cost of system travel and investment expenses. In the EV scheme, it means that EV charging stations will be built in the traffic network, and total investment and travel costs for charging stations will be reduced to a minimum this equilibrium, NDP [3]. Wang et al. developed a globally applicable optimization approach for a discrete NDP which can be used in EV network architecture, can be formulated using a two levels programming technique. This is a bi-level programming model, which attempts to reduce aggregate cost (total travel and expenditure costs) at the top level, whereas the low level is a conventional Wardrop users' balancing (EU) problem. Bi-level model has been used to develop the toll for the transport network in a variety of congestion pricing schemes [4].

1.2.Classification Of Electric Vehicles

The EV may be divided into three types: pure electric vehicle (PEV), hybrid electric vehicle (HEV) and electric vehicle cell fuel based on supplement power and propulsion systems (FCEV). Electricity from the storage unit is the pure source of electricity to the PEV, whereas PEV is only powered by an electric motor. HEV's system incorporates the electric motor and the engine while electricity and gasoline and diesel power sources are available. The electric motor drives FCEV and could use hydrogen, methanol, ethanol, or gasoline directly or indirectly. The ability for energy storage is fully dependent on the battery technology in PEV, which is loosely called the battery electric vehicle (BEV).

The zero PEV emission from discharge should be a major gain since the electricity is only generated by the battery installed on the vehicle [5]. The existing status restrictions on PEV battery technology on-board make it on the other hand, less desirable than ICEV, under the same economic and driving criteria. High-power batteries with low energy densities result in longer charge times – for maximum charge, even with fast-charge technology, it takes one to several hours. Therefore, limited driving range, high initial costs and a lack of charging infrastructure are the main challenges of the PEV. The battery size and position inside the PEV should also be standardized for realistic implementation.

Due to zero roadside emissions, FCEVs are attractive. The FCEV still remains competitive, despite taking into consideration the overall emissions, including the emissions from chemical plants and reforms on the road. Crucial technology for FCEV is an electrochemical system that generates electrical DC energy through a chemical reaction. Fuel cell FC supplies the power supplier [6].

FC comprises five main components - anode, a layer of anode, electrolyte, cathode and a catalyst layer of cathode. The required amount of power can be generated for driving the car with a suitable parallel/series link of FC sources. The range of applications of FCs from the smaller power plants in the range of 200 W for small power plants in the range of 500 kW is equivalent to ICEV. This means a wide range of applications. The high initial costs and lack of refueling plants remain however considered as major challenges to FCEV's progress.

The HEV blends ICEV and BEV characteristics. The driving power sources for HEV include both petrol/diesel and electricity; the engine and electric motor are used as propulsion. HEVs may be categorized either as traditional HEVs or as grid-able HEVs, depending on various

refilling or recharging steps. The traditional HEV could be produced further in three forms on the basis of combined levels: micro, mild and complete HEV [7]. The HEV range may either be a PHEV (Figure 1) or an electric vehicle that expands the range (REV).

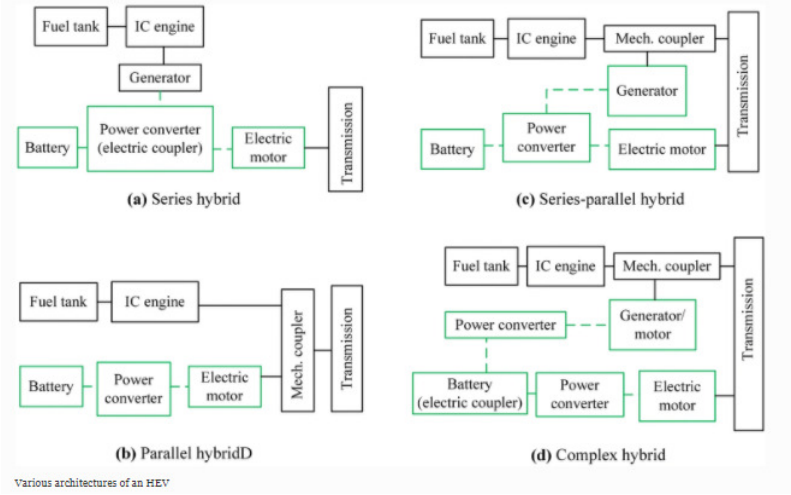

Figure 1: The types of hybrids with their architectures.

The PHEV is one of the AFVs which can minimize emissions of GHGs. Hybrid gasoline – EV is promising in the future because, without the need to adjust the class of vehicle, it can minimize fuel consumption and the emissions of the GHGs between 30 and 50% (Figure 1). The limited battery capacity that makes cruising ranges between 150 and 200 km, however still hampers more widespread utilization of EVs. Furthermore, the most intractable challenge continues to be the dilemma of chicken and egg – who buys and installs AFVs if a refueling infrastructure is not usable, and who builds the refueling infrastructure before the AFVs are installed [8].

In view of the inadequate coverage of charging infrastructures in the near future period, the driving range cap inevitably imposes some limitations on the conduction of batteries for electric vehicles (BEV). The widespread implementation of PEVs needs the fundamental improvements of the current network flow modelling software, as well as placed restrictions on travel requirements forecasting and assessment of transportation growth plans, to identified potential behaviour. Figure 2 shows the power flow in the electric vehicle.

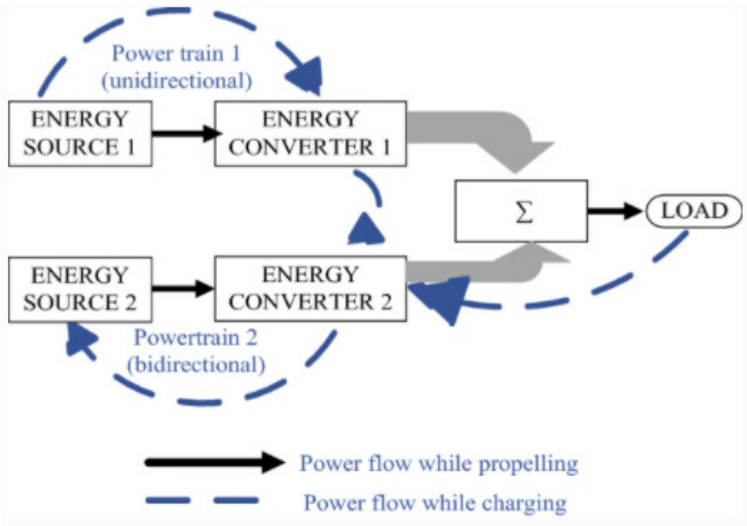

Figure 2: The power flow in the architecture of electric vehicles.

The biggest challenge for hybrid vehicles is powerful and inexpensive batteries. Different HEV battery compositions with best performance from lithium-ion products have been evaluated in the past. There are three potential stages of incorporation in vehicles of the battery packs: individual battery packs, individual modules, consisting of single cells and modular battery packs. Over short periods, batteries should be able to generate high power and be able to endure millions of transient shallow cycles during vehicle life. To improve the battery's range and life, it can be interconnected with a UC that allows for long life cycles, higher charging/unload speed and a reduction in internal power, thus minimizing thermal loss and improving reliability. UC increases the period of productivity from 80% to around 90%. Compared to their individual output, the combination of batteries and UC forms a hybrid energy storage system (HESS).

2. DISCUSSION

In order to classify and profile early EV adopteders, Peters uses the principle of creativity disseminement (DOI) (Rogers). Five categories of factors influencing adoption, namely relative advantage, compatibility, difficulty, trial-ability and observability are defined by Rogers. Relative gain is that the invention is better than the existing product it replaces. The continuity of innovation with customer values, experiences and desires defines its quality. With regard to DOI, Schuitema and others have related the purpose of adopting EVs to market innovation that is relatively earlier than most consumers, described as the propensity to pick up new goods (Foxall et al.). They use the instrumental, hedonic and symbolic motives proposed by both Vandecasteele and Geeuens for three explanations of market innovation. The consumer's emphasis on functionality of the car is focused on instrumental motives. The importance of feeling, as the enjoyment of experiencing the car, is highlighted by hedonic creativity. Symbolic innovation reveals the importance for buyers of the symbolic characteristics of the car (Schuitema et al.).

It must be noted that only a battery can be supported by the range extender without any propulsion. REV technology has been successfully introduced by GM Chevrolet Volt, with a pure electric driver range of 64 km, with an engine of 1.4 litres and a 16 kWh capacity. Similarly, with a pure power range of 50 km and a battery power of 12 kWh, the Audi A1, REV is designed to use its 15 kW spin motor as an APU (Newcomb).

In a recent paper, Shih and Schau examined the consumer's aspirations and feelings for potential events as variables that influence adoption behaviour. In the opinion of them the perceived innovation rate (Shih and Shau) will contribute to expectation of regrets, or rates where customers interpret technological conditions change on the market and consequently postpone technological innovation procurement.

3. CONCLUSION

As a consequence of lower oil consumption and harmful pollution, HEVs are quickly emerging as a possible alternative to current transport conditions. The future of road transport will be propelled by stringent CO_2 emission regulations and greater public understanding of HEVs. The introduction of PHEVs into the market would dramatically change the operations of the grid and efforts are made to create two-way contact between the customer and the grid. In this paper the features for various EV forms were checked. The most scope for reducing road pollution is in PEV and FCEV. The bottleneck of current battery technologies has nevertheless limited PEVs, while the use of FCEVs shows reduction in reliability. The driving expectation tends to be very similar to ICEVs for various stages of traditional HEVs. However the constraints on the huge initial costs and heavy weight for the mass market are unreasonable.

The electric hybrid vehicle integrates the latest technology and contributes significantly to the conservation of climate. In terms of driver anticipation, driving range and fuel economy, PHEVs are regarded as possible competitors for ICEVs. Research shows that supercapacitors tend to be very suitable to be implemented in PHEV thanks to their high power capacity. Alternative materials and methods should be discussed and studied to reduce the overall cost of BEV and PHEV. In addition, to improve overall performance, energy electronics technology needed for the internal transmission should be investigated.

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CHAPTER 5

AN OVERVIEW ON ROLE OF MATHEMATICS IN EVERYDAY ACTIVITIES

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ABSTRACT: ***Math success is valuable in and of itself, but it's being increasingly acknowledged as critical to the country's economy. According to national polls, Americans are not skilled in arithmetic and lacking the sort of numeracy abilities that would appear to be required for ordinary activities and make educated medical decisions. As per current study on arithmetic in medical policy taking many individuals struggle to answer simple proportion and decimals issues, which are required for comprehending health-related risk messages. Adults stumble with such a wide variety of ratio ideas, according to this research and other studies in educational and intellectual abilities (including proportions, fractions, and probability judgments). As per studies, this problem has been associated to worse survival rates, a less correct evaluation of health hazards, and a hindered ability to make healthcare choices, as measured by material arithmetic examinations. We suggest that, like literacy, numeracy is essential to make health as well as other external affairs in daily situations, but that a fresh focus on alternative framework is necessary to overcome common errors in reading and utilizing statistical data.***

KEYWORDS: ***Everyday Life, Maths,Mathematics, Skills, Science.***

1. INTRODUCTION

Many students consider maths to become a difficult issue, whereas others consider it intriguing, as per a survey. Nevertheless, like everyone understands, arithmetic is essential for accomplishing a variety of activities in existence. In our daily lives, maths plays an important part. As both a result, children study a variety of mathematical concepts in math classes. Apart from everyday life, mathematics has a broad array of applications inside a number of academic fields. It means that if a child problems in math, they are likely to have problems in other subjects as well[1].

Math concepts include weighing, understanding chemical formulas, assessing marketing data, measuring, sketching, and calculating statistics. Moreover, students who doesn't have a basic concepts of math might discover that their job options are limited[2]. A summary of a few of the ordinary activities that need the usage of math is supplied:

- Maintaining a clean cheque book.
- Getting ready to eat.
- Understanding how to acquire a financing for a vehicle, school, car, house, or another purpose is essential.
- Becoming acquainted with sports (being team statistics and a player).
- Baking.
- Sewing.
- Managing finances.
- Trying to find the best deal.
- Calculating trip time, distance, and cost.
- Listening to music.

- Interior design.
- Landscaping and gardening

1.1 Science and Technology:

Science and Mathematics are intimately connected in the areas of astronomer, chemistry, and physicists. Astronomical graphs and charts may be difficult to comprehend for those who lack basic math abilities. Students can utilize advanced arithmetic such as geometry, algebra, and calculus to solve complex chemical problems, explore the motions of galaxies in the universe, and evaluate scientific studies[3]. But besides that, maths is essential in practical fields like computer science and engineering. Throughout their academic research, learners must solve numerous equations when developing computer programs and working out algorithms; as a result, Math is essential to investigate these subjects.As an instance, consider math and science. Engineers use mathematics to design a machine that is both balanced and functioning. When designing a car, a bike, or any other conveyance, mechanical engineers use arithmetic and advanced physics concepts[4]. Math is being utilized to answer inquiries regarding geometry and also to solve problems with materials. Engineers must also include the gravity element when assessing air pressure during an automobile's speed.

1.2 Literature and Writing:

You could be wondering on how math connects to literature, but you might not recognize that mathematical equations can help students grasp poetry easier.

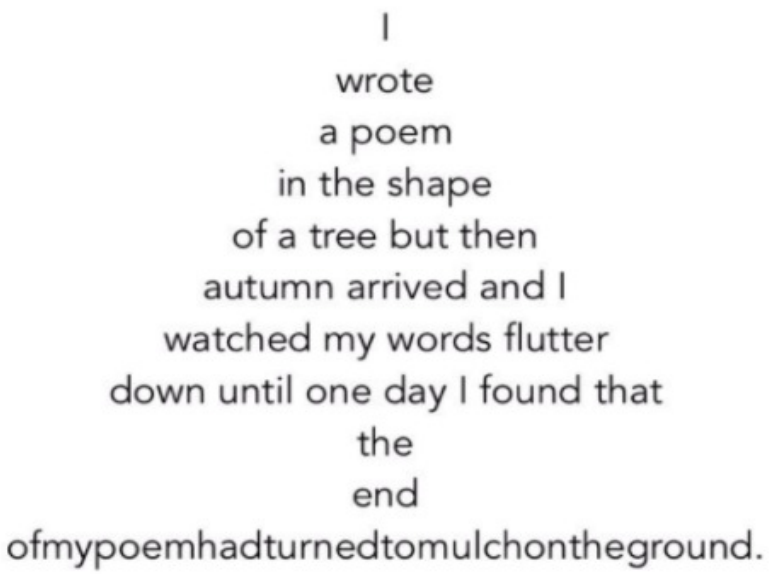

Figure 1: Representation of Literature using Maths to make understanding easy.

The word count in some kind of a straight line, the poetic rhyme, and the influence of rhythms on the audiences all necessitate mathematical calculations (shown in Figure 1). Apart from that, mathematics has a variety of uses in everyday situations, such as aiding students in scheduling their literature assessment tasks[5]. Through keeping a record of typical viewing time and predicting how long it'll take

Through keeping a record of typical viewing time and predicting how long it'll take as a consequence, students' use of logical thinking to answer math problems aids them in writing in a much more rational and simple manner. Consider the following scenario. When writing anything, it is critical that a person has a clear idea of what they've been going to express.

Apart from this one, they should have excellent communication skills in order for the reader to comprehend the writing notion[6]. Math is now an important component of writing since it assists with text structure. Organizing here means putting the paper together in a rational fashion and conveying each argument one by one. This, such as the Fibonacci sequence, helps the reader grasp the story's flow[7].

1.3 Social Studies:

Charts and graphs that give historical evidence or statistics about ethnic communities must be evaluated and studied by students in social science courses such as history. Learners in teaching career, from the other extreme, must grasp how, among several other factors, the altitude of a certain field affects the inhabitants. If learners understand basic mathematical equations and vocabulary, they can acquire statistical information throughout the social science field[8]. The equal rights stem from social science, as per the author, may be expressed using the equation below:

Equity = Inputs/Outputs

The input herein refers with what the corporation's personnel put towards their job (such as loyalty, effort, and so on). The output, and from the other side, will be what the management of firms get (such as job security, salary, and so on). As a consequence, we might claim that math applicability can be discovered in social science areas that don't appear to require mathematics[9].

1.4 The Arts:

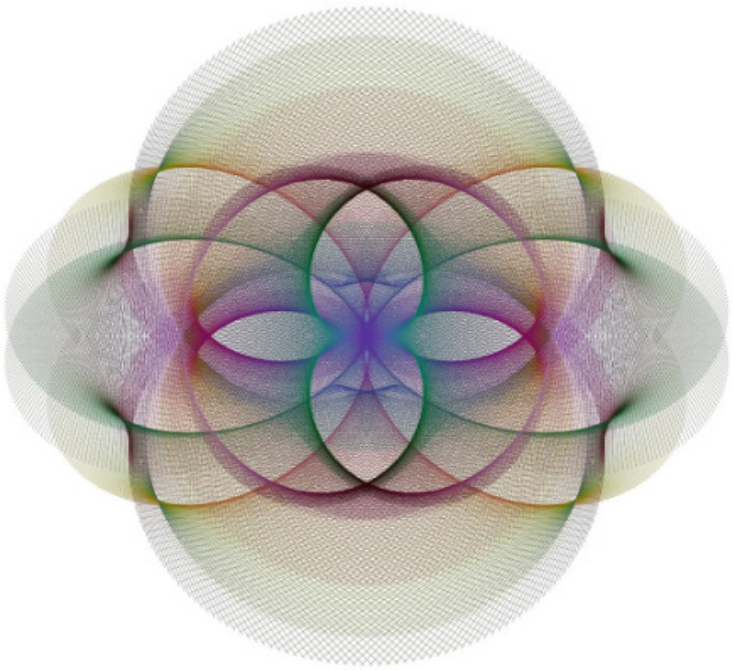

Figure 2: Representation of art using symmetrical concept of mathematics.

There are 4000 line segments in the image above (Figure 2). The ends of the kth line segment are (A(k), B(k), and (C(k), D(k) for k=1, 2, 3, ...,4000, where:

$$A(k) = \sin\left(\frac{14\pi k}{4000}\right) ((\sin\left(\frac{16\pi k}{4000}\right))\text{^}2 + (\sin\left(\frac{14\pi k}{4000}\right))\text{^}2),$$

$$B(k) = \cos\left(\frac{14\pi k}{4000}\right)((\sin\left(\frac{16\pi k}{4000}\right))\text{^}2 + (\sin\left(\frac{14\pi k}{4000}\right))\text{^}2),$$

$$C(k) = \sin\left(\frac{30\pi k}{4000}\right)((\sin\left(\frac{16\pi k}{4000}\right))\text{^}2 + (\sin\left(\frac{14\pi k}{4000}\right))\text{^}2),$$

$$A(k) = \cos\left(\frac{30\pi k}{4000}\right)((\sin\left(\frac{16\pi k}{4000}\right))\text{^}2 + (\sin\left(\frac{14\pi k}{4000}\right))\text{^}2).$$

Learners who want to pursue a career in music, art, theatre, or dance might benefit from their basic math abilities. Music has a beat that follows a complex arithmetic series; hence, math aids students in learning the rhythms of dance and music utilized in ballet and theater performances[10]. Because the research of art entails the research of geometry, learners who are familiar with fundamental geometry formulae may readily create remarkable art characteristics. To capture the photographs, each photographer also utilizes mathematics to calculate the exposure duration, lens length, lighting angles, and shutter speed. Various formulae, such as the Fibonacci sequence, have been found to be utilized to incentive a certain design. Apart from that, activities such as dancing need the use of mathematics in order to master the steps that must be performed in order to depict the dance steps[11]. As a result, an artist must always have a rudimentary understanding of mathematics.

1.5 Aside from academia, these are some examples of how math is used in daily lives:

1.5.1 Managing Money

Because it involves calculating compounded and simple interests, the abilities gained in algebra schools can be applied to money management. As a result, these abilities may be used to arrange one's money; moreover, they can be used to choose the finest bank deals. They can also choose which one of the credit and debit cards to be used for their purchases. The basic notion of interest must be understood by everyone who wishes to take out a loan. The application of arithmetic in daily life can assist in determining the best places to spend and conserve money[12].

1.5.2 How math help in saving money

Let us just take a look at the "penny jar assignment." Put your extra dollars in a container every day for years. [For example, Day 1 equals one cent, and so forth.] Nearly every day, keep note about how much you've placed into the jar. Maintain consistency and stick to the plan to save enough money as possible. Count how much income you saved over the course of a year. This is the income you have preserved without having to deal with any problems. Furthermore, you may save money by using the 70 20 10 rule, which allows you to invest 70 percent of your salary on expenses, 20 percent on savings, and 10 percent on investments, charity, or anything else [13].

1.5.3 Recreational sports:

Geometry and Trigonometry may help people improve their sports talents by allowing them to see all of the different ways they can score a bucket, hit the ball, or sprint around over a course. The ability to keep pace of sports results is also aided by a rudimentary grasp of the mathematical topic. The participants in a basketball court utilize math to better their effectiveness. Angles & percentages are utilized to attain the aim of putting the puck in the net. One may simply determine which athlete will score far more baskets by using the least logical proportion of attempts with an exact angle[14].

1.5.4 Cooking

Angles & percentages are utilized to attain the aim of putting the puck in the net. One may simply determine which athlete will score far more baskets by using the least logical proportion of attempts with an exact angle. Let's say you want to prepare a dish that calls for 2 cups of chocolate chips, yet you don't have any. So, you look to release a third of a container of walnuts and a sixth of a container of almonds. Then you discover that your recipe is of sufficient quality to include. Calculate however many tablespoons of chocolate you have for the dish now. According to the declaration:

$$2 – 1/3 -1/6= 12/6 – 2/6 -1/6= 9/6=1 \text{ and } 1/2$$

It implies you used 1 1/2 cups of chocolate in the recipe. You could see how the math method may also be used in the kitchen [15].

1.5.5 Shopping

During purchasing, it is important to understand the basic implications of math in daily life. Consider the following scenario: while purchasing a new computer, it is important to determine which retailers give the highest financing or lowest pricing. As a result, arithmetic may be useful in determining the optimum price for various goods. Such mathematical abilities are beneficial since they assist in calculating various discounts because an item may be purchased at a fair price[16]. Tell your children to choose square-shaped cookies and a variety of other forms such as rectangles, circles, and more. That's how you may teach your children about different sizes and shapes using numbers. Ask your kid questions in the shop to draw her awareness to the patterns you observe. For instance, ask them to look for objects with circles or triangles on them, or containers in the shape of a cube or even a rectangular block[17].

2. LITERATURE REVIEW

Ralph T. Putnam, The writer's objective is to teach fifth-graders how to apply mathematics in real-life situations. What the researcher deems useful is just what she refers to it as the "hows" of mathematics, or understanding how to do certain computational operations. This focus on physics, combined with the reader's deficiencies in maths, is represented in the two lessons detailed in this piece. The authors proposed pupils to the idea of averaging during the first session, which was made straight from her department's college curriculum[5]. She focused on the phases of the averaged technique, leaving pupils with limited opportunity to consider the mathematical principles required. The authors implemented a series of class polls in the second session to generate data for determining statistics. However, the authors and students unintentionally computed erroneous averages due to a focus on the phases of the results calculated as well as a lack of thought on the rationality of answers. The researcher has strong opinions on what students can learn and how mathematics works. As a consequence, efforts from of the state or district to modify mathematics instruction are generally ineffective[7].

Atallah and Fida, While the research is explorative, it yields some intriguing and perhaps beneficial results. As instructors, we keep hoping that the findings will help make extra committee consists and, as a consequence, better decisions about the educational design procedure by expanding our understanding of learning objectives and trying to guide us in selecting appropriate instructional resources and strategies[8]. Its findings point to a need for more dynamic learning environment, as well as the introduction of a broad variety of relevant

contexts, the creation of 'real world' learning processes, and the presentation of learners with many 'faces' of mathematics (e.g. civil, cultural, and aesthetic).

Crossings between procedures could be built throughout teaching and learning by (a) trying to describe the document containing (in the transfer relationship) and analyzing the related narratives as processes of indications; and (b) analyzing the differences and similarities between narratives (e.g. school vs. everyday maths) in order to identify productive 'points of verbalization' between mathematics in erectile dysfunction and mathematics in erectile dysfunction[12].

Terezinha N. Carraher et al., The problem of differences and similarities among previous research under different circumstances is an important one in developmental psychology, and it arises in various different settings research contexts—for example, in cross-cultural analogies of the same knowledge taught in different cultures, in investigations of transfer of knowledge from one content to another, or in studies of child development (such as transitioning from school to daily life or vice versa)[15].Maria Northcote and Alistair McIntosh, whereas the research yielded some intriguing results, the primary goal of this study was to have an influence in the classrooms by giving proof of what works in private maths[17].

3. DISCUSSION

Mathematics is the practical implementation of material. It is termed in this way because the topic teaches a guy to be methodical and systematic. Mathematics brings order to our lives and pressure is decreased. Strength of reasoning, inventiveness, abstract and spatial thinking, critical thinking, problem-solving abilities, and even good communication abilities are all traits that mathematics fosters. Mathematics is the center of all inventions, and the world would not budge an inch now without. Anyone requires mathematics in your daily lives, whether they are a cook or even a farmer, a builder or a technician, a merchant or a doctor, an architect or a researcher, a singer or a magician. Many insects utilize maths in their daily lives to stay alive.

Snails fashion shells, spiders weave webs, & bees construct hexagonal nests. In evolution's fabric, there really are multiple instances of mathematical patterns. Everyone may become a mathematician if they are given adequate direction and instruction during their early years. A solid mathematics curriculum aids in the efficient learning and teaching of the course.

Learning mathematics may be made much easier and more pleasant if we incorporate mathematical exercises and games into our program. Math riddles and puzzles assist children develop precision in cognitive thinking by encouraging and attracting an alert & aggressive policy. From elementary school onwards, the formation of a coherent mathematical idea in a kid should be emphasized.

When a weaker growth in this area, the youngster will acquire a fear of the topic as he progresses through the grades. A lecturer should use images, sketches, diagrams, and models as much as possible to convey a mathematical concept. It is thought that when our senses are complemented by our sense of vision, the education information is finished. Open-ended inquiries should be provided to the kid to respond to, and he or she must be encouraged to discuss all possible responses. Every time the youngster makes a good try, he or she should be praised. And any errors must be addressed right away, without any judgment. The most difficult obstacle to overcome in the procedure of teaching and learning is a shortage of experience. Learners should solve at least ten problems each day from various places in order to grasp the idea and improve their problem-solving precision and agility. In the lower grades, learning multiplication facts should be emphasized. Student is another extremely efficient method of

disseminating mathematical knowledge amongst youngsters. When a pupil has grasped an idea from his instructor, the latter will ask him to describe it to his classmates. Furthermore, all of the students would be able to identify issues about the issue and have them addressed through group conversations. The current era is characterized by skill technology and advancement. We will become more effective if we use a more scientific method. Our emotions are explained by mathematics. This is a device in our arms that allows us to simplify and ease our lives. Let us recognize and appreciate the recipient's beauty, and accept it wholeheartedly. It is a skill that should be cultivated by everyone in all walks of life.

Furthermore, mathematics is among the most important topics in our lives. Its application is widespread, regardless of the sector or vocation you have just a position with. That is why it is critical to have a good understanding of the topic. Even if the fundamentals of mathematics begin in school, their application continues until we are adults, and in this way, maths became an important part of our lives. Imagining our life without technology is akin to imagining a boat without even a sail. You might be surprised to learn that we utilize mathematics all the time, even if we aren't aware of it. Our existence is ringed by mathematics, from dialing integers upon on cellphone to handing over cash to make payments. So, let's examine how much of an impact this topic has had on our existence. When preparing meals, we usually measure the flavored syrups to ensure that we prepare the perfect amount. That's only possible due to mathematics. That wouldn't have been acceptable to measure, make improvements, and create wonderful meals if we won't realize about the data. So, you might argue that each day begins with such a math concept.

When we go purchasing, we make a list of what we need, calculate the amount of money we'll need, and so on. This tally is based on figures derived via mathematics. You can't pick the quantity you have had to pay to a business and the quantity you have saved even without figures. So you're encompassed by the world of mathematics even when you're shopping. That's where many mathematics principles are used, and so as a result, the professionals must have a good understanding of the topic and its order. Trying to take care of a bank's transactions isn't simple, and you'll need some arithmetic knowledge to keep track of your documents, save and withdraw currency, and so on. If you want to borrow money, think about how much interest you'll want to pay and how much of a monthly premium you'll have to pay. Because the financial sector is linked to mathematics, even customers should be familiar with it.

Everyone enjoys travelling, but there is far more than just that. When planning your trip, you must not only decide where you want to travel, but also reserve your hotel, tickets, and other necessities. This necessitates time management and a sense of mathematical knowledge in order to complete the numerous assignments successfully. Planning a trip separately towards its cost, purchasing transportation tickets, hiring taxis, and so forth everything necessitates math.

4. CONCLUSION

According to the standardized criteria we examined, thousands of Americans are incapable of dealing with the numeric demands of daily life, which is particularly true for categories including the elderly, the poor, some less skilled, and persons of color. These people are unwell to comprehend their dangers and, as a result, prevent adverse steps to avoid sickness and impairment, or to take part in collective decision alongside health experts concerning life-or-death medical care decisions. Despite the fact that the technological demands of life and work are growing, the mathematics skills of people entering the profession have remained relatively unchanged from 1973. For instance, when research produces

unprecedented volumes of data that might be utilized to minimize suffering and mortality, the burden of proof is moving to patients to interpret the data and determine their own judgments.

Patient-centered judgement, on the other hand, is an unattainable ideal for individuals who are unable to make even the most basic assessments of health-related hazards and possibilities. Furthermore, even college qualified people have difficulty grasping the source of data most important to health that is accessed in numeracy exams, such as hazards and probability. Risks and probability, for example, appear to be particularly vulnerable to distortions and delusions that impair judgement and decision-making. There are, thankfully, evidence-based cognition theories that compensate for the distortions and misconceptions that render ratio ideas so difficult. These descriptive models also enable us to create practical treatments that have been demonstrated to improve numerical information understanding while essentially eradicating biases or misconceptions in judgement and decision-making tests. The possibility for these kinds of models to enhance data organizations comprehension and application in real-world tasks, such as personal decision, has just recently been realized.

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CHAPTER 6

THE USE OF REMOTE DETECTING AND GEOGRAPHICAL INFORMATION SYSTEM

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ABSTRACT: ***Remote sensing and geographic information systems (GIS) have risen to prominence in recent years as exciting and desirable fields with rapidly expanding opportunities and vital tools that can be used at various levels to aid decision-making for self-sustaining socioeconomic advancement and natural resource conservation. In recent decades, remote sensing and GIS technologies, as well as their applications in a range of sectors, have grown in popularity. The most widely used processing processes for remotely sensed data, including computer vision techniques and GIS technology application capabilities, are detailed in this study. The use of GIS and remote sensing to the quick development of different control management systems might be very beneficial. In addition, some research has consistently used remote sensing or geographic information systems (GIS) to solve development planning issues. Remote sensing also offers a solid data foundation for creating baseline information about natural resources, which is required for any developmental project's design, execution, and monitoring. In several settings, remote sensing and geographic information systems (GIS) are useful instruments for pollution control. Remote sensing technology has shown its ability to monitor not only on a global scale but also on a small scale. The main objective of this paper is to understand more about Remote Sensing or Geographical Information Systems and their applications. "Interactive remote sensing," which involves farmers genetically "marking" their crops to improve the remotely detected spectral signature indicating crop distress or optimum harvesting, is one potential. To lead this future, policy measures are underway.***

KEYWORDS:*Electromagnetic, Geographic Information Systems, Remote Sensing, Radiation, Sensor.*

1. INTRODUCTION

The practice of identifying and managing an area's physical attributes by detecting its reflected or emitted radiation from such a distance is known as remotely sensed (typically from satellite or aircraft). Researchers may "feel" facts about the Earth by using special cameras to acquire remotely sensed photos [1], [2].

- Cameras on satellites or aircraft capture photographs of enormous regions on the Earth's surface, enabling us to view far more than people can see from the ground.
- Sonar equipment on ships can also be used to make images of the ocean's bottom without having to go to the ocean's bottom.
- Images of temperature variations in the seas can be captured using satellite cameras.
- Large forest fires may be tracked from space, enabling rangers to view a considerably broader region than they would be able to see from the ground.
- Tracking clouds to help anticipate the weather or observe erupting volcanoes, as well as assisting in the detection of dust storms.
- Monitoring a city's development or changes in farms or woods over many years or decades.
- Exploration and charting of the ocean floor's severe terrain (e.g., massive mountain range, deep gorges, and "magnetic striping").

1.1.Geographic Information System (GIS):

A geographic information system (GIS) is a computer program that analyzes or displays spatially related information. It uses data that is tied to a certain location. Much of the knowledge we have about our planet involves reference to its location. If a rare plant is found in three different locations, a GIS analysis may reveal that the plants are all found on north-facing slopes greater than 1,000 feet, where more than 10 inches of rainfall per year. Researchers can then use GIS maps to show all areas in that area that have comparable features, allowing them to find more unusual plants. GIS examination of agricultural sites, stream locations, elevation, and rainfall, along with knowledge of the geographic location of fields employing a given fertilizer, will reveal which streams are likely to carry that fertilizer downstream [3], [4]. These are only a handful of the numerous applications of geographic information systems (GIS) in earth sciences, resource management, biology, or other subjects [5], [6].

1.2. The use of remote sensing:

Evelyn Pruitt of the United States Office of Novel Research coined the technical phrase remote sensing in 1958. Since the launch of Landsat 1, the first Earth observation satellite in 1972, remote sensing has become more popular as shown in Figure 1. Remote sensing is the science but also the technology that allows the characteristics of objects of interest to be identified, measured and evaluated without coming into direct contact with them. "the art, science, including the technology of obtaining reliable information on physical things and the environment through the process of capturing, measuring, or interpreting imagery or digital representations of energy patterns produced from non-contact sensor systems [7], [8].

1.2.1. Remote Sensing Stages:

- Emission of electromagnetic radiation.
- Energy transmission from the source to the earth's surface, including absorption and scattering.
- EMR's interaction with both the earth's surface, including reflection or emission.
- Energy transfer from the surface to a distant sensor.
- The output of sensor data.
- Data transfer, analysis, and processing.

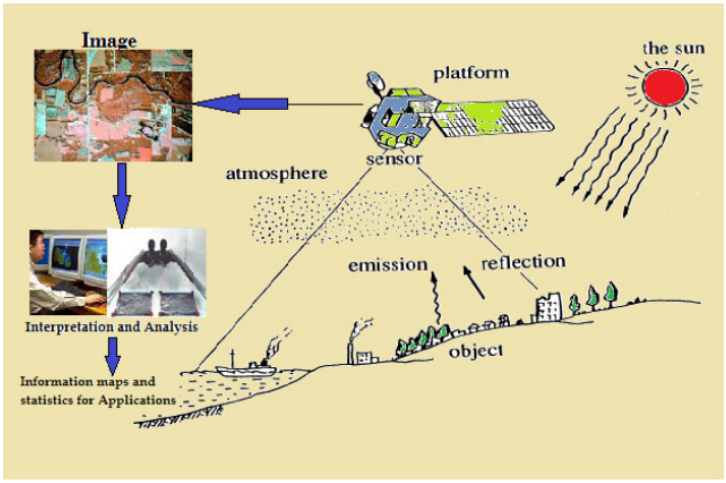

Figure 1: Illustrate Remote sensing data collection. The practice of identifying and monitoring parts of the city's physical features by detecting its reflected or produced radiation from a distance is known as remotely sensed [9]**.**

1.3. Remote Sensing Components and Principles:

Remote sensing includes objects, electromagnetic radiation sources, sensors, platforms, picture analysis, and data interpretation. EMR (electromagnetic radiation) is a type of electromagnetic radiation produced by electronic devices. Electromagnetic radiation reflected or emitted from an object is the most frequent source of remote sensing data. However, any medium, such as gravitational or magnetic force, can be employed in remote sensing. Electromagnetic radiation acts as a carrier of electromagnetic energy by transmitting the oscillations of the electromagnetic field through space or matter. It is generated through the transmission of electromagnetic radiation. Maxwell's equations were used to make it. Electromagnetic radiation has both wave motion and particle motion [10], [11].

1.3.1. Sensor and Platform:

The term "remote sensor" or "sensor" refers to a device that detects electromagnetic radiation reflected or emitted from an object. Remote sensors include things like cameras and scanners. The platform is a vehicle that transports the sensor. Platforms include aircraft and satellites. Sensors are divided into the following categories.

1.3.2. Remote Sensing Flow Process:

The flow process of remote sensing, in which three different objects are measured by a sensor in a finite number of bands related to their electromagnetic properties after several conditions have affected the signal. Remote sensing data will be automatically processed by computers and/or manually analyzed by people, and then used in agriculture, land use, forestry, geology, hydrology, oceanography, meteorology, and the environment.

1.4. Remote Sensing Techniques:

Remote sensing can be divided into two categories: passive and active. For remote sensing and self-emission, passive systems rely on other sources of light, while active systems use the power of their kind. As a result, there are two types of energy-based remote sensing [12], [13]:

1. Active remote sensing.
2. Remote Sensing (Passive)

Remote sensing is classified into three groups based on wavelength:

- *Infrared Remote Sensing (Visible or Reflective):*

The Sun is the energy source for visible and reflected infrared remote sensing. The Sun emits electromagnetic light with a peak wavelength of 0.5 m, and the reflectance of objects on the surface of the ground is also a major factor in remote sensing data [14], [15].

- *Infrared Thermal Remote Sensing:*

Since every object at normal temperature emits electromagnetic radiation with a peak of about 10 m, the object itself is the resource of radiation energy employed in thermal infrared remote sensing

- *Microwave Remote Sensing (Microwave Remote Sensing):*

There are two forms of microwave remote sensing in the microwave field: passive electromagnetic remote sensing or active microwave remote sensing. Microwave radiation

generated by an object is detected in remotely sensed microwaves, while the black scatters coefficient is measured in active microwave remotely sensed data.

1.5. Geographical Information Systems:

A geographic information system (GIS) is a spatially related data storage, processing, and retrieval system. This notion also includes the methods of collecting and interpreting geographic data. Data in a GIS is stored in its database, which is made up of a data plane derived from a variety of data sources. The combination of data sets allows for data interpretation. A single type of data, such as digital elevation data, forms a data plane (according to M. Suresh Kumar et al.) [16]. Digital data can be stored in one of two different forms. A picture, a map, a table, or a written text. To effectively manage tropical waters, large amounts of data must be handled. The people in charge of the overall management of these resources need quick access to statistical data and information. Subject-based map manual interpretation can be used to include only small amounts of field data, maps, and aerial photos. A geographic information system (GIS) is a system that integrates spatially referenced data with remotely sensed imagery. GIS can also aid in the retrieval of information from data collected by remote sensing. The combination of remote sensing and geographic information systems (GIS) has given environmental research a genuine investigative capacity.

It is only one of many available data sources whose use is justified by the desired result. Using satellite photographs to monitor the dynamics of local settings over a short time frame, such as every 5 years, is not practical due to the geographic scales at which satellites observe Earth. To detect spatial changes in these locations, the data collection and analysis scale must be greater than 1:5. 000, with 1-meter precise measurement. Numerical orthophoto graphics or airborne remote sensing (CASI) can now overcome the limited resolution of satellite sensors, allowing them to be used to monitor tropical shallow lakes.

A GIS should be able to offer data to users in a language and format that is not only accurate but also aesthetically appealing and easy to understand. In topics related to tropical water management, it is preferable to include a large percentage of maps or diagrams in written material to encourage quick feedback from decision-makers. These sheets are used as a visual help for field people, as well as an inventory aid and a source of communication (according to S. M. J. Baban et al.) [17]. GIS allows users to quickly save data from several sources, aid in the creation of maps that fulfill certain criteria such as size or typology, and possibly minimize time spent generating information via design automation. All of these factors contribute to better map quality and map building. greater connection with the goals to be achieved Data collection, storage, processing, output, input, or application is all examples of data collection, storage, processing, output, input, or application.

1.6. Remote sensing and GIS Applications:

Remote sensing and Geographic Information Systems (GIS) are becoming more important in the study of hydrogeology or water resource development. Several researchers have conducted extensive hydrogeological investigations to delineate groundwater resources in hard rock terrain. The only technique that can give a holistic approach to the study of the entire environment, while also elucidating the diverse processes or interrelationships that occur within different biophysical elements, is remote sensing or geographic information systems. After all of these things are done, people will have eco-development or a balanced environment. As seen below, remote sensing and geographic information systems (GIS) may be employed in several fields (according to M. A. Khan et al.)[18].

1.6.1. Agriculture as a Field of Application:

Agriculture is vital in both developed and developing countries. Crops are categorized, their health or viability is assessed, and agricultural practices are tracked with the use of satellite and airplane pictures as mapping tools. Some examples of agricultural remote sensing applications are as follows:

- Categorization of crop types
- Agricultural area categorization
- Crop condition evaluation.
- Estimating agricultural yields.
- Statistical applications in agriculture.
- Soil characteristics mapping.
- Estimating the size of the crop.
- Soil management methods are being mapped out.
- Observation of compliance (farming practices).
- crop surveillance

According to new research, radar has just been proven to be an effective technology for crop monitoring. Chen and Mcnairn, for example, used radar to monitor rice in Asia.

1.6.2. Forestry as a Field of Application:

Forests are an important resource that supplies food, shelter, animal habitat, fuel, and basic requirements such as water and power. Medicinal compounds and paper Forests have an important role in controlling CO2 levels on the globe. It allows interchange as a critical link between the environment, geosphere, and hydrosphere. The following are examples of remote sensing applications in forestry [19], [20]:

- *Mapping Reconnaissance:*

A variety of goals, including updating forest cover and minimizing depletion, must be met by national forest/environmental authorities. The biophysical properties of forest stands are being measured and monitored.

- *Forestry for Profit:*

Commercial forestry companies and resource management agencies both rely on inventory. harvesting data, updating wood inventory information, biomass measurements, supply, broad forest type, vegetation density, or supply

- *Monitoring the Environment:*

Conservationists are concerned about the number, health, and diversity of ecosystems and forests on the planet.

1.6.3. Geology as a Field of Application:

The study of landforms, structures, and the subsurface to get a better understanding of the physical processes that build and modify the earth's crust is known as geography. The discovery and exploitation of mineral and hydrocarbon resources to enhance social situations and living standards is how it is most often understood. The following are some examples of geological uses of remote sensing:

- Mapping of surficial deposits and bedrock.

- Mapping of lithology.
- Planning out the structure.
- Botany of the earth
- The foundational infrastructure.
- Monitoring and mapping of sedimentation.
- Recognizing different sorts of rocks.
- Geological faults or anomalies' location.
- Mapping or monitoring of events.
- Mapping of geo-hazards.
- Planetary cartography.

1.6.4. Hydrology as a Field of Application:

Hydrology is the study of water on the Earth's surface, whether it is flowing above ground, frozen as ice and snow, or held in the soil.

- Wetland mapping and monitoring are examples of hydrological applications.
- Estimate of soil moisture.
- Snowpack monitoring and extent delineation.
- Determining the thickness of the snow.
- Calculating the snow-water equivalent.
- Ice monitoring in rivers and lakes.

1.6.5. Application in the Sea Ice Field:

Ice covers a considerable section of the Earth's surface and is vital to the commercial shipping or fishing industries, as well as Coast Guard and construction operations, and global climate change research. Some instances of sea ice data and applications are as follows:

- The concentration of ice.
- Ice kind, age, and movement.
- Calculating the mass balance of glaciers.
- Detection and monitoring of icebergs.
- Topography of the surface.
- Tactical lead identification: navigation/rescue: safe shipping routes
- The ice situation (state of decay).
- For planning considerations, historical ice and iceberg conditions and dynamics.
- Study on meteorology and climate change.

1.6.6. Use in the Fields of Land Cover and Land Use:

Even though the terms land cover and land uses are often used interchangeably, they have quite distinct meanings. Land cover refers to the surface cover on the ground, while land use refers to the purpose of the land. Land cover may be determined from remote sensing properties, and land use can be extrapolated from that, particularly with supplementary data or a priori knowledge. The following are examples of remote sensing applications for land use:

- Conservation of natural resources.
- Conservation of wildlife habitat.
- GIS input baseline mapping.
- Urban encroachment / expansion

- Calculating the area covered by land.
- Exploration /Seismic/resource extraction activity routing or logistical planning.
- Delineation of damage (flooding, tornadoes, seismic, fire, volcanic,)

1.6.7. Environmental Monitoring Applications:

- Environmental impact assessment.
- water quality monitoring.
- Examining wildlife habitat.
- Pollution surveillance.
- Catastrophe relief.
- Earthquake research and analysis.
- Management of floods.
- Sand and dust storm warnings

2. DISCUSSION

The Remote Sensing or Geographic Information Systems. Field of Study at Asian Institute of Technology (AIT) was founded in 1990 and offers doctorate, master's, postgraduate diploma, and certificate programs in Remote Sensing and Geographical Information Systems. It began as a research initiative and has evolved into a renowned education, training, and research program that meets the region's demand for cutting-edge technology. The program is meant to cover both theoretical and practical elements of space technology, with a focus on remote sensing, geographic information systems, and global positioning systems. Through laboratory sessions, it gives students plenty of time and opportunity to obtain experience with geographical data. Students are taught about the structure and characteristics of digital spatial data, how to capture it using airborne and spaceborne sensors, how to handle big geo data, how to process, analyze, and extract information using digital tools, GIS, and cloud-based applications, and how to visualize and disseminate the extracted data using the web and location-based services. To meet the need, open-source geoinformatics is used in conjunction with commercially provided spatial data processing and analysis tools.

2.1.Geographic Information Systems Top Five Advantages:

- Cost reductions due to increased efficiency.
- Improved decision-making.
- Better communication.
- More accurate spatial data archiving.
- Geographical management.

Without making any physical touch, remote sensing and GIS technologies allow agencies to get trustworthy information on natural and man-made features, as well as analyze and interpret suitably phenomena happening across the earth's surface. Farmers nowadays depend on technical advancements.

3. CONCLUSION

GIS and remote sensing are inextricably linked. Remote sensing advancements are useless without GIS advancements and vice versa. Remote sensing can provide vast amounts of data from all around the world regularly. GIS is capable of evaluating enormous amounts of data in a short period. Without the introduction of GIS, this vast amount of data would have been rendered worthless. Many environmental challenges have prompted large expenditures in the usage or development of differential global positioning systems (GIS). From balloon

photography to aerial photography to multispectral satellite imaging, remotely sensed technology has advanced.

Earth but also atmosphere radiation interactions characteristics in various regions of the electromagnetic spectrum are very valuable for recognizing and describing earth and atmospheric features. The discipline of remote sensing or geographic information systems (GIS) has grown fascinating and glamorous in recent years, with fast-growing potential. As a result, an integrated strategy based on remote sensing and geographic information systems (GIS) may be utilized to solve issues in a variety of sectors. Remote sensing or geographic information systems have shown to be effective tools for pollution management in a variety of situations. Remote sensing techniques have shown their potential to monitor on a local scale as well as on a global scale.

The primary goal of this study is to learn more about remotely sensed and geographic information systems, as well as their applications. One possibility is "interactive remote sensing," wherein farmers genetically "mark" their plants to enhance the recognizing object's spectral signature signaling crop distress or optimal harvesting. Policy initiatives are being implemented to help guide this future.

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CHAPTER 7

BACK PAIN AND LINKED FACTORS AMONG IT INDUSTRIES IN DLF CYBER CITY, GURUGRAM

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ABSTRACT: ***Back pain happens through damage to a muscle (strain) or ligament (sprain). Generally, this would happen through sitting on the chair for a long-time interval in a single position, Irregular physical exercise, and fracture of the backbone, Improper sleeping posture, inappropriate lifting, and various causes for back pain. Mainly back pain happened in the Backbone, Most Cases pain goes away on its own in two or four weeks but does not end and is again repeated, a few cases required surgery. This study is focused on back pain occurrence inside the employee of IT industries. The data are drawn from an online survey that is used to detect actual causes of back pain inside the employees of the IT industry where 200 respondents of IT industries in DLF cyber city are responding to the cause of back pain as well as the impact of back pain in their life. Analysing the data of employees in some cases in which employees are permanently disabled with their bodies, and another rare case is found that patients experience pain without any physical harm. The employees should follow the proper exercise, diet, and avoid Irregularity to decrease the cause of back pain occurrence as well as after identify the causes of back pain occurrence. The proper guidance provides to the office workers which results will give a happy life, maintaining physical and mental health as well as increasing the productivity of IT industries.***

KEYWORDS; Back Pain, Backbone,Health, Physiotherapist, Spinal, Symptoms.

1. INTRODUCTION

The backbone of the human body is the bone, tendons, muscles, and additional tissues that extend from the tailbone to the base of the skull. The backbone encloses with spinal cord and the fluid surrounding the cord and this is also named the vertebral column, spine, or spinal column. The low back or lumbar spine comprises interconnecting bones, nerves, ligaments, muscles, and joints entirely these employed together to provide flexibility, strength, besides support. Conversely, this is a very complex structure of the human body also consent the low back susceptible to injury besides pain [1]-[2]. The low back supports the upper body's weight and provides mobility or motions such as bending and twisting. The responsible factors for flexing and rotating the hips while walking or running are muscles and also supporting the spinal column.

Any sensation regarding in body supply through the nerve system of body, Nerve system of the low back supply sensation and made powerful muscles in the pelvis, hands, fingers, legs, and feet. Entire sensations in the body supply by the nerve system of the body to the brain. These sensations could be injury and pain inside the body.

Back pain comprises upper backbone pain, middle backbone pain, lower backbone pain. And other factors that cause backbone pain may be nerve, degenerative disc disease, muscular problems and arthritis. Back pain remains the most mutual problem for office employees worldwide because these employees are working with sitting single posture for a long time interval, lack of physical exercise in daily life, Improper lifting, Irregular activities that has numerous causes responsible for back pain [3]-[4]. Commonly eighty percent of adults who are experiencing significant low back pain worldwide are working in the office. This type of

pain remains receiving the correct treatment to alleviate back pain a very frustrating besides challenging task, aimed at both patients besides healthcare takers.

1.1.Types of back pain:

Various types of back pain occur and their symptoms are considered as the main element of back pain and should follow strategies that are comprised cutting-edge a treatment plan aimed at that specific pain outline. However, this is critical to note there remains nothing substitute besides complete valuation performed through the experience holder physiotherapist as shown in Figure 1.

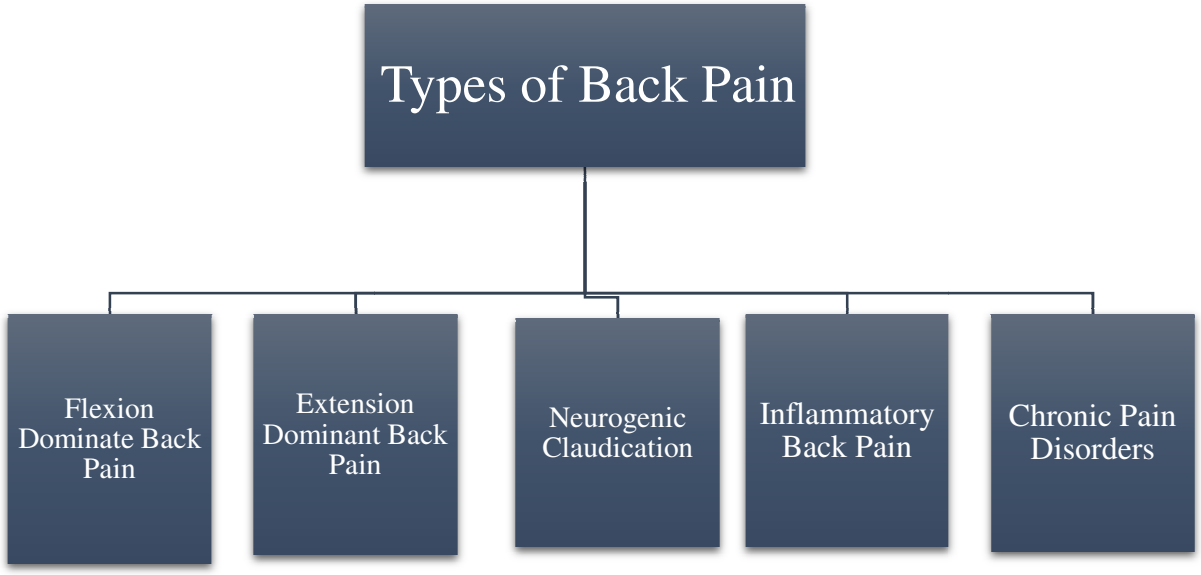

Figure 1: Illustrated various type of Back pain that are occurs due to Irregular activities.

The expert physiotherapist may diagnose pain due to irregularity in the lifestyle of individual, after analysis or identifying the specific symptoms the expert start the treatment of the patient. The expert adopts the crucial strategy for decreasing the back pain after accurately matching the diagnosis to treatment of the suffered patient [3].

1.1.1. Flexion Dominate Back pain:

The back pain is the most common complaint demonstrated in terms of harm to the disc. Back pain is suffered by approximately 51-76% of adults at the present, lumbar disc inside the backbone is a general source of back pain, A disc structure that is placed between vertebrae and performs like a shock absorber inside the spine [4]-[5]. These Discs move up the complete spinal column amid all vertebrae from back to the neck.

- *Cause :*

These symptoms could be made worse through sitting, lifting, and bending, which may include spine pain, legs pain, or both possible.

- *Symptom*s:

The patient may experience tingling/numbness and further proceed to leg weakness and difficulty occur for straightening up after rising from sitting posture

- *Treatment:*

The effective care aimed at Flexion Dominate pain comprises proper exercise/stretch habits in the routine of daily life that execute at intervals throughout the day maintain spinal range of motion besides decrease. The expert physiotherapist can modify the exercise to recover its effectiveness [6]-[7]. Flexion dominates back pain in the lumbar discas shown in figure 2.

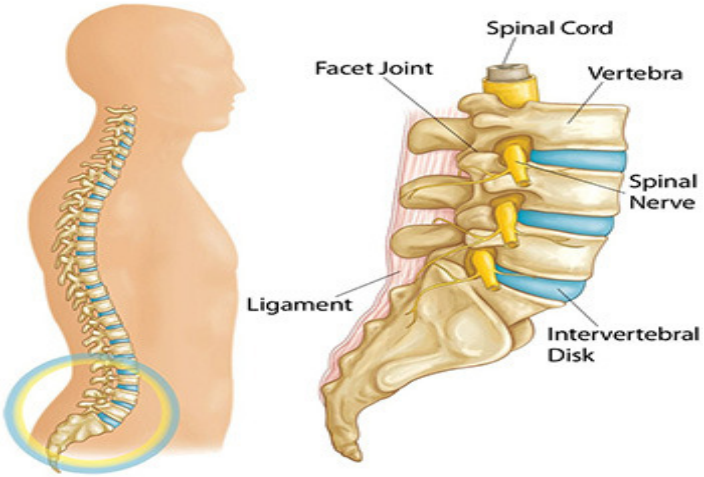

Figure 2: The figure Illustrating Flexion Dominate Back Pain in lumbar disc inside the backbone.

1.1.2. Extension Dominate Back Pain:

Extension Dominate pain demonstrated in the word of the joints at the back of the spine recognized as zygapophyseal joints or (Z-joints). Back pain stands with low back's arched, precise abdominal stability exercise and hip mobility stretches should be effective[8]-[9].

- *Cause:*

Back pain happens after standing for a long interval of time and performing high-impact activities like running, lifting heaviness, gymnastics movements.

- *Symptoms:*

The back might be stiff, but these are always stiff in the same way including localized spinal pain, legs pain, tingling, and numbness in severe cases.

- *Treatments:*

Manual therapy or acupuncture techniques play an important role in decrees the pain temporarily but not ending permanently. The effective treatment of back pain reduces by abdominal stability exercise and movement of hip stretches.

1.1.3. Neurogenic Claudication:

The Neurogenic Claudication back pain majorly affects an older person (+60), the nerves of the body are compressed whenever the patient wants to stand or walk. Consequently, this patient has not walked a long distance and feels tired.

- *Cause:*

Generally, back pain happens due to compression of the nerve and also sitting on a chair in a single posture for a long time interval.

- *Symptoms:*

Generally, no symptoms occur when sitting, when the person wants to raise or walk for some distance then back pain happens and various patients have no local spine pain.

- *Treatment:*

These symptoms decrease by exercise, training, and standing can be effective. This patient should be an attempt to fight through the pain or trained to walk further. The patient should

avoid decompression surgery because of making the nerves [10]-[11]. The physiotherapist is well trained to reduce the sustained lumbar extension through exercise and spinal care.

1.1.4. Inflammatory Back Pain:

Inflammatory back pain remains caused by excessive inflammation cutting-edge the spinal joints, and another causes due to low immunity system to attack the joints of the spine for example inflammatory back pain is ankylosing spondylitis.

- *Cause:*

This type of back pain happens through excessive inflammation inside the spinal joints due to the weak immune system of the body.

- *Symptoms:*

Back pain happens actually in a patient under 35 years of age and the stiffness of pain worsen with immobility, particularly at night besides early morning when the patient wants to rise from bed.

- *Treatment:*

The back pain besides stiffness tend to reduce with physical movement or exercise. Anti-inflammatory medicines are available to reduce inflammatory pain and stiffness, but these symptoms are also reduced naturally, turmeric can help to reduce inflammatory pain. In rare excessive inflammatory pain and stiffness, the patient should contact a physiotherapist[12].

1.1.5. Chronic Pain Disorders:

This back pain disorder is more challenging to treat for professionals. The nerve system misinterprets stimuli to the brain that pain is abnormal pain and harmful for the body as dangerous then the brain experiences the pain which is provided by the nerve system[13]. This is a very complex situation to handle the patient, the caretaker continuously tells to patient there is no physical cause of back pain but the patient experiences pain rapidly.

- *Cause:*

The nerve system involves misinterpreting stimuli to the brain for pain and this is an actual complex situation for both patient and caretaker.

- *Symptoms:*

These pain have no limit and the location of pain can migrate to include other parts of the patient's body. Patients experience suffering back pain disorder and complicating factors, like depression or anxiety which may contribute to the problem.

- *Treatment:*

Initially of back pain patient should concern with a physiotherapist to treat back pain. A physiotherapist should recognize their pain besides monitor them to keep their physical fitness besides health.

The impact and causes of back pain are the focus of this research paper. The current study is divided into many sections, the first of which is an introduction and the second of which is a review of prior back pain studies. After that, the research approach for this study is given, followed by the analysis of more data. Finally, the data will be compared to past data, a brief discussion will be held, and a conclusion will be made.

2. LITERATURE REVIEW

Markeyllanne Leocadio Morais [14] discussed low back pain besides associated features among physiotherapy students. The author wants to explain the problem with students which are sitting on a chair in a solitary posture for a long duration of time, especially for physiotherapy students. This is needed to evaluate their development landscape, creating

global health indicators aimed at the investigated group besides avoiding this type of habit that may accelerate the new generation of the pain incapacitation procedure. In this research paper, the author surveyed 410 undergraduate students, replied opinion poll linking to socio-demographic data, lifestyle, besides the Nordic Feedback form aimed at musculoskeletal symptoms, and got the result that the prevalence of low back pain reported in last year was 56.3percent (%) students of physiotherapist visited the doctors in the last 12 months besides this student reported of low back pain cutting-edge these years. Inside the University's campus, students who suffered from the high prevalence of low back pain were declared and so the author recommended that some measuring substitute should understand the magnitude of the effects caused through this pain besides consequently find the finest preventive besides intervention idea.

S. Neupane et al.[15]explained musculoskeletal pain caused by physical or psychosocial workload, and the impact of sick leave in the food business. In their study a total of 3420 working-age Finns aged 30-55 years were included in the sample. Questionnaire forms, interviews, and diagnostic procedures were used to collect baseline data on musculoskeletal pain during the previous month, present physical workload, job control, and care at work, lifestyle, chronic illnesses, and difficult work history.

According to the authors Musculoskeletal discomfort was found in 18 distinct parts of the body and was divided into four categories: no pain, single-site pain, besides multisite pain (upper limbs, lower limbs, neck, and low back). One-third of the study participant had solitary-site pain, whereas the other third had multisided discomfort. Employees in the food industry who had a high physical workload and strong demand for their services had the highest chance of being sick. There was no statistically significant interaction amid job factors besides pain in this study. The author showed that unhealthy lifestyles and chronic conditions lowered risk estimates across the board. Finally, there is no evidence of substantial changes in the connection due to physical or psychological burden during illness absence or musculoskeletal discomfort.

John M. Dement et al.[16] discussed about Occupational Surveillance System aimed at Health Care Workers in the healthcare industry. According to the authors of this study the workers were exposed to a variety of work-linked stressors including infection such as chemical or physical agents, psychological hazards, besides workplace violence and the Duke University Health System (DUHS) tracked occupational exposures, stressors, and injuries as well as illness among the crowd of health care workers (HCWs).

The population risk of DUHS was used to express throughout the human resource job and work location data. The output besides exposure data from current occupational health besides safety programs besides employee health insurance were related with human resource data besides without identification to build the Duke Health and Safety Surveillance System (DHSSS). The surveillance system was expressed that consists four examples which are presented for demonstrating how to system had used to study continue work-linked stress occurrence, Risk feature of back pain, inflammation a well as exposure of blood and body fluids (BBF). In this study authors used exiting data which was utilized, and data are collected for another purpose as well as it could be successfully integrated then besides also utilized aimed at occupational health surveillance monitoring of HCWs.

Research Question:

- How to reduce the causes of back pain?
- What are the causes of occurrence the back pain in the employees of IT industry?

3. METHODOLOGY

3.1.Design:

According to this research, the data was collected through the online survey in several IT industries which are situated in DLF Cyber City, Gurugram. Online surveys are the most important survey for this time. In this research, data are collected by asking the question regarding back pain to the various respondents. These respondents have faced a challenge to perform work in the office due to back pain. The Initial data regarding this research are used to conduct the study and also used to collect the actual information of this research. The design of this research completely influences the employees which are working in an office.

3.2.Sample:

Many dissimilar questions were asked (i.e., survey, Questionnaire) to respondents for collecting the primary data. Entire data of online surveys for online investigation have taken from the website and Google forms which are secondary data. The survey was asked by 200 different working employees in the office from various industries of DLF Cyber City, Gurugram. The different types of questions are asked to the various respondents regarding the back pain occurrence and their causes of back pain on working culture, and lifestyle of employees.

3.3.Instrument:

This segment demonstrates the equipment which are used for data collection and also find the cause behind the back pain. The data have collected by individuals in which ask the question and get the information regarding back pain. This gathered information are the personal opinion of employees which have faced the problems due to back pain in life. Herein some following questions are mentioned below which are used to collect the information for this study:

- What are the effects of back pain on our lifestyle?
- What are the major factors behind back pain occurring?
- What should be the daily routine of working Individuals in the office?
- Which method follows to reduce back pain?
- What should be the working environment of IT industries?
- Which type of exercise and diet should be followed?
- Can back pain be converted into permanent disabilities?
- Which age groups are majorly affected with back pain?

3.4.Data collection:

The data have represented in different tables that represents the information about back pains and their causes and also the factors by which employees are suffered during the working surrounding in DLF Cyber City Gurugram. These respondents are provided the complete information about their working culture, working environment and Irregular activity and also the causes of the back pain. The whole data has been collected by asking different questionnaire to the various employees from different IT industries and these data are specified below in the form of a Tables. Based on these data further Data analysis regarding back pain happens of office workers.

Table 1: The below data based on the Impact of back pain in the life of employees in DLF Cyber City Gurugram.

Effect of back pain in life	No. of Respondents

Walking or Running Problems	28
Stiffness problems in the backbone	12
Painful to rise from bed	50
Difficulty in sitting	32
Difficulty in Eating or Drinking	18
Pain in bending	40
Another Impact	20
Total	200

Table 2: Illustrating the data based on back pain IT industries in DLF Cyber City, Gurugram.

Back pain problems in employees of IT Industries	**No. of Respondents**
IE3 Innovations Pvt. Ltd.	48
Aristocrat Technologies India Pvt Ltd	22
Tata Technologies Ltd.	28
Infogix International Pvt. Ltd.	32
Ramco Systems	34
Totality Corp	36
Total	200

Table 3: The below Table is based on major causes of Back Pain.

Back pain	**No. of Respondents**
Heaviness lifting	40
Sitting in a single posture	51
More sleeping	19
Awkward Movement	28
Poor physical Condition	30

Constant standing	14
Constant strain or stress on back	18
Total	200

3.5.Data Analysis:

These research papers are analyzing the data gathered through Google form polls, websites, and newspapers. The information of respondents has taken from DLF Cyber City Gurugram, and these respondents are dealing with back pain in their daily lives. On the basis of the gathered information, attempt to find the solution of back pain in the IT sectors. The impacts of back pain on daily routine will be demonstrated using three sets of tables that categories information about back pain and its causes. After examining the data, researchers discovered how human living influences back pain, and getting the result in this study is simple.

According to Table 1 out of 200 respondents 28 respondents are suffered in walking or running due to back pain, 12 respondents had Stiffness problems in the backbone, 50 persons have the pain to rise from bed, 32 respondents has affected with difficulty in sitting, 18 respondents have difficulty in Eating or Drinking, 40 respondents have a problem for bend and 20 respondents of them have another impact of back pain. From Table 2, 48 employees of IE3 Innovations Pvt Ltd says that has more suffered from back pain, 22 respondents from Aristocrat Technologies India Pvt Ltd assumed that has more affected with back pain, 28 respondents of Tata Technologies Ltd say that has more affected by back pain, 32 respondents of Infogix International Pvt Ltd says that has more affected from back pain, 34 respondents of Ramco Systems suffered from back pain and rest 36 respondents of Totality Corp listed to more affected by back pain.

Rendering to Table 3, 40 individuals say the cause of back pain due to lifted heaviness, 51 respondents assumed that sitting in a single posture caused back pain, 19 person say that occurrence of back pain due to more sleeping, 28 respondents say about the cause of back pain due to awkward movement, 30 respondents supposed that cause of back pain because of poor physical condition, 14 respondents supposed that back pain because of constant standing in working field and 18 respondents say that happens back pain because of constant strain or stress on the backbone.

4. RESULTS AND DISCUSSION

The various dissimilar outcomes based on the altered data are obtained after analysing the data that major impact of back pain on the human lifestyle. The study is grounded on original data collected via online survey reports on the Google website, and these reports may be accessed on a variety of eight questions. Back pain data were gathered based on the reports of respondents. Back pain is the physical incapacity of humans that has a major impact on daily routines and other aspects of their lives. Back pain has an impact on employees' work as well as their daily routine. In some cases, the nerves of the back are compressed and these back pain symptoms have evolved into permanent disability, and in some case of back pain patient are likely to be dead corpses.

Another problem with back pain sufferers is that patients experience more pain without any actual harm to their bodies because the brain gets incorrect information from the body's nerves. Figure 3 shows that 25 percent of the employees have pain while attempting to get

out of bed, and 16 percent have trouble sitting in a chair. Various data were collected from IE3 Innovations Pvt Ltd respondents who had more difficulty owing to back pain. For example, 20% of respondents experienced back pain as a result of heavy lifting and sitting in a single posture for long periods (Figure 3).

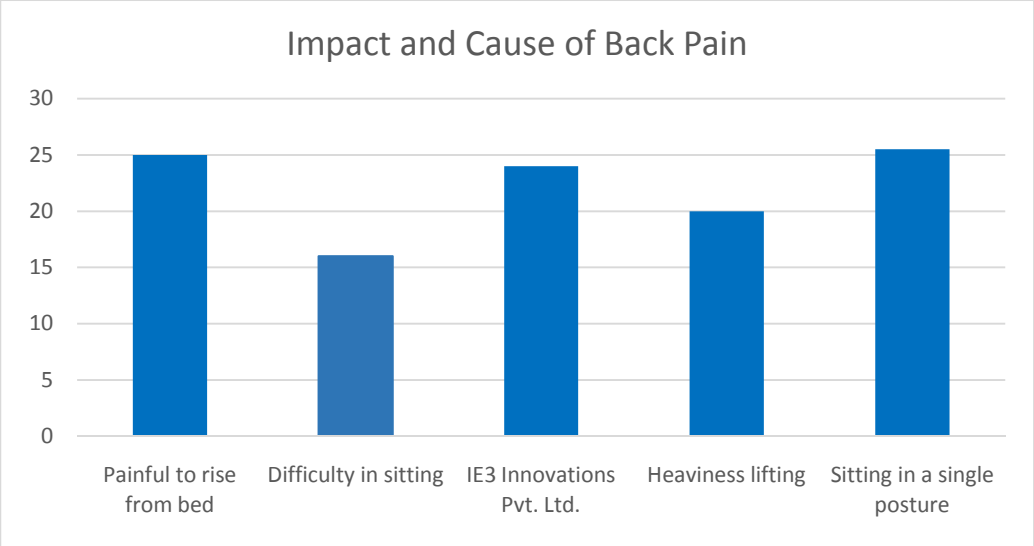

Figure 3: Illustrating the Impact and the Cause of Back pain which are Occur in the humans.

5. CONCLUSION

Today's peoples are busy, and everybody needs to succeed in their field and make a lot of money without worrying about routine, health. Back pain is a common problem in the modern world, particularly among office employees which sit in a single posture for long periods. According to the author, back pain is especially common in the Information Technology (IT) sectors, where people work from dawn to dusk and leads to unhealthy habits as a result of the organization's target-based working culture. This study helps to determine how many peoples are affected by back pain and what the main causes of the back pain. People suffering from back pain should adopt a healthy lifestyle and routine, such as daily exercise, sensible nutrition, taking a short rest during the day, and avoiding intoxicating products that decrease the body's immunity. Back pain causes must be taken into account by the IT industry furthermore, industries and employees should work together to reduce the causes of back pain by focusing on the same issue. It is analysed the causes of back pain which office workers obtain proper guidance regarding the back pain that these employees of IT sector get to live a happy life, maintaining their physical and mental health. Industries should aim to plan a pleasant activity within the IT sector to improve working conditions and ensure that employees are physically and mentally fit. Each IT industry's participation involves a fun activity that encourages them to join together in such a single working frame. When an issue of back pain is finished, everyone gets benefits: employees are healthier and more productive than before, and the company's production increases.

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CHAPTER 8

DETRIMENTAL HEALTH EFFECTS OF REVERSE OSMOSIS TECHNIQUES AND ALSO MONITORING THE INTEGRITY OF REVERSE OSMOSIS IN WATER

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ABSTRACT:Water is a basic requirement for living organisms and contaminated water affects human health so use reverse osmosis (RO) technology to remove contamination from water.RO is the membrane type of treatment process; it is used for the separation of dissolved solutes from the water. RO is known for its application in purifying drinking water, especially to eliminate salt and other contaminants from the water molecules. The "membrane separation filtration system" is the most advanced membrane filtration system available. This is a membrane-based technology that filters water by removing dissolved contaminants from the input stream, leaving cross or reject streams suited for a range of domestic and industrial applications. In this paper, the author talks about the reverse osmosis technique, the process of reverse osmosis, its impact on human health, and also discussed its advantage and disadvantage. The main goal of this paper is to learn more about the reverse osmosis process or its impact on human health. Various studies have been done on this topic but there is scope for further changes in this technology in the future.

KEYWORDS: Desalination, Filtration, Human Health, Membrane, Reverse Osmosis, Water.

1. INTRODUCTION

One of the most well-known and commonly used separation methods for water treatment is reverse osmosis. In the 1950s, this process was largely employed for saltwater desalination because the entire process was slow and confined to a few laboratories. However, after much research and technological advances, significant progress has been made, especially in the field of polymers and in the production of efficient membranes [1]–[3]. Today, many people around the world use this method to purify water for industrial, commercial, domestic, and scientific purposes. While reverse osmosis technology is an important scientific discovery for humanity, this paper will provide a basic understanding of the entire process. Desalination has become a very cost-effective method of dealing with freshwater shortages, which are widespread in tropical or offshore places. The distillation core method utilizes RO membrane technology and desalination is a process that extracts clean water from saltwater. It is a water purification process that uses a porous material to remove ions, macromolecules, and large particles from drinkable water. In reverse osmosis, compressive stress is used to compensate for osmotic pressure, which would be a thermodynamics parameter caused by chemical broad changes in the solvent [4]–[7].

1.1. Osmosis:

To understand the purpose or method of reverse osmosis, you must first understand the natural process of osmosis, and the natural process of osmosis is one of the most significant on the planet. A less saline solution will prefer to move to a stronger saline solution throughout this process, and plant roots take water from the earth, whereas our kidneys absorb water from our blood [8]–[10].

The process of osmosis is seen in Figure 1, a lower concentration solution will naturally migrate to a greater concentration solution. If you had a semi-permeable barrier between a container filled with water with a low sodium concentration and a container filled with water with a high sodium concentration, the water with a lower sodium concentration would move towards the container with a higher sodium concentration. If you had a low-salt-fixation water holder and a high-salt-fixation water holder separated by semi-permeable membranes, the lower salt-fixation water would begin to migrate towards the higher water holder.

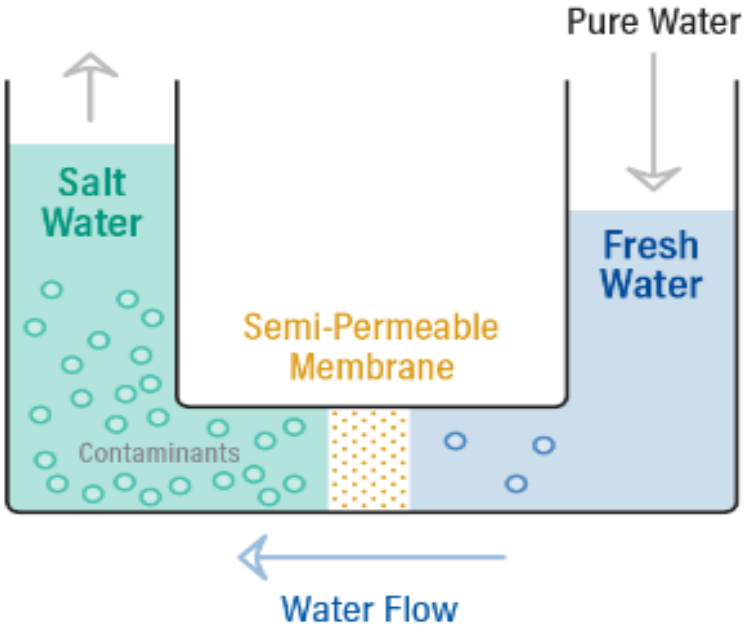

Figure 1: Above Figure Shows the Working Osmosis Process and also Shows the Semi-Permeable Membrane Which is Help to Filter the Water [11]**.**

A semi-permeable barrier allows certain atoms or molecules to flow through but no other, a screen door is a basic example. This allows air molecules to get in, but nothing bigger than the aperture of a bug or screen door. Gore-Tex fabric is another example, as it is made from an extremely thin plastic sheet with billions of microscopic pores. The pores are larger sufficient for water vapor to pass through but not large enough for the liquid to escape.

1.2. Reverse Osmosis:

Reverse osmosis, which is used in both industrial operations and the production of potable water, may remove a wide range of dissolved or suspended microbes from water, including bacteria. As a result, the solute is limited to the membrane's pressured part while the pure solvent is permitted to pass through. Complex molecules should not be permitted to pass through the pores of the membrane, while smaller components of both solutions ("including such solvent molecules") should be allowed to flow freely. The solvent naturally travels across a membrane from a low solute concentration ("higher water potential") to a high solute concentration ("lower water potential") in a normal osmosis process ("lower water potential"). The driving force for solvent movement is the loss of free energy generated by a variation in solute concentration on every side of a membrane, which results in osmotic pressure as even the solvent moves in a more concentrated solution. The method of using external pressure to reverse the natural movement of a pure solution is known as reverse

osmosis. In reverse osmosis, diffusion occurs when pressure, flow rate, and other parameters influence the process, as well as the reverse osmosis process, is depicted in Figure 2 [12]–[14].

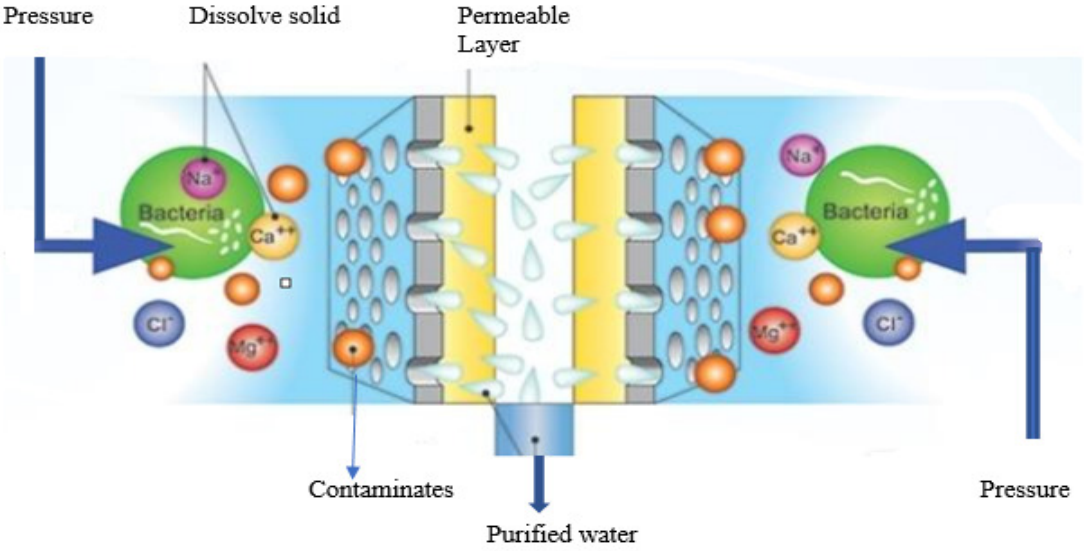

Figure 2: Above Figure Shows the Working of the Reverse Osmosis Process, and It's Also Showing How Water is Purified [15]**.**

This approach has been appreciated around the world as a safe or cost-effective way to clean intake water. It gets rid of the dissolved compounds or heavy metals like nitrates, sodium, fluoride, sporidium, crypto giardia, sulfide, arsenic, uranium, radium, lead, and mercury, as well as crypto giardia, sulfide, arsenic, sporidium, uranium, radium, uranium Lead, and mercury. As it flows through thin semi-permeable membranes, water can remove harmful bacteria and chlorides. Consequently, it is important to examine the current progress in the field of reverse osmosis membranes.

1.3. Principle of Reverse Osmosis

The presence of a membrane further complicates the process by preventing large molecules of the solute from flowing through it, forcing them to remain on the pressurized side. Pure solvent, on the other hand, is permitted to pass through the membrane. The solute molecule is concentrated on one side of a membrane while the other is diluted when this happens. Furthermore, the volume of the solution varies somewhat. When a solvent in its most basic form travels across a membrane against a gradient of concentration, reverse osmosis occurs. It progresses from a low to a high degree of concentration.

1.4. Process of Reverse Osmosis:

The osmotic pressure is the minimal pressure necessary to halt the passage of solvent across a semipermeable barrier. As a result, when the pressure on the solutions side (the side with the greater concentration of solutes) exceeds the osmotic pressure, the solvents particles on the solution side pass through the semi-permeable membrane to the low-concentration area. Reverse osmosis is a method of reversing fluid transport through a semipermeable membrane. The pressure applied on the solution side must be greater than the osmotic pressure for the reverse osmosis process to operate. The concentration of a solution affects the osmotic pressure, which is a collinear characteristic. Reverse osmosis is important in water treatment and many modern water purifiers use reverse osmosis as part of their

filtration process. When a semi-permeable barrier separates two solutions with variable concentrations, solvents (water) flow from the restricted solution to the pure solvent. The process of driving a solvent through semi-permeable membranes from an upper to the lower concentration of the solute by applying a pressure greater than the osmotic pressure is known as reverse osmosis. Purified brackish water is pushed against the membrane's surface, resulting in salt-free water being conveyed across the membrane or portable potable water being expelled from the lower pressure sides. The reverse osmosis membrane's polymers matrix, being either skin of an asymmetrical membrane or even a polymerized layer of race couples combined inside a thin-film polymeric coating, separates the race couples [16].

The feed, permeable and reject streams make up the RO process, and before being supplied over a semipermeable membrane with a high-pressure pump, feed water should be precipitated to eliminate particles or suspended solids, or feed. Due to the material utilized, post-treatment may be required, and Figure 3 depicts the RO process schematically.

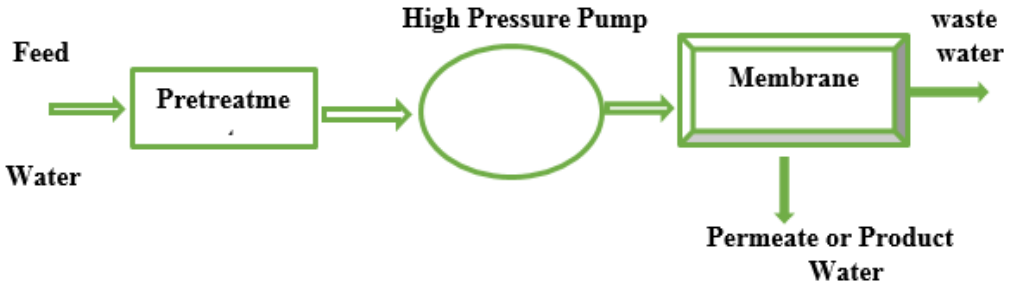

Figure 3: Illustrate the Schematic Flow Diagram of the Reverse Osmosis Process Technique.

1.5. Reverse Osmosis water impact on human health:

Water is a highly refined liquid, despite its chemical composition being as simple as that of water. Its composition is influenced by many factors, including atmospheric interactions, soil minerals, and interactions with living and biological organisms. The resulting natural water may contain traces of gases, minerals, organic water, or even pathogens in its raw form. As a result, no groundwater or surface water source has ever been chemically pure water. Each country has established maximum allowable limits on the amount of dissolved inorganic and organic substances in the water to ensure that the water people drink is safe for human consumption. These tolerable values are based on several criteria, including the natural environment, soil conditions, as well as other community characteristics. This is because, although some dissolved elements are harmful to human health, others, such as dissolved vital minerals (such as sodium, calcium, potassium, magnesium, or others), are important to our general health. However, some water filtration processes remove these essential dissolved minerals. People lose the additional health benefits of these minerals when they drink demineralized water. Experts and the "World Health Organization" have issued warnings on the adverse health effects of demineralized water.

1.5.1. Neurological, Cardiovascular, or developing impacts

Although water is not a major source of calcium and magnesium, research has linked low calcium and low magnesium water consumption to cardiovascular risk, pediatric fractures, premature birth, or low birth weight, as well as some neurodegenerative diseases.

1.5.2. Blood pressure, Bone strength, and blood creation are all affected

The human body requires specific minerals or micronutrients to function properly. Natural water is better with minerals, the plants that grow in such water and the animals that eat these plants are the sources of such nutrients. According to research, mineral components from water are more easily absorbed into the body than from dietary sources. The increasing consumption of junk food, which is naturally devoid of important nutrients, as well as the use of demineralized RO water, have significant harmful effects on human health. For example, calcium deficiency causes brittle bones, magnesium and potassium deficiencies lead to high blood pressure, and low iron intake from demineralized water impairs blood formation.

1.5.3. Increasing your chances of developing chronic kidney disease or gastrointestinal problems:

pH is the measure of acidity or alkalinity in a solution, with a range of six to eight being neutral, with lower values being acidic. The water released from the RO filtration process has a low pH and drinking low pH water over a long period has significant health consequences, including a higher risk of kidney disease and gastrointestinal issues. Using RO purifiers can lead to “total dissolve solute” (TDS) levels falling below the permissible limits, which can harm human health. Before installing an RO water purifier, people should have a clear understanding of how it works and the health risks associated with drinking demineralized water. Bottled water from reputed companies is thus a healthier and safer option as it gives you clean, mineral-rich water [17].

1.6. The implication of reverse osmosis techniques:

This method utilizes a membrane-based process to complete or separate the concentration without requiring changes in state, chemistry, as well as heat energy, making it energy-efficient or well suited to recovery applications. Waste from refineries, modern waste from the beverage industry, groundwater treatment, phenol compound recovery, drinking water sanitization, hydrogen creation, window cleaning, as well as wastewater recovery, as well as "seawater invert assimilation" (SWRO) treatment are all completed along with the Reverse assimilation system. The effectiveness and value of the RO method may be seen in the treatment of.

1.7. The prospect of RO techniques:

Nanomaterials are becoming more expensive, and scaling up Nano membrane production techniques for commercial application is difficult. These are the two biggest hurdles to growth in nano-structured membrane technology right now. In addition, there are concerns regarding the use of nanoparticles concerning health or safety. As a result, adopting a multifunctional membrane for single-pass reverse osmosis eliminates the need for pre-treatment, higher salt rejection, or cost-effective maintenance, and the development of novel RO-membranes with permeability on capital investment. When it comes to operating expenses, RO desalination technology should have been the primary focus of future research.

1.8. Benefits of RO water purifier:

It is important to improve immunity at a time when the COVID virus has killed more than a million people across the world. Following are the five health benefits of using an RO water filter.

1.8.1. Avoid harmful waterborne diseases with an RO water purifier:

Clean drinking water is available in India and harmful bacteria or viruses can be found in contaminated drinking water. To filter the water, RO water purifiers use a semipermeable membrane with tiny pores ("about 0.0001 µm wide"). Most dangerous bacteria, fungi, parasites, germs, or viruses are removed from the water by this membrane. The ultraviolet chamber in most RO water purifiers neutralizes any remaining viruses or bacteria in the water. This implies that water purified using a RO system is devoid of disease-causing bacteria. As a consequence, a RO water purifier keeps you healthy or protects you from waterborne illnesses.

1.8.2. Heavy metals are removed from drinking water using a RO water purifier.

Heavy metals in water can cause serious health problems in the long run, such as stunted growth, cancer, organ failure, or nervous system damage. According to 2019 research by the "Ministry of Jal Shakti", water tests of the most important rivers in India have indicated excessive levels of heavy metals such as mercury, copper, lead, iron, and nickel. Homes that rely on groundwater can also be exposed to excessive amounts of heavy metals. As a result, it may be necessary to filter the water to remove harmful toxins. An RO water purifier's pre-carbon filter and RO filter remove these heavy metals, making the water completely safe to drink.

1.8.3. Improves Digestion or Metabolism:

A high metabolic rate indicates that the body burns calories even while resting, which is a sign of good health. Drinking fresh water with proper mineral content boosts the overall metabolism of the body. It also speeds up the digestion of food, helping you feel more energized and healthier. According to the World Health Organization, copper is essential for the normal functioning of many important enzyme body systems. After the filtration process, some purifiers include copper, which provides you with water that can help you break down fat, increase metabolism, and aid digestion.

1.8.4. Helps With Weight Loss:

Water aids in the digestion of food, its passage through the intestine, as well as the body's absorption of essential nutrients. If people don't drink enough clean water, their digestion will suffer and their metabolism will slow down. As a result, it is critical for those who are attempting to lose weight to understand that drinking clean water from a RO water purifier boosts metabolism, improves digestion, as well as aids weight loss.

1.8.5. Improves hair and skin:

Water is also good for your skin or hair, helping you seem younger and the water makes up a big portion of human skin cells, but not getting enough of it can cause dry, sensitive skin or even premature aging. To keep moisturized skin as well as strong hair, you must consume a sufficient amount of clean and safe drinking water. And the finest source of safe or clean drinking water is a RO water filter.

Introduction, literature review, discussion, and conclusion are among the sections of this paper. The author discusses the reverse osmosis method, the idea of reverse osmosis, and how reverse osmosis works in the introductory part. With the use of the RO method and the influence of RO water on human health were also examined by the author. The author mentioned previous research on the RO method in the literature review part. In the

discussion, the author explores the benefits and drawbacks of reverse osmosis, and the author concludes at the end.

2. LITERATURE REVIEW

S. Koreet al. studied the reverse osmosis method and its use. The author of this paper detailed the reverse osmosis technique and how water is filtered via it. RO technology is used in wastewater or hazardous waste purification as well as separation processes in the food, beverage, or paper sectors, and recovery of physical or chemical components from chemical processes is being investigated as an alternative approach. They also talked about RO technology, which is utilized in the purification of wastewater or hazardous waste, separation procedures in the beverage, food, including paper industries, including alternative methods for recovering organic and inorganic components from chemical processes. The author concludes that the effectiveness of the pretreatment is important for the performance of the RO system. Treatment of saline streams is a major concern when desalination capacity is increased to prevent ecological losses, which is dependent on plant location [18].

S. Sagarstudied automation or reverse osmosis water plant monitoring systems. According to the author, remote monitoring or automation are important duties for such plants. A system is necessary to manually control and monitor critical elements such as “total dissolved solids” (TDS), flow rate, or water level. In the absence of adequate maintenance and monitoring, manually operated RO plants have failed. This technology allows users to not only monitor but also remotely manage critical RO plant parameters affecting performance. In response to a request message, the system generates a measurement report and notifies the user if a critical condition has arisen at the facility. Using a “Global Systems for the Mobile communication” (GSM) based wireless connection, the system can be placed anywhere and administered from a single location. According to the study authors, the proposed strategy can increase the operational efficiency of the RO plant while reducing operating or service expenses [19].

H. Janna, et al. studied reverse osmosis water treatment stations or their effect on human health. This study looked at the concentration of various key criteria for the human body, or the function of RO technology in local water treatment stations in lowering these components. All of the drinking water generated by these stations, according to the findings, failed to fulfill “world health organization” (WHO) and Iraqi requirements. The magnesium concentration varies from 9.5 to 18.2 mg/l, while the calcium content ranges from 5.3 to 25 mg/l. Consequently, RO water must be demineralized, or calcium compounds added to the water, to increase the number of required components and limit the risk of low-level carbonate ions affecting the water [20].

3. DISCUSSION

The filtering process of reverse osmosis, often known as RO, is used to remove ions and molecules from a solution. The technique of applying pressure to one side of a solution (“usually higher than the osmotic pressure”) while a membrane is in place is known as reverse osmosis. The membrane is placed in between the two solutions. Using this membrane, the pollutants are filtered down to the finest particles and the contaminants are described using the term "residual oxygen concentration" (ROC). RO water is a specialized method of filtering and eliminating semi-permeable membranes, pathogens, contaminants, and, unfortunately, mineral ions. RO water is therefore pure but demineralized water that is devoid of essential minerals such as magnesium, sodium, calcium, potassium, and other dissolved solids.

Previously, RO water purification was limited to labs and industry, but, as water pollution has increased, RO water purification has spread to the average person, who now uses RO filtration systems to purify water for daily use. Given the increasing usage of demineralized and RO water, it's important to remember that while RO provides clean water, it also removes minerals that are critical to human health. Consumption of mineral-depleted water has negative consequences for our health.

3.1. Advantages of Reverse Osmosis:

- RO membrane technologies may remove both inorganic and organic pollutants at the same time.
- RO technology allows waste processing stream to also be recovered and recycled without affecting the substance being recovered.
- The RO plant is often kept at room temperature because of the evident anticalin or disparity usage, which decreases scale formations or corrosion problems and minimizes maintenance costs.
- The undamaged membrane rejects viruses, bacteria, or pyrogen materials. In this regard, RO water is comparable to distilled water in terms of purity.
- The available units are small and take up little room. They're ideal for dialysis at home.
- The membrane lasts approximately one to two years in normal use before it has to be replaced.
- Complete sterilization of the RO system using formalin or another sterilant is possible regularly.
- This technology may be used to successfully remove a wide range of suspended particulate chemical particles, but also biological entities (such as bacteria) from water.
- It can be used to clean water to avoid sickness.

3.2. Disadvantage:

- Because of the lower back pressure, household RO units use a lot of water. As a consequence, between 5 and 15% of the water that goes through the system is collected.
- The remainder is dumped as waste and there is no possibility to recover the wastewater in domestic systems as it contains rejected pollutants. Most of the wastewater is discharged through domestic drains, increasing the workload of the septic system. A reverse osmosis facility that produces five gallons (19 liters) of pure water per day can also create 20 to 90 gallons (75 to 340 liters) of polluted water, a threat to megacities.
- Reverse osmosis removes unwanted pollutants from water and can also remove valuable minerals due to its thin membrane structure.

4. CONCLUSION

Groundwater is a significant supply of water for home consumption, small irrigation, and industrial purposes. Because of the hardness of the water, many people drink it directly from municipal bore wells, putting them at risk of heart disease, growth retardation, reproductive failure, as well as other health problems. By constructing community-scale water treatment plants, reverse osmosis (RO) technology is used to purify groundwater. RO is becoming more common in industrial settings when it comes to controlling or treating wastewater.

Companies are becoming more aware of the critical role they play in dealing with massive volumes of water.

Businesses might consider investing in water purification equipment, such as RO systems. RO techniques have been widely adopted as a safe or cost-effective technology to provide clean water as it is efficient in removing dissolved compounds, dangerous bacteria, heavy metals as well as chlorine from water, as it passes through a thin layer. RO is also beneficial to the environment as it does not require the use of electricity, requiring only sufficient water pressure to complete the operation. Consequently, membrane maintenance or cleaning, as well as a comprehensive search should be focused on multi-functional membranes materials with high permeability, higher ion or organic contaminant permeability, and high ion or organic contaminant permeability. The efficacy of pretreatment has an impact on the effectiveness of the RO procedure. Treatment of brine streams is a significant problem, depending on the plant site, with increased desalination capacity to reduce the ecological impact. This method has also been applied to the treatment of municipal wastewater and also RO technology is used because typical municipal treatment processes do not eliminate dissolved particles. In chemical or environmental engineering, RO is increasingly being used as a separation technology to remove organic or organic contaminants from wastewater. According to a research study, RO techniques have been widely employed for the separation or concentration of solutes in many fields. The main objective of the study is to learn more about reverse osmosis and how it affects human health. Many studies have been done on this topic, but there is always room for more technological improvements in the future.

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CHAPTER 9

COMPARISON OF VARIOUS TYPES OF BIOMETRIC AUTHENTICATION TECHNIQUES

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ABSTRACT: ***Biometric authentication entails using a portion of the body composition to verify individual's identity. Biometrics is an automated way to verify the identity of a person. This could be a fingerprint, iris scan, face recognition, or some other part of the human's body. Nowadays traditional methods of security such as passwords, keylocks, card locks, etc. are easily cracked. Therefore, Biometrics is now widely used in domains such as forensic science, security, and identity and authorization systems. The objective of this paper is to study the various types of biometric authentication techniques. As a result, the author concludes that the use of biometric technologies depends on the user's needs, hardware costs, enrolment time, and acceptance ratio. People choose one of the strategies based on the system's safety level, functionality, and needs. In the future, this study will help to understand the pros and cons of various types of biometric authentication techniques.***

KEYWORDS: Biometric Authentication,Behavioral Traits, Face Recognition, Security.

1. INTRODUCTION

Today's technological culture has made each individual a member of a large worldwide community, necessitating the use of high safety automation systems for accurate person recognition[1]. The usual strategy of utilizing credentials and a smart card is no longer sufficient for a safety system that is reliable. This necessitates the development of biometric-based personal identity verification systems. Because biometric identities cannot be exchanged or misplaced, they provide excellent person identification solutions. Biometrics is an automated method of verifying a person's identity by utilizing the person's single physiological or behavioral traits such as "face, fingerprints voice, signature" and so on. Because biometrics are based on a unique attribute that is part of a people, there is no risk of losing it, losing it, or leaving it elsewhere [2]. Individual biometric information is more secure because of its uniqueness, which makes it impossible for others to copy, reproduce, or steal it. The objective of biometrics is to ensure that only a valid user can access the services that are offered. Secured entry to structures, military laboratories, computer networks, laptops, mobile phones, and ATMs are just a few possibilities. These strategies are also used in immigration, such as border security, time and attendance (such as school and workplace attendance), and welfare (such as health care and benefit payments). The usage of biometrics allows a person's identification to be confirmed or established based on "who he is," rather than "what he has" (e.g., an ID card) or "what he recalls."

Biometric technologies have lately progressed, leading to improved reliability and decreased prices. Identification may now be performed swiftly and simply thanks to biometric solutions. Biometrics would be beneficial in several ways. Among credible biometrics efforts and biometric specialists, there is currently a chasm [3]. Biometric debate groups might be developed and biometric information searchers asked to participate to bridge the information gap. The end-user would just need rudimentary user knowledge and effort. Biometric gadgets

will undoubtedly become increasingly prevalent in many civil domains in the future. Current research trends suggest that brain waves and ECG could be used as biometric identification. According to current studies, human identification is both more effective and significantly more difficult [4].

1.1. Biometric recognition techniques:

The biometric recognition techniques are divided into 2 Physical traits and behavioral traits as shown in Figure 1. Physiological traits are further divided into 6 parts and behavioral traits are further divided into 3 parts which will discuss below.

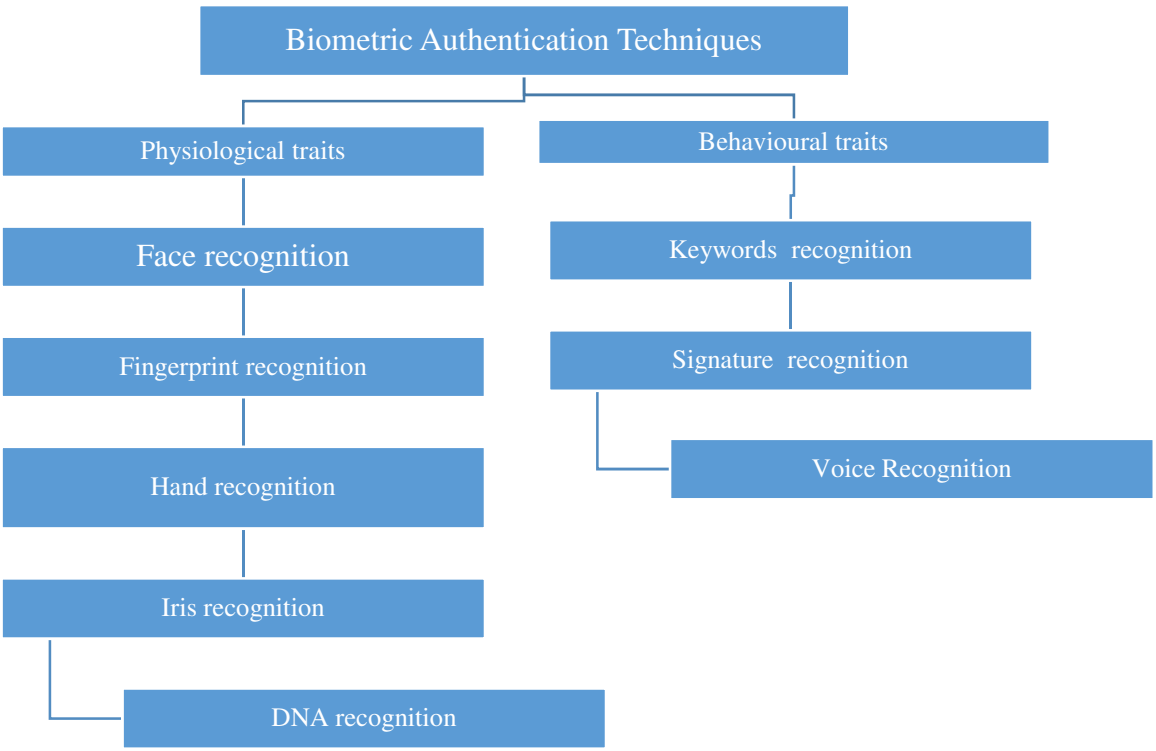

Figure 1: Illustrating the types of Biometric Authentication Techniques which broadly divided into two categories physiological traits and behavioral traits.

1.1.1. Iris recognition:

Every person's iris has some distinguishing qualities that can be utilized to identify them. The iris is a colorful muscle ring that surrounds the pupil of the eye, with an inner pupillary region and an outside ciliary region, and it resides between the cornea and the lens of the human eye, as seen in Figure 2. For the authentication procedure, the iris photos are recorded by the scanners, and the iris patterns are evaluated using several iris libraries such as CASIA, MMU, UPOL, IITD, and others to determine the performance rate [5].Advantages of Iris recognition system are shown below:

- Extremely precise (1 in 10 billion persons have the same iris pattern).
- Wearing glasses or contact lenses does not affect accuracy.
- There is no direct physical touch with the system.
- Due to the small size of the template, the processing time is expected to be fast (2 to 5 seconds)
- Low rate of false acceptance.

- Iris's recognition system was consistent throughout her life.

Figure 2: Illustrating the position of the iris in the human eye [CLOUDFRONT].

1.1.2. Hand recognition:

Hand recognition is an arrangement that contains the spatial geometry with variable dimensions (unique) for each person and cannot be changed, the human hands or fingers can be utilized as a biometrics profile for authentication as shown in Figure 3. Because it takes very little storage space, it is necessary to scan 2 or 3 fingers of a person to authenticate an individual [6]**.** Advantages of hand recognition system:

Figure 3: Illustrating the hand recognition system for security purposes [MATHWORKS].

- It is a user-friendly and long-lasting recognition system.
- The outcome of this system is unaffected by changes in wetness or texture of the skin.
- It's simple to use and has a tiny template size.
- Non-invasive is a term that is used to describe something that is not intrusive
- This system can work in difficult and abrasive conditions.

1.1.3. face recognition:

Every person has a unique face, which can be used as a biometric profile for secure authentications. Face recognition technologies have sprung out as a result of this idea of

using the face for authentication. High-resolution sensors record the face in a face recognition system, which is subsequently used as a pattern for matches [7]. The template is compared using numerous pattern matching techniques to verify or authenticate a person's identification approaches as shown in Figure 4 [8]. Advantages of face recognition:

- In the face recognition system, there is no physical contact, therefore it is completely non-intrusive.
- It is simple to store templates in a database.
- Statistical complexity for recognizing facial images has been reduced.

Figure 4: Illustrating the face recognition system of human [ANALYTICSINDIAMAG].

1.1.4. Fingerprint recognition:

Fingerprint recognition is the best–known and oldest biometric authentication method. It's a computerized, computerized variant of the classic ink-and-paper identifying method used by police agencies [9]. It is based on examining the properties of an individual's fingerprint to recognize it for each person, fingerprints are distinct and immovable, and their essential properties do not change over time. Even identical twins' fingerprints are different. Furthermore, the fingerprints on both fingers of the same person differ. The grooves and corrugations of a fingerprint are used to identify it [10]. The uniqueness of a fingerprint is determined by the patterns of ridges, furrows, and microscopic points on the finger. Fingerprint matching techniques are divided into three categories which are shown in Figure 5.

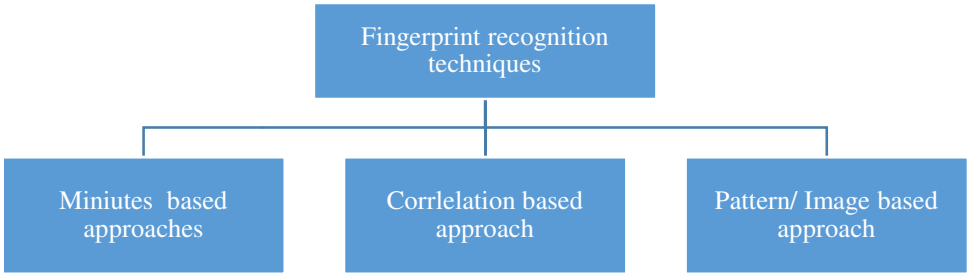

Figure 5: Illustrating the Fingerprint Recognition Techniques which will Broadly be Divided into 3 Types.

- *Minutes-based approaches:*

Minutes-based approaches are the recognition of minute points on the finger as well as their relative location [11].

- Correlation-based approaches:

Correlation-based approaches are based on a large amount of grayscale data. It can deal with data of poor quality[12].

- *Pattern/Image-based approaches*:

Pattern/Image-based approaches analyze the claimant's basic fingerprint patterns in a database of fingerprint templates.

Advantages of face recognition:

- It's more secure and dependable.
- Because the template size is minimal, matching is quick. It also takes up less memory.
- *Fingerprint recognition* techniques are not invasive and do not change on their own.

1.1.5. Deoxyribonucleic Acid (DNA) recognition:

"Face recognition", "fingerprinting, iris scanning, retina scanning", voice dynamics, and handwriting recognition are examples of biometrics that have grown in popularity and progress. These tactics have been incorporated into the system and are dependent on the comparability of showcase assessments, which leads to inaccuracies in a global identifying method. The best identifier is DNA. It is a genetic substance found in all living beings and the nucleus of each cell. Hereditary features are found in the DNA of each human being. It is essentially digital and remains unchanged through every person's lifespan and even after death. DNA is a type of genetic code that is unique to each person, Only fraternal twins have identical DNA [13]. In most cases, instead of confirmation, DNA identification is used for identification. The technique of creating a DNA sample is known as DNA sequence or genetic profiles. The similarity of these DNA profiles is compared to DNA samples that have previously been taken and kept in the database. When comparing DNA samples, the ones with more features are more exact enough to identify the individual.

Advantages of DNA Recognition techniques:

- DNA recognition techniques provide the highest level of precision.
- The chances of two persons having the same DNA profile are less than one in 100 billion.

1.1.6. Keywords recognition techniques:

This method involves analyzing the keystroke patterns created when typing, which have been discovered to have a unique biometric signature [14]. As a result, these sequences can be utilized as a digital fingerprint to verify a computer's identity on a local workstation or over the Web. By analyzing the way these strings are entered, the username and credential safety paradigm may be improved by keystroke analysis. There is no need for any additional hardware because every laptop comes with a keyboard. This method accounts for the temporal patterns that emerge as a consequence of a typist pressing various keys on the keyboard[14].

Advantages of keywords recognition techniques:

- Keywords recognition techniques do not necessitate any new hardware or sensors, and it is inexpensive.
- In this technique, Identification is quick and safe.

1.1.7. Signature recognition techniques:

A person's signature style has also been discovered to be a distinguishing feature. It requires user touch with the writing tool as well as effort. As a form of acknowledgment, this methodology is approved by the government, as well as economic and legal activities [15]. Signature recognition techniques are a type of behavioral biometric that can alter over time and are impacted by the person's emotional and physical states. Some people's signatures differ dramatically, to the point that subsequent signature impressions differ. Professional impostors create precise replica signatures, resulting in erroneous acceptance.

Advantages of signature recognition techniques:

- Signature recognition techniques are non-invasive in nature and have a good accuracy rate.
- Signature recognition techniques are suitable for large-scale corporate transactions.
- In signature recognition techniques, if the template is stolen, it is simple to recover it.

1.1.8. Voice recognition techniques:

This method analyses the user's voice to create a voice print that can then be utilized for recognition. The goal of voice recognition is to figure out "what principle" was uttered, but the goal of speaker verification is to figure out "who" said it. Instead of focusing on the sounds or articulation of the speech, speech validation concentrates on the voice qualities that create it. Voice clarity is influenced by the thickness of the mouth, vocal tracts, nasal canals, and various language processing mechanisms in the human body. These qualities of individual speech are distinct to an individual [16].

Advantages of voice recognition techniques:

- Voice recognition techniques are easy to implement.
- In this technique no need for some extra device.

1.2 Need for biometric authentication techniques:

- *High Safety:*

Safety issues are 1 of the main basic reasons why biometric authentication has become so popular. Card swiping, chip swapping, and shoulder surfing are all examples of payment fraud that may be prevented using biometric authentication.

- *Low maintenance:*

Biometric-enabled debit cards are highly cost-effective as contrasted to keeping PINs and credentials. Given the increased demand for biometric credit and debit cards, fingerprint detector technology firms are now working on a quick and cost-effective enrollment solutions for their customers.

- *Easy enrollment*:

The idea of using a biometric payment card might seem far-fetched at first, but the procedure of enrolling couldn't be simpler. To enenrollrol, the customer does not require to visit a bank or upload their biometric information to a centralized database; instead, they just touch their fingertip on the card's scanner.

- Unique to the user:

A fingerprint is made up of distinctive features such as each individual has hills, troughs, and minute points. A fingerprint is almost impossible to copy, and it stays the same over time until anything exceptional occurs.This paper divided into 3 section out of which section one discusses that overview of biometric authentic techniques, types of biometric authentic techniques (which includes face recognition techniques, fingerprint recognition techniques, hand recognition techniques, iris recognition techniques, DNA recognition techniques, keyword recognition techniques, signature recognition techniques and voice recognition techniques), Section two discusses the outcome of previous paper and section 3 discusses the conclusion of the study.

2. DISCUSSION

R. Singh and S. Kumar stated that biometrics uses a person's biological traits or behavioral traits to identify them. A biometrics system really employs different patterns, such as iris patterns, retina designs, and biological traits, to identify patterns. In this paper author discusses the various biometric techniques. As a result author conclude that all biometric techniques have their own advantages and disadvantages[17].B. Alsellami et al. stated that measurements pertaining to physical traits of humans are referred to as "biometric technology" in a technical sense. The safety mechanism of the gadget would identify a person using biometric technology based on distinct personal attributes in a way that hackers cannot readily duplicate. In this paper author discusses the different types of biometric traits. As a result author conclude that nowadays organizations, governments, and people now must protect themselves from intruders using a high-security biometric system [18].

Biometrics is a branch of statistics concerned with the measuring of biological entities. It ensures that the user is authenticated. A fingerprint is almost impossible to copy, and it stays the same over time until anything exceptional occurs. Speech, signature, gait, and keyboard analysis are examples of behavioral biometrics, whereas physiological biometrics include the face, ear voice, fingerprints, finger geometry, finger veins hand geometry, palms, iris matching, and, more recently, neuro-signals. Biometric identification is very interesting since individual biological features are far more difficult to alter. Passcodes, safety codes, hardware locks, smart cards, magnet stripe cards, ID (Identity) cards, and physical keys are all susceptible to being misplaced, stolen, copied, or lost at home. People are expected to memorize various credentials like ATM (Automated Teller Machine) PINs (Personal Identification Number), mail credentials, and so on, and credentials can be lost, exchanged, or watched. Biometric authentication is quick, simple, accurate, dependable, and less expensive for a range of applications. Biometrics now employs non-invasive technologies for identifying persons. The processes involved in the processing of a biometric system are image acquisition, Pre-processing, feature extract, and templates storing in the system database are all done in the system database. Authenticity is determined by comparing the input query picture attributes to the saved characteristics during validation. To increase reliability and develop biometric systems or suggest a new method to an existent system, one must first understand the basic biometric system, its characteristics, constraints, biometric situation, biometric symbols utilized for an application, kinds of mistakes, and current

techniques. There is no such thing as an ideal biometric system. There is always a need to improve the biometric system's accuracy and performance.

3. CONCLUSION

The measuring and statistical examination of an individual's distinctive physical and behavioural traits is known as biometrics. The technology is mostly used for access control, identification, and for locating people who are being watched. The fundamental idea behind biometric identification is that each individual may be uniquely identifiable by their innate physical characteristics or behavioural characteristics. Biometric technologies are extensively used and recognized around the world to verify a person's identity. Furthermore, the adopted technology overcomes the limits of the traditional authentication method, like knowledge-based difficulties, such as the use of a password or a token for an individual's authentication. In this paper, the author examined a variety of biometric identification strategies. As a result, the author concludes that all use of biometric technologies depends on the user's needs, hardware costs, enrolment time, and acceptance ratio. People choose one of the strategies based on the system's safety level, functionality, and needs. Today, biometrics plays an important role in a variety of applications, including military, forensic, and access control.

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CHAPTER 10

EXPLORING THE BEAUTY OF ART AND SCULPTURE IN GREECE'S CULTURE

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ABSTRACT: ***The Greek civilization is known for its fine art and sculpture since the time of existence. It is a very ancient civilization that is known for its culture and literature. There are many old studies on the Greek culture but now with the advancement in new technologies, it become necessary to know the new aspects of the Greece culture which are still unknown. The focus of the study is to know the uniqueness of ancient Greek civilization and how it is different from some other civilizations. The different scholars, researchers, philosophers, and architects studies Greece and published their views. The study of different Greece cultures is the study of Ancient Greece, Byzantine Greece, and Modern Greece. Further studying the culture of ancient civilization, it comes to know that Greece is known for its different arts and literature which are unique and novel to the world. So, after studying the Greece civilization it becomes easy to know the foundation of geometry and mathematics origin from Sir Pythagoras. The study of Greece culture will further help in developing the knowledge of civilization and the design and architectural strategies of Greece civilization.***

KEYWORDS: ***Architecture, Byzantine, Civilization, Greece Culture, Sculpture.***

1. INTRODUCTION

Greece's culture has developed over many millennia, starting in Minoan and Mycenaean Greece and continuing most prominently into Classical Greece while also having an impact on the Roman Empire and also its successor, the Byzantine Empire. However, archaeologists praise the Greek Independence war for rejuvenating Greece and giving rise to a unified force of its multifaceted culture. Other cultures and states, including the Venetian Republic, the Frankish provinces, the Ottoman Empire, and the Bavarian and Danish monarchies, have also left their mark on Modern Greek culture. Greece is frequently cited as the birthplace of democracy and Western culture. Western democracies owed an appreciation to Greek ideas of popular sovereignty, jury trial, and legal equality. Numerous disciplines that depend on systematic thought, such as physics, biology, philosophy, geometry, and history, were pioneered by the ancient Greeks. They brought crucial literary genres including history, tragedy, comedy, and epic and lyric poetry. Figure 1 shows how the Greeks' quest for discipline and proportionality resulted in a conception of beauty that had a significant impact on Western art [1].

Figure 1: Represents the Ancient War Sculpture of Greece (Parthenon Frieze).

The Minoans, Aegean's Bronze Age culture on Crete and some other Aegean Islands, were the first wonderful ancient Greek civilization. They flourished from approximately 3000 BC to approximately 1450 BC, and after a long period of decline, their civilization finally came to an end about 1100 BC during the beginning Greek Dark Ages. They constructed buildings during the peak of their authority, including city homes and royal palaces. The castle of King Minos at Knossos, which had two to three floors, more than 500 compartments, and several balconies with porticos and steps, served as an example of this type of structure. There were enormous reception halls, bedrooms for the royal family and attendants, bathrooms with full drainage and sewer systems, storerooms, theatres, sporting arenas, and other facilities inside this castle. The walls of the Athens temple, as seen in Figure 2, were constructed of marble tile or brickwork and were adorned with elaborate frescos. Akrotiri, a whole Minoan city just on the island of Santorini, was founded in 1967 in addition to the castle. Later, in Tiryns, Pylos, and Mycenae, the Mycenaean civilization built magnificent buildings [2], [3].

Figure 2: Representing the Temple Of Athens in the Ancient Greece Civilization.

Around 449 BC, an unidentified architect built the ancient Temple of Hephaestus just on Agoraios Kolonos Hill in Athens, Greece. Following the early Greek Dark Age, the architectural style evolved into the style which, together with Roman, served as an inspiration for Classical and subsequently neoclassical architecture. Their theatres and temples, including the Erectheion and Parthenon on the Athenian acropolis, are examples of this style. Temples and theatres both employed a sophisticated medley of visual tricks and harmonious proportions. Typical components of typical Ancient Greek temples include a foundation with stairs along each edge, a combination of skills with a religious statue inside, pillars, an architrave, and two pediments one on the front side and one on the rear Greek stonemasons and builders created the Doric, Ionic, and Corinthian orders, a set of guidelines for all structures, by the fourth century BC. Their columns make them the most noticeable. Figure 3 depicts a bronze statue of a young warrior from 310 BC. The Corinthian pillar is identical to the Ionian one, however, the capital is radically different, being embellished with acanthus leaves and four scrolls. The Doric pillar is substantial and plain. The Ionic one is leaner and seems to have 4 inscriptions at the points of the capital [4], [5].

The builders of its Eastern Roman Empire, also known as the Byzantine Empire, constructed city walls, castles, hippodromes, bridges, irrigation systems, and cathedrals when the Roman Empire's center was moved into Constantinople around 330 AD and the Western Roman kingdom fell some 150 years later. The basilica, which had been widely used and underwent the most evolution of all the buildings created in the empire, was one of the more well-known

types of churches erected by the Byzantines. The Byzantine architectural style served as the primary source of motivation for architectural features in Eastern Orthodox nations through alterations and modifications of regional inspiration [6], [7].

Figure 3: Representing the Bronze Sculpture Of 310 BC of Victorious Youth[8].

Figure 4: Representing The Ancient Gravestone Of Child Labor And Lord In 100 BC.

The Hagia Sophia was seen as an emblematic church of Christianity, much like the Parthenon, which had been constructed in homage to the religion of Ancient Greece. Both the external and interior designs of the temples of the two religions are very different. The inside of the temple, where the cult figure of the god to whom it was erected was housed, was the most significant area in ancient times, and only the priesthood was allowed access there, as illustrated in Figure 4. The rites were placed outside, and the worshipers could see the temple's front, which was made up of columns, an entablature, and two pediments. While this was happening, Christian services were done within churches, which often had little to no adornment on the exterior [9], [10].

Marble columns, vaulted ceilings, and lavish ornamentation, such as the frequent utilization of mosaic on a golden background, were common features of Byzantine architecture. Byzantine builders opted for stone and brick as their primary construction materials, with a thin alabaster sheet for apertures, as opposed to the marble that the Ancient Greeks greatly valued and employed. Neoclassical architecture was widely employed both for the governmental and non - governmental structures after Greece gained its independence and throughout the nineteenth century. Athens' and other Greek towns' 19th-century architectural styles were largely inspired by designers including Anastasios Metaxas, Theophil Hansen, Lysandros Kaftanzoglou, Panagis Kalkos, Stamatios Kleanthis, and Ernst Ziller. Greece's churches, on the other side, went through a Neo-Byzantine rebirth. Le Corbusier signed and released this same Athens Charter, the manifesto of a modernist movement, in 1933 as shown in Figure 5. Takis Zenetos, Patroklos Karantinos, Ioannis Despotopoulos, and Dimitris Pikionis, were the main architects of this movement.

Figure 5: Representing the Ancient Greek Theatre Having Its Unique Design and Structure[11]**.**

Massive apartment building development in the major Greek urban areas after World War II and also the Greek Revolutionary War played a significant role in the Greek economy's post-war recovery. The OTE Tower as well as the Athenian Tower Complexes were two of the first skyscrapers built in the late 1960s and early 1970s. The history of Greece is as beautiful as its art of sculptures. There are many historical sculptures in the world but Greece has its unique art of sculpture which makes it unique in the world. The art, architecture, and culture of Greece had a great impact on history. Thus, the purpose of the study is to know the uniqueness and beauty hidden in the art and sculpture of Greece.

2. LITERATURE REVIEW

Sibel Almelek İşman, their research focuses on Greece culture and how four statues Sleeping Ariadne, Venus of Milo, Apollo Belvedere, and Nike of Samothrace, appear in the minds of artists who work in a variety of artistic mediums. This descriptive study focused on depictions of ancient sculptures and their creative and original interpretations. Ancient Greek sculpture has been looked for in works from the 20th century. Thanks to the appreciation and respect shown for Ancient Greek sculpture in the 20th century, these ageless paragons of the

Classical and Hellenistic eras have been given a new lease of life. It may be said that artists produced memorable and captivating works by combining imagery from the past and the present [12].

Maya Jess discussed the views of beauty in ancient times, from classical Times of Greece to imperial Rome. Finding a visual of the attractiveness one is attempting to express is a frequent initial step when attempting to communicate something lovely to someone. This research aims to investigate what aspects of the most feminine but also masculine human body in ancient Greece and Rome were considered to be lovely. Because people are preoccupied with the notion of beauty and strive to be viewed as lovely, this study is crucial because we are unsure of the origins of these ideals of beauty. Both Greeks and Romans were responsible for the vast bulk of architectural ideals of beauty as in the West. Understanding their thoughts of beauty concerning humanity can help us comprehend our contemporary concepts of beauty [13].

Maria João Durão describes the significance of blue throughout ancient Greece. The controversy was sparked by Pliny's list of the colors used among Ancient Greek painters, which did not contain a blue pigment, and Homer's poems, whose assessment did not show up to comprise a term to designate blue. This paper responds to the arguments behind these claims and adds to the conversation by explaining how Ancient Greeks seem to have been able to see blue. The chosen strategy combines information from several fields, including Greek philosophy's ideas of color and vision, color nomenclature, and the historical theory resulting from the use of color in Ancient Greek art and architecture [14].

Keyang Wang, compares and contrasts the styles of ancient Greek and Roman art from a variety of angles, including geography, politics, cultural influences, and historical considerations. It also discusses the strategies that ancient Greek and Roman painters employed in their creations. Whatever the distinctions between ancient Greek and Roman art were, and how they were passed down. In a summary, ancient Roman painters place more emphasis on realism and emphasizing the souls of their emperors than their Greek counterparts, who place more emphasis on independence and idealism. research is to identify the distinctive cultural and aesthetic elements of these two historic, great nations.

Kanwaljit Kaur describes the few of the oldest and most exquisite representations of Indian architecture that may be seen in the villages of the Harappan Culture, which are notable for their creative town design. Hindu, Buddhist, and Jain architectural styles make comprise the three types of post-Harappan architecture. In the modern world, Hindu-style architecture is the most common. The Persian and native architectural styles combined to create a unique hybrid throughout the Middle Ages. After that, the colonial era introduced Western architectural forms to India, which have influenced Indian architecture ever since. The outcome is an original architectural composition formed of native styles and other influences, each of which has given the finished product its peculiar charm [15].

Anika Sharmila et al. examined and described the architectural design of their structural components, the research seeks to confront the colonization identity of both the heritage buildings in Rangpur city. The historical monuments are first meticulously surveyed and recorded, after which they are examined to see how colonial architecture's structural elements have been incorporated into them. The importance and historical value of these historical buildings may be understood by observing these specific architectural aspects. This would help to appreciate the historical context of these structural characteristics as well as their relevance in comprehending the variety of our heritage structures. Additionally,

discussing the structural components used in the buildings over time can help with preservation efforts for these buildings with significant historic importance.

There are various studies done in the world that are done on architecture, arts, and sculptures. Many monuments are unique and show fine art to the world. There are many studies on the fine art of Greece by very famous philosophers in the world. The study is done to analyze the importance and uniqueness of sculpture in the world. The Greece civilization is one of the ancient civilizations in Europe which has its beauty and style which make the country unique in the world.

3. DISCUSSION

Greece has a remarkable 2800-year-old literary history that has endured through several centuries. The period is known as the Classical era, which started in 800 BCE and continued to have an impact up to the beginning of the Byzantine period before being superseded by the influence of Christianity, is the one most often associated with Greek literature. Modern Greek literature, notably the works of George Seferis and Nobel laureates Odysseus Elytis, reflects various facets of a centuries-old heritage. The culture of Greece is known for its arts, sculpture, and architecture all over the world. There are different stages of development in the Greece culture which affect the life of civilians in Greece. The development stages brought changes in the Greece civilizations and the applications of various techniques and methods in human lives.

3.1.Ancient Greece:

Ancient Greece has several interrelated painting traditions. They underwent relatively diverse developments as a result of their technological differences. The archaeological record does not adequately document all painting methods. According to writers including Pliny and Pausanias, panel paintings individual, portable paintings on oak panels were the most revered type of art. With the magnificent fresco art of locations like Knossos, Tiryns, and Mycenae, the history of a mural in Greek probably dates here to the Mycenaean and Minoan Bronze Ages. The majority of monumental sculpture from ancient Greece was made of marble or bronze, having cast bronze emerged as the preferred material for large-scale pieces by the early fifth century. Fortunately, bronze and marble are both incredibly strong and simple to shape.

Chryselephantine sculptures, which were employed for temple worship figures and opulent works, typically used ivory for the entire figure and gold, most frequently in the form of leaves, among other materials. These sculptures were far less widespread and just a few fragments have remained. Even by the early 19th century, several statues with evidence of particularly colorful surfaces had been discovered through the methodical excavations of ancient Greek sites. Painting on ancient Greek statues was not a known truth until German archaeologist Vinzenz Brinkmann revealed his findings in the late 20th and early 21st centuries. Brinkmann demonstrated that the whole Parthenon, including the original building and the sculptures, had been painted using high-intensity lights, ultraviolet lights, specially developed cameras, plaster molds, and certain powdered minerals.

In Greece, the theatre was created. Its center was the urban of Ancient Athens, which during this time rose to prominence as a great cultural, administrative, and the national army. Dionysia, a festival honoring the deity Dionysus, is where it was institutionalized. The three theatrical styles that developed there were comedy (486 BC), tragedies (6th century BC), as well as satyr play. To foster a shared cultural identity, Athens spread the event to its many colonies and allies. This etymology suggests a connection to the rituals of the prehistoric

Dionysian cult. However, it is hard to tell for sure how these reproductive practices served as the inspiration for both tragedy and comedic works.

3.2.Byzantine Greece:

The ancient Greeks painted a lot of their figural and architectural sculpture in vibrant colors. Greek masonry like this is referred to be polychrome. Polychromy on architecture and sculpture has typically significantly or completely faded due to intense weathering. The term "Byzantine art" was used to describe the artwork produced within the Eastern Roman Empire in between the fifth century as well as the siege of Constantinople around 1453. This new aesthetics' "abstract", or anti-naturalistic, nature was its most striking characteristic. Byzantine art appears to have relinquished this endeavor in favor of a much more symbolic approach, whereas classical art was characterized by the desire to produce representations that matched reality as nearly as possible. Byzantine art mostly included hagiographies and icons.

In stark contrast to the medieval art of either the West, where the spectacular sculpture was resurrected from Carolingian art onward, the Byzantines produced only injunctive relief, of which very few survive that are even close to life-size. They carried over the early Christian mistrust of painting and sculpture in religious art. Small ivory objects were generally in relief as well. A so "minor arts" played a significant role in Byzantine art including luxury goods, such as ivory carvings used for formal presentations. The Byzantine era saw the widespread production of consular artistic renderings or caskets like the Veroli casket, made of graphite sculptures, enamels, jewelry, metallurgy, and figured silks. Although many of these were religious, many other items with utilitarian or non-representational ornamentation were also made, such as ivory carvings of subjects from ancient mythology. Because pottery was seldom seen at the banquets of the wealthy, who ate off of silver, Byzantine ceramics were comparatively simple.

The dramatic arts saw a significant decrease throughout the Byzantine era. Despite the enmity of the official state, the folk theatre was the only form that managed to exist, according to Marios Ploritis. The Karagiozis became the primary form of dramatic folk art throughout the Ottoman era. The Venetian Crete witnessed the Renaissance that gave rise to an Advanced Greek theatre. Georgios Chortatzis and Vitsentzos Kornaros are notable dramatists.

3.3.Parthenon Frieze:

The elevated Pentelic marble sculpture known as the Parthenon frieze was made to embellish the top of the Parthenon's naos. Between around 443 and 437 BC, it was carved, most likely under Pheidias' guidance. 128 m, or around 80%, of the original frieze's 160 m remains. The paintings claimed by French artist Jacques Carrey from 1674, 13 years before the Venetian attack that destroyed the temple, are the only source of information for the remaining details. Currently, the bulk of the frieze is housed in British Museum in London; the majority of the other parts are split among six other institutions. The Beazley collection just at Ashmolean Museum in Oxford, the Spurlock Museum at Urbana, the Skulpturhalle in Basel, and other places have casts of the frieze.

Greek artists rediscovered sculptures with the founding of the Greek Empire and the impact of Neoclassicism in the west. Ancient Greek history, the War of Independence, and significant personalities in Greek history were the main subjects. The extensive neo-classical architecture and design ornament at the Academy of Athens was one of Leonidas Drosis's major accomplishments. Other notable sculptors of the new state included Georgios Bonanos,

Georgios Vitalis, Yannoulis Chalepas, Ioannis Kossos, Lazaros Fytalis, Dimitrios Filippotis, and Lazaros Sochos.

*Modern Greek:*Early in the 19th century, following Greek independence, the Medieval Greek theatre emerged, first influenced by Heptanesean theatrical and melodramatic, including such Italian opera. The Parliamentary Candidate by Spyridon Xyndas, which had a solely Greek libretto, was presented just at "Nobile Teatro di San Giacomo di Corfù", which served as modern Greece's first theatre and opera house. Revues, musical comedies, operettas, nocturnes, and prominent writers like Theophrastos Sakellaridis, Dionysios Lavrangas, Spyridon Samaras, and many others dominated the Athenian theatre scene in the late 19th and early 20th centuries.

The history of Greek is very large with different rules and laws there are various changes in the Greek culture from ancient to modern civilizations. There are many variations and changes in the lifestyle of the people from the old world to the New Greek world from one ruler to another where many lives survived the hardest to golden times of different rulers. The theatres, community buildings, art galleries, museums, etc. are some of the places of great importance in ancient Greece. There are different clothing styles and lifestyles of people belonging to the different classes in the community. Most of the sculptures and the carvings are still preserved by their citizens in different forms. The masks, wall paintings, and stone carvings are unique styles of Greek art. The arts and the ancient work are still to be studied and known and decoded in their different styles using technology.

The development of Greek civilization makes the world aware of the fine art and architecture of ancient Greece. Many historians and archeologists studied the Greek culture and its different aspects in the world of other civilizations. The different philosophers elaborated and explored the uniqueness of Greece and Rome's civilization and their marvelous work in the field of arts and architecture. The various studies surprised the world by seeing the different designs in the ancient civilization of Greece. The study helps to know the importance of the fine arts on the historical monuments in the ancient Greece civilization.

4. CONCLUSION

The Greek civilization is known for its fine art and sculpture since the time of existence. It is a very ancient civilization that is known for its culture and literature. The focus of the study is to know the uniqueness of ancient Greek civilization and how it is different from some other civilizations. The different scholars, researchers, philosophers, and architects studies Greece and published their views. The study of different Greece cultures is the study of ancient Greece, Byzantine Greece, and modern Greece. Further studying the culture of ancient civilization, it comes to know that Greece is known for its different arts and literature which are unique and novel to the world. So, after studying the Greece civilization it becomes easy to know the foundation of geometry and mathematics origin from Sir Pythagoras. The study of Greece culture will further help in developing the knowledge of civilization and the design and architectural strategies of Greece civilization.

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CHAPTER 11

COMPARATIVE STUDY ON THE STRUCTURAL & CULTURAL ASPECTS OF EGYPTIAN AND MESOAMERICAN PYRAMIDS

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ABSTRACT: ***Pyramids are unique and beautiful examples of engineering and architecture. Different countries have different designs of pyramids with different functions. The elements used to build the pyramids are used in different areas, including different types of soil, sand, and rocks. The focus of the study is to compare as well as discuss the structural and cultural aspects of the Egyptian and Mesoamerican pyramids. Various studies and literature have been used for this study as well as the components and distinctiveness of monuments. The study shows that there are different cultures and civilizations in the world which have their design and architectural strategies which are still not properly disclosed to the world. Further study on pyramids may be followed by the discovery of design strategies and the implementation of its new technology and will also show how the science is implemented in a particular pattern that is unique to the study.***

KEYWORDS: ***Architecture, Culture, Egyptian, Egyptian Pyramid, Giza, Mesoamerica, Pyramid.***

1. INTRODUCTION

A pyramid is a building that substantially resembles pyramids in the geometrical sense when its outside borders remain triangular and rise to a single component at the summit. A pyramid foundation might be a triangular, quadrilateral, or any other type of polygon. A pyramid, therefore, has a minimum of three exterior triangular surfaces. A typical variation is a square pyramid, which has a square base area and four triangular exterior surfaces. Due to the shape of a pyramid, where the pyramidion is at the top and the rest of the weight is closer to the bottom, less material will be pressing down from above on a pyramid. Early civilizations were able to build solid monumental constructions thanks to this distribution of weight. Pyramids have been constructed by civilizations around the world. The Pyramids of Cholula, located within the Mexican state of Puebla, is the biggest pyramid in terms of volume. The Red Pyramid at the Dashur Necropolis as well as the Pyramids of Khufu, both in Egypt, were the biggest buildings on Earth for thousands of years; the latter and the only one of all Seven Wonders of the World World still standing.

The most well-known pyramids are those in Egypt, which include enormous brick or stone structures that are among some of the tallest buildings in the world. They are designed to resemble the sun's beams. To seem shiny from a distance, the majority of pyramids had polished, highly reflecting white limestone surfaces. The capstone was often formed of granite or basalt, which were both durable stones; it might have been coated with golden, silver, as well as a precious metal and might even be quite reflecting. Pyramid construction by the ancient Egyptians lasted from 2700 BC until about 1700 BC. The 3rd Dynasty's Pharaoh Djoser with his designer Imhotep constructed the first pyramid. Six piled mastabas made up this step pyramid. The Giza pyramid structure includes the tallest pyramids in Egypt, as may be seen in Figure 1 [1],[2].

Figure 1: Represents the Egyptian Ancient Pyramid of Giza.

At Giza, between 2575 and 2150 BC, the ages of the pyramids peaked. Because the holy pharaoh's spirit was intended to merge with the sun throughout its fall while continuing also with the sun inside its everlasting loop, ancient Egyptian tombs were often built west of the Nile. About 135 pyramids had been found in Egypt as of 2008. The largest pyramid in Egypt and among the biggest on the entire globe is the Pyramids of Giza. Before the completion of the Lincoln Cathedral in 1311 AD, it stood at 481 feet. The base spans an area of more than 52,600 sq m. One of several Seven Wonders of the World is the Great Pyramid at Giza. That is the one that has endured into the present era. White limestone that has been polished and contains a lot of fossilized seashells was used by the Ancient Egyptians to cover the faces of the pyramids. Many of the coping blocks had fallen or been taken out and utilized in Cairo's building[3],[4],[5].

Only one royal pyramid, in the Abydos temple complex, is south of Cairo, where the majority of pyramids are found. Ahmose I, the monarch who established the New Kingdom and the 18th Dynasty in Egypt, ordered the construction of the pyramids at Abydos. During the rule of King Djoser in the Third Dynasty, pyramid construction started. Pyramid construction began under early monarchs like Snefru, and continued under succeeding kings up for the rest of the Middle Ages. Later monarchs buried their graves in the hills, including the Valley of Kings in Luxor's West, after Ahmose, the last king to construct an aristocratic pyramid. Individuals constructed a small pyramid in Medinat Habu aka Deir el-Medina. The Nubians who governed Egyptians in the Late Periods also constructed small pyramids having steeper slopes [6],[7],[8].

Pyramid-shaped buildings were also constructed by a majority of Mesoamerican tribes. Mesoamerican pyramids often resembled the Mesopotamian ziggurat more than the Egyptian pyramid because they were stepped and had temples on top. The Pyramids of Cholula, located mostly in the Mexican state of Puebla, is the biggest pyramid by volume, as seen in Figure 2. The greatest structure ever built elsewhere in the world, this pyramid was built between the third and ninth centuries AD and is being excavated today. Mexico is also home to the Pyramid of the Sun in Teotihuacan, the third biggest pyramid in the world. Just at the location of Cuicuilco, which is today located within Mexico City and was mostly buried in lava following an outburst of a Xitle Volcano during the first century BC, there is a unique pyramidal structure with a circular layout. Teuchitlán, Jalisco also has several

Guachimontones, or circular stepping pyramids. In Mexico, pyramids were frequently utilized as sites for human sacrifice. For the re-consecration of the Pyramids of Tenochtitlan in 1487 [9],[10],[11].

Figure 2: Represents the Mesoamerican Pyramid "El Castillo, Chichen Itza".

Archaeological digs at Hellenicon and the writings of the ancient author Pausanius, who saw two pyramids in Greece, provide evidence of pyramid construction in that country. The Hellenic ruins are not as well preserved as the Egyptian pyramids, and there are no Greek documents that reference pyramid construction, therefore it is still unclear how the Grecian pyramids worked. Pausanius' accounts seem to suggest that the pyramids were memorials to fallen heroes, and perhaps some of them were, but some scholars have hypothesized that perhaps pyramids were used as watchtowers because the Hellenicon ruins have a door in the base that can only be locked from the inside. However, because the Hellenicon pyramid's top has been gone for a very long time and there are no records of it from ancient times, this must remain speculative (Figure 3).

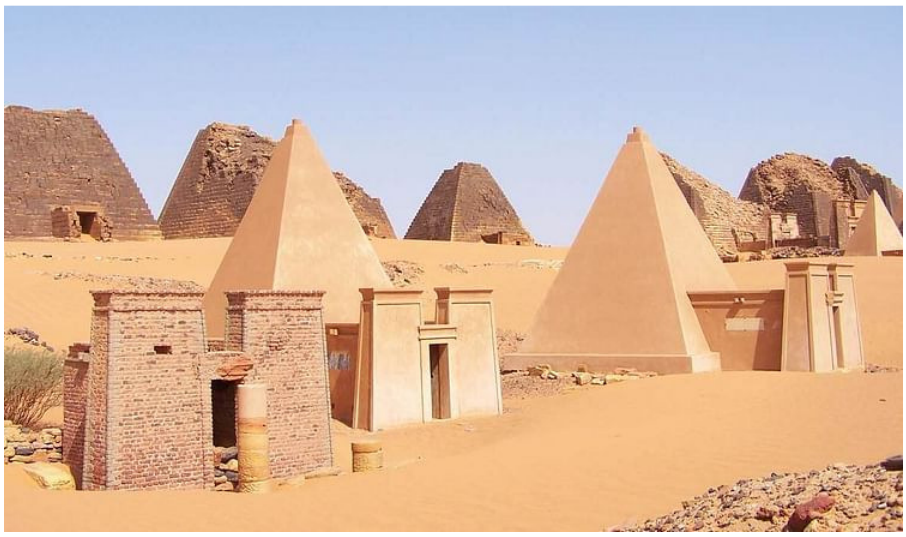

Figure 3: Representing the Meroe Pyramids Reconstruction [worldhistory].

The pyramid was once again used as an Egyptian burial during Roman times, and it is still standing today in Rome next to Porta San Paolo. The pyramid, which was the mausoleum of

the magistrate Gaius Cestius Epulo and was constructed between 18 and 12 BCE, rises 125 feet from a foundation of 100 feet. The form and internal layout of Cestius' pyramid might be regarded as either Egypt or Nubia, although there is significant debate about whether the Romans borrowed this shape from one or the other. Although comparable to those of Egypt, the pyramids of the Kingdom of Meroe seem to lack the intricate internal chambers of Egypt.

There were no convenience shops in ancient civilizations like Mesopotamia and Egypt where people could go to get milk and slushies. Instead, they were the first farm-to-table societies, in which agriculture played a central role in all aspects of life. Both were situated in river valleys, which are plains with rivers snaking through them. Every year, these rivers would overflow, leaving behind excellent soil ideal for agriculture when the water had subsided. Ancient Egypt had the Nile River flowing through it, while the Tigris and Euphrates rivers circled and passed through Mesopotamia, producing what is known as "the Fertile Crescent." However, Mesopotamia's rivers often caused significant amounts of damage and fatalities when they suddenly and irregularly flooded in the spring. The ancient Egyptians based their calendar on the river's annual summer flooding since it occurred at such a precise time. Mesopotamian and ancient Egyptian faiths were developed as a result of their dependence on their geographic region to provide them with sustenance.

2. LITERATURE REVIEW

Salah Saleh et al. conducted a geological survey in the Lahun region, to find archaeological ruins near the Senusret II Pyramid in Lahun, Fayoum, Egypt. Senusret II is reported to have constructed his pyramid in the Lahun region, which served as the monarch's necropolis at the time. Wherever shafts, chambers, or cavity-like formations are anticipated, a gravity survey was used, and a magnetic survey was used where mudbrick constructions are anticipated. The geophysical survey was successful in locating anomalies that may have been part of a trench between the Queen's Pyramid and the east as well as south corners of the Senusret II Pyramid, 2 chambers that may have been royal tombs, and the remnants of three sizable mudbrick buildings that may have been ancient warehouses.

Dominic Thibault, has calculated the number of rows in an equilateral square-based pyramid with egyptian influence using a mathematical equation. That aims to determine the number of layers in an equilateral pyramid with a square base that resembles an Egyptian pyramid. The pyramid was initially split into floors, the number of layers on each level was determined utilizing Riemann's first law on addition, and then the total of the bricks from each floor was determined. The mathematical method led to the discovery of a graph with a degree 3 polynomial function, zero unique spots, and a flawless coefficient of correlation of 1.0. Furthermore, the Great Pyramid of Egypt may contain over twice as many bricks as are currently believed by archaeologists, according to the implementation of the proposed equation. The findings of that study allow for the computation of either the number of pieces in an equilateral square-based pyramid modeled after the Pyramids of Egypt, allowing for a critical evaluation of existing estimations by archaeologists.

According to the Letizia Cerqueglini about 100 nouns and about 20 personal names of important biblical personalities make up the Ancient Egyptian linguistic legacy found in Hebrew thus far. Ancient Hebrew speakers had persistent and culturally significant interaction with Egypt, according to research by Yahuda and Noonan as well as historical and archaeological data. Hebrew and Egyptian languages shared linguistic roots from the time of the Egyptian invasion of Canaan in the New Empire (1549–1069 BC) to the Late Years as a result of social and political interaction (7th century BC). The author discussed the possibility of additional Ancient Egyptian foreign words throughout Hebrew, a feasible Egyptian

influence on the Hebrew word for “color”, and “m”, a case of phonologically distinct Hebrew words with semantically similar Afroasiatic counterparts, and a modern understanding of the meaning of the word “ra”, which means “fresh, newborn”, in the illumination of Ancient Egyptian records. Hebrew and Egyptian words with distinct origins from shared Afroasiatic origins.

Dows Dunhamdiscussed how ancient Egyptians constructed a pyramid has long been a source of inquiry and astonishment. Herodotus' depiction of the process in History appears to already be based on stories Egyptian dragomans told him in the 5th century Bc However, the fundamental obstacle to finding a conclusive solution to the issue still exists because the Egyptians themselves did not leave a straightforward record of how this was done. As a result, author must rely on our very shaky understanding of what they knew about engineering and the techniques we are aware they used to handle heavy or bulky components. As the first of the sequence of depictions of outstanding architectural feats from the past, the Museums, and Science in Boston started building a replica of each of the Egyptian pyramids mostly in the spring of 1950. The job was assigned to Mr. Theodore B. Pitman, a skilled model builder from Cambridge, Massachusetts, and Sir Bradford Washburn, President of the Museum, who requested the writer to serve as an archaeology consultant [12].

J. Klokocnik et al. discussed the Mesoamerican Pyramid and Ritual Centers Oriented to Use a Magnetic Compass. This claim is put to the test using newly available information, specifically, a comparison of paleomagnetic declensions for the time and region (Korte and Bhnel) and building orientation data based on our measurement techniques at numerous archaeological sites in Mexico, Guatemala, and Copán, Honduras, using GPS and a precise compass. Authors discovered that the majority of constructions had an orientation that deviates from the topographic maps north direction after excluding those with documented astronomical and calendar alignment. That observed by visiting and building orientations can thus still be explained by the Fuson theory. But to accept or reject the theory, more thorough and reliable information is required, mostly from pale magnetization and archaeology. It would be crucial for the comprehension of ancient world history if there were evidence that compass use existed in Mesoamerica before it was known to the Chinese [13].

Christine D. et al. stated the residential Histories of Human Sacrifices at Teotihuacan's Moon Pyramid. Authors examined teeth enamel for oxygen- as well as strontium-isotope ratios and bone alone for oxygen-isotope ratios to determine the geographical origin of a sacrificial Burials 2- 5 from the Moon Pyramids at Teotihuacan and to recreate changes in residency during their childhoods. Combining these analytical methods affects all-weather and geologic factors, improving geographic identification resolution. The majority of the sacrificial people seem to be born abroad. Although the Winged Serpent Pyramid consists of a distinctive community with really reduced oxygen isotopes ratios, suggesting Oaxaca, Michoacan, or the beach area and piedmont of Guatemala, the Moon Pyramid sacrifices contain a few people with good oxygen-isotope ratios, usually indicates the Gulf Coast or Maya Lowlands. The movement patterns of the sacrifice in the 2 pyramids also vary. The bulk of Moon Pyramid fatalities appeared to have just moved to the area, but the bulk of the Winged Serpent Pyramid victims had been in Teotihuacan for just a considerable amount of time before their deaths [14].

James E. Brady and Wendy Ashmore, stated the landscapes in the ancient Maya's imagination. Numerous academics have examined aspects of the Maya environment, as well as its significance and connections to prehistoric art, architecture, and culture. Author’s focuses on the mountains, caverns, and water features that serve to actively and cooperatively orient the Maya environment. They take pertinent information from different Mesoamerican

locations, times, and peoples despite our focus on the lowland Maya of the Classic era (AD 250–900). They draw attention to new fieldwork on Maya caves, particularly the Petexbatun Regional Cave Survey, and observed rising acceptance of the power, age, pervasiveness, and structuring function of the physical references to this conceptual complexity [15].

3. DISCUSSION

The pyramid was the focal point of a surrounding complex in every civilization that used one and, of course, as indicated, there were additional pyramids in China, across Mesoamerica, India, and, eventually, throughout Europe. The Great Pyramid at Giza, which is now located between the two lesser pyramids and other newly discovered Mastabas, would have initially risen over terraces, pathways, and structures erected in honor of the gods of that location or the spirits of the departed. On the Giza plateau, there were formerly worker's settlements, which later developed into commercial hubs. These laborers weren't foreign slaves; rather, they were Egyptians who were either hired as a kind of sacred sacrifice, gave their time freely as a form of communal duty, or were rewarded for their skills. No indication of forced labor was discovered during archaeological digs at the Giza Pyramids or any other Egyptian sites.

A pyramid is a building or monument with a typically quadrilateral base and a triangle summit. While there are over 70 pyramids in Egypt that span down the Nile River Valley and were once the focal points of enormous temple complexes, they are not the three lonesome buildings on the Giza plateau at the border of the Sahara Desert as is often believed. Although the pyramid form is mostly associated with Egypt, it was initially used in Mesopotamia in the mud-brick ziggurats and was later adopted by the Greeks and Romans. In the Nubian kingdom of Meroe, south of Egypt, in Maya towns throughout Central and South America, and China, in a variant of the shape, there are also pyramids. Egyptian pyramids may have evolved from Mesopotamian ziggurats, which date back as far as 4000–3500 BCE and are known for their stepped patterns in the earliest pyramids. In the Saharan area of Niger, tumuli with megalithic structures emerged as early as 4700 BCE, before presumed older monuments in the Eastern Sahara.

It's also likely that the mastaba and pyramid of Egyptian Civilization may have their roots in these megalithic structures from the Saharan regions of Nigeria and the Eastern Sahara. Tumuli may be found in a variety of places from the Predynastic period in Egypt. First, from the Early Dynastic Period, wealthy Egyptians were interred in mastaba tombs, which resembled benches. It was found that the 1st Dynasty's Mastaba 3808 at Saqqara included a sizable, independently constructed step-pyramid-like structure encased inside the outer palace facade mastaba. There might be further constructions of this type from this period, according to archaeological artifacts and inscriptions. Egyptologists believe that the 3rd Dynasty king Djoser built the earliest known Egyptian pyramid in recorded history. Although Egyptologists frequently identify the vizier Imhotep just like its builder, the dynasty Egyptians themselves did not attribute to him the creation of a stone building or the design of Djoser’s pyramid, either at the time or in several subsequent dynasty texts about the figure. The Pyramid of Djoser was initially constructed as a square mastaba-like framework, whereas these structures were typically known to be rectangular. This square mastaba-like structure was later expanded several times through a sequence of accretion layers to generate the stepped hierarchical system seen today.

Egyptologists think this structure acted as a huge staircase for the pharaoh's spirit to use to go to paradise. Ancient masonry buildings called the Egyptian pyramids may be seen throughout Egypt. There are at least 118 known “Egyptian” pyramids, according to sources. About 80 pyramids were constructed inside the empire of Kush, which is now a part of contemporary

Sudan. The majority of those found in contemporary Egypt were constructed as graves for such rulers of the nation even during the Old and Middle Empire eras.The earliest recorded Egyptian pyramids are located at Saqqara, north of the city of Memphis. However, at least each step-pyramid-like framework during the First Dynasty Mastaba 3808, which is also believed to have been built during the rule of Pharaoh Anedjib, as well as other archaeological artifacts from the period, have also been discovered at Saqqara. The Pyramid of Djoser, erected between 2630 and 2610 BCE during the Third Dynasty, is the oldest of them. Most people agree that this pyramid and the surrounding complex are the earliest monumental dressed masonry monuments in existence. The Giza pyramids, which are located outside of Cairo, are the most well-known Egyptian structures. So many of the Pyramids of Giza rank among the biggest buildings ever constructed. The biggest pyramid in Egypt is called the Pyramid of Khufu. Even though it is an ancient wonder of roughly 2,000 years, it is one of only the Wonders of the World that is still standing.

The oldest pyramidal buildings, known as ziggurats, were constructed by the Mesopotamians. These were vividly painted in gold or metal in antiquity. Little of them is still visible since they were made of mud-brick that had been sun-dried. For their local faiths, the Akkadians, Assyrians, Babylonians, Elamites, and Sumerians constructed ziggurats. Each ziggurat was a component of a larger temple complex that included contained other structures. Raised platforms from the Ubaid era in the 4th millennium BC were the forerunners of the ziggurat. Near the conclusion of the new Dynastic Period, the earliest ziggurats appeared. The most recent ziggurats in Mesopotamia are from the sixth century BC.

The great pyramid was a pyramid-shaped building with an undercut that was constructed in levels that retreated from a square, rectangle, or oval platform. The ziggurat's structure was mostly composed of sun-baked bricks, with heated bricks used for the exterior facings. The facings were frequently glazed in various hues and may have represented astrological signs. On these glazed bricks, kings' names have occasionally been inscribed. There were two to seven layers in all. The solely written proof for them having sanctuaries at the summit comes from Herodotus, though there's no archaeological proof for this. There would have been steps solely on a single side of a ziggurat leading to the shrine or a spiral ramp leading from the base to the peak.

There is no connection between the pyramids from the ancient Mayan and Egyptian civilizations. However, it's still fascinating to consider how many societies came up with the concept of building pyramids as a part of their cultural identities. Egyptian pyramids predate the Mayan pyramids in age. Around 100 BCE, they were constructed. Their pyramids were utilized for rituals and as temples. They didn't intend for their pyramids to stand for millennia. In actuality, the Mayans planned on having to reconstruct them when they constructed them. They built their staircase-equipped pyramids in the center of their towns for easy access. The utilitarian purpose of Mayan pyramids was fundamentally different from that of Egyptian pyramids, even though rulers were sometimes buried there.

4. CONCLUSION

The different countries have different designs of pyramids with different functions. The elements used for the construction of pyramids are used in different regions including different types of soil, sand, and rocks. As the focus of the study is to compare and discuss the structural and cultural aspects of Egyptian and Mesoamerican pyramids. Different studies and literature have used the study of the components and uniqueness of monuments. After the study, it is found that some pyramids in the world are unique and are among the Seven Wonders of the World. Some pyramids have unique and new designs which show the skills

of ancient architecture and architects. Further studies on the pyramids can be followed the exploring the design strategies and implementation of its new technology and also it will show how science is implemented in a particular pattern that is unique to study.

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CHAPTER 12

INVESTIGATING THE HISTORICAL ORIGIN OF GREEK THEATRES AND ITS IMPORTANCE IN THE GREEK CIVILIZATION

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ABSTRACT: ***The Greek civilization is known for its art and culture; the unique beauty of Greece architecture is seen by the world in its historical sculptures and monuments. The theatres are used to aware the people about their rights and duties towards their nation with entertainment. Different philosophers and literature disclosed the Greek civilization according to their studies which also discussed the importance of theatres in the life of Greek peoples. The Greek theatres are the mode of communication and the conveying the information through the mode of acts and plays which leads to the development of theatres. The focus of the study is to understand the origin of theatres in Greek civilization and their importance for public awareness. Thus, the purpose of developing theatre is simply to convey the messages to the audience and to maintain peace. The study further helps in improving the techniques to aware people as well as design for human comforts. This study is also useful for studying the historical origin of Greek civilization and the world of various parts of the country.***

KEYWORDS: ***Architecture, Greek Civilization,Greek Theatres, History, Entertainment, Theatre.***

1. INTRODUCTION

Greek civilization developed the idea of the theatre building, which is a simple structure in which exceptional aesthetics and utility coexist together. From the Classical era onward, theatres were an essential component of any urban center. They were located at the hubs of political, social, and religious activity the acropolis, the bouleuterion, the stadium, the sanctuaries as well as the agora. Theaters stood out for their straightforward architecture and circular or semi-circular seating arrangements that, when paired with the difference in height between the tiers, produced a singular combination of an unobstructed view and superior acoustics. The positions of the cavea had been typically built into the edge of a natural mountain ridge, with the core dug out from the floor or rock and the sides banked up. However, in some, albeit rare, instances, an arbitrary elevation was built on level ground to serve as the cavea seating's foundation, as seen in Figure 1 [1],[2].

Figure 1: Represents the Design of Theatre in Ancient Rome with Seating Arrangements.

Only literary works and vase paintings have been used to describe the first wooden theatres, which date to the 6th century Bc. Greek theatres attained their final form in the 4th century Bc, consisting of three different elements: the audience seats called cavea, the orchestra, as well as the stage construction, which grew increasingly sophisticated to accommodate shifting dramatic requirements, as seen in Figure 2 and Figure 3. Stone buildings have existed since the fifth century. Most theatres had stone seats, and the stairways were made of the same stuff and were divided into wedges. The cavea is divided horizontally by the diazoma, as well as a concentric passageway. The top part of the cavea is referred to as the epitheatre [3],[4].

Figure 2: Represents the Masks used in the Ancient Greek Theatres for Plays during Entertainment.

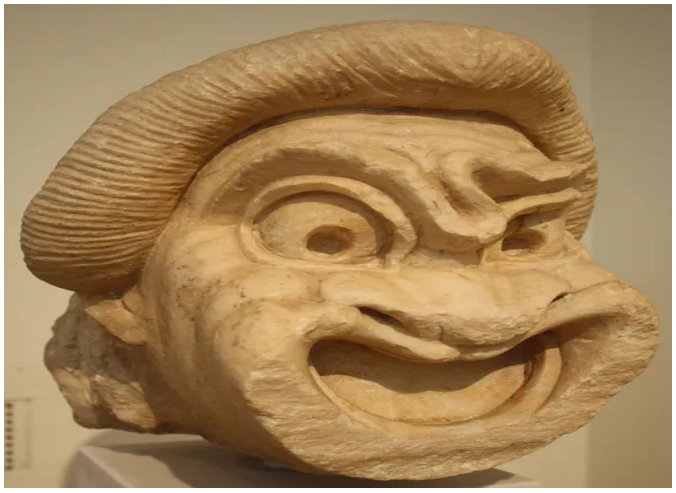

Figure 3: Represents the Mask used for Comedy Plays in Ancient Greek Theatres.

Admission to the orchestra was supplied through the two parodoi entrances on either side. A drainage channel regularly moved across the orchestra in front of the first seating area to collect rainwater cascading off the cavea. When the stage buildings are finished being built, they normally have a platform along with a bottom floor, upper floor, and proscenium. A short row of columns, pillars, or semi-columns of the Doric or Ionic style frequently makes up the proscenium. The spaces between the columns of the proscenium were painted, and it is usually assumed that each of the three similarly painted entrances led to a palace, the country, or the port. In certain theatres, the god of the hades might enter and have an effect on the

main actors on stage thanks to the “Charonian steps”, a tunnel leading from the auditorium to the orchestra [5],[6].

Between both the orchestras and the stage set was the logeion, wherein performers performed. As the stage structure developed over time, this was moved to the proscenium flat ceiling or on distinctive raised platforms. The bulk of Greek plays was converted into arenas during the Roman period to suit the various types of spectaculars that were growing in popularity. The orchestra was enlarged to accommodate gladiatorial combats and competitions involving wild animals, and spectator-safety structures were built. Water cisterns were sometimes placed in the orchestra to allow water sports and other festivities [7],.

Plays, which at first were intimately related to religious rites, were the purpose for which the theatres were constructed. They subsequently developed independently of religion, reaching their zenith in performance by performers and a chorus that included all the elements of a modern-day theatrical production, including script, scenery, staging apparatus, and theatrical props.

Theaters evolved throughout time into multipurpose spaces that served the needs of the city-state and were utilized for political goals related to the institutions of Democracies as well as for theatrical and religious events. It is instructive that the Greek traveler Pausanias considered the theatre, including the agora, the gym, and the public administration buildings, to be one of the fundamental civic aspects of a Greek city and a crucial component in identifying towns in Eastern Greek. Thus, it is necessary to know about such ancient Greek civilizations and the origin of Greek theaters in Greece, and their impact on the world.

2. DISCUSSION

2.1.Theatre of Dionysus in Athens:

Located north of the Monastery of Dionysos, on the east side of the south slope of the Acropolis, are the impressive ruins of its theatre. The majority of the remnants that have survived today are from the massive construction of the theatre that the used namely of Athens Lycourgos undertook in the latter part of the 4th century BC. However, the theater's original structure dates to the sixth century B.C. At that time, the Archaic Paradise of Dionysos had been built, and immediately to its north, a circular space was leveled where the god's worship rituals were performed. On the hilltop, where wooden chairs were soon after erected, people viewed these festivities while seated .

Tragic events originated in the dithyrambic circle dancing of the followers of Dionysos as shown in Figure 4. Despite the lack of clarity on its exact shape, the theatrical framework of the fifth century Before Christ (BC) must be a straightforward one. Stone seats progressively took the place of the cavea seats, and for the first time, staircases were built, separating the cavea into crescent cunei and delineating the theater's parodoi. Additionally, a fixed masonry stage was constructed, most likely consisting of a simple rectangular structure [8].

The cavea of the theatre was completely built out of stone during the reign of the archon Lycourgos in the second half of the 4th century BC. It was also enlarged to the foot of the Spiritual Rock, integrating the Peripatos the path encircling the Acropolis section that passed above the original cavea and transformed it into some kind of diazoma (horizontal passageway). The epitheatre was created by the portion of the cavea beyond this diazoma. The theater's capacity is said to have been between 15,000 and 16,000 people at the time. 67 marble thrones occupied the first row of seats. Most likely a rectangular structure with two parascenia, the theatre.

Figure 4: Represents the theatre of Dionysos in Athens of Greece

The stage construction and the entire theatre were severely damaged in 86 BC, following Sulla's invasion of Athens. A new stage of extraordinary dimensions was built in the middle of the first century AD, during the reign of Emperor Nero. Marble was used to pave the orchestra, which was reconfigured into a semicircle. A tall logeion was constructed at the front of the theater structure in the middle of the second or third century Anna domane (AD) [9].

2.2.Theatre of the Amphiareion:

Following the founding of a Greater Amphiareia celebration in 332 BC, the theatre of the prophecy of Amphiaraos at Oropos, Attica, existed where music and dramatic competitions were conducted every four years. The cavea's fan-shaped design and the round orchestra are from the Classical periods, while the trapezoid shape and the five distinct engraved iron thrones of the proedria are masterpieces from the Late Hellenistic era. The playhouse of the Amphiareion maintains components from at least 2 distinct stages. The masonry walls of something like the parodoi and a little portion of the bottom seats are all that remain. The colonnade's top was a triglyphic and metope-adorned architrave. The restored proscenium, along with the proedria thrones and the devotional markings, collectively represent a highly informative ensemble from a crucial stage in Hellenistic theatre building [10].

2.3.Theatre of Epidaurus:

The Monastery of Asklepios, home to the ancient healer-god and the largest healing center inside the old Greece and Roman empires, was where the old theatres of Epidaurus were constructed. It was constructed of stone masonry on a natural slope of Mount Kynortion. Poetry recitals, singing competitions, and other events that were a part of Asklepios festivals were held at the theatre. Due to the balance of its dimensions, the geometry of its components, and its outstanding acoustics, the stage of Epidaurus is regarded as the most ideal theatrical construction from antiquity. Pausanias praises the structure's symmetry and elegance and credits the Argive designer Polycleitus with designing it [11].

An epitheatres were added to the theatre in the second century BC, which was when it was thought to have been erected in two parts, beginning just at end of the fourth century BC. But according to a recent study, the cavea was completely built towards the end of the fourth century BC. The theatre has been in operation up to and during the third century AD. The theatre was built under an integrated plan controlled by mathematical rules inspired by

Pythagorean ideology. More specifically, the layout of the cavea is structured on a pentagon that is centered around the orchestra. This geometric form represented the harmony of a whole for the Pythagoreans.

The stage construction, orchestra, and cavea the three fundamental components of an ancient theater are easily identifiable in the Epidaurus Theatre. The cavea is split into wedge-shaped cunei that extend through the orchestra, formed from 3 locations, and is bounded by 2 soft or semi-hard-stone retaining walls. This design is responsible for the theater's exceptional acoustics. The cavea is separated into two portions by a paved tunnel and has a total of 55 levels of seating. Luxurious backed thrones may be found on the first levels of each section and the bottom level of the bottom level. Two imposing two-door propyla in the parodoi led to the theatre and the orchestra.

A 20-meter-diameter perfect circle is formed by the ensemble. A stone base, which experts believe to be the foundation of the sanctuary of Dionysos, is still present in the center of the structure. Poros stone was used to construct the stage structure. The beaded curtain and a two-story stage with parascenia on either side made up its original design. Both the proscenium's front and the ground-level stage building's rear were ornamented with colonnades. The framework was modified to reflect the functional shifts in theatre in the second century BC. Just a handful of the sculptures that were found during the excavations serve as the stage building's ornamentation. The stage structure is still standing as a little ruin today. It is anticipated that the theatre can hold between 13,000 and 14,000 people.

2.4.Theatre of Megalopolis:

According to Pausanias, the ancient theatre at Megalopolis had the highest seating capacity in all of Greece and was built to accommodate a large crowd of 17-21k spectators. This is less than two kilometers from the contemporary town called and is located on the left riverbank Elissonas in a region of remarkable natural beauty. The theatre, which was constructed around 370 BC, was used for pan-Arcadian celebrations honoring Zeus Lycaeus as well as ancient play performances as well as meetings of the Arcadian League, and representatives of the inhabitants of Megalopolis.

The hillside's natural slope was used to build the theatre. The cavea was divided into three parts and had a maximum diameter of about 130 meters, whilst the semicircular orchestra had a diameter of 30 meters. An original innovation in the design of theatres woven into the structure of a city was the arcaded porch of the Thersilion, erected on the southern edge of the theatre, which functioned as a stage background facing the cavea. A portable wooden stage was initially there, but it was taken down and placed in the storerooms that were built near the west parodos. The Roman era saw the construction of the stone doorway, whose base is still visible today.

2.5.Theatre of Argos:

The theatre of Argos, which was carved into the foundation of the southeastern slopes of Larissa Mountain in the 3rd century Bc, served as a venue for political gatherings as well as the musical and theatrical competitions of the Nemean Olympics honoring Hera. The theatre can accommodate, according to experts, 20,000 spectators. The monument's cavea, which has 82 levels of seating, is divided into 4 wedge-shaped cunei by five radiating stairs. The northern and southern parodos provided entry to the orchestra through two entrances. Twenty columns made up the facade of the elliptical proscenium. The stage building was behind it, and two ramps led up to it. Originally, the theatre had just one entry on the southeastern side of the stage structure.

The theater's stage construction was updated when the Romans arrived in Argos. These changes include the imposing facade including its 3 entries, the rebuilt logeion including its niches that Hadrian erected, and the symmetry parascenia connecting to the elevated platform of the logeion. From the stage structure, three stairs led to the logeion. With the addition of new shows like gladiatorial combats and contests with wild animals, a spectator protection fence was erected and supported by posts driven into holes in the orchestra floor. There are additional holes near the cavea that suggest a velum (canvas cover) was used to shield the spectators from the sun. A new podium for dignitaries was built to the north of the main staircases. The hardwood floor at the extremities of the stage was replaced in the third century AD by mosaic pavement with geometric designs. A cistern was constructed in the orchestra in the fourth century AD to be used in water activities. In the 5th and 6th centuries AD, the theatre was abandoned.

2.6.Theatre of Delphi:

The theatre of Delphi, located in the northwest corner of said Sanctuary by Apollo, is the largest building there. It is extremely near to the house of the deity, which served as the center of worship. It was constructed in the second century BC for the musical competitions that were a component of the Pythian Games, despite the cavea's location having likely previously been well set out at a previous time. According to an inscription, Eumenes II in Pergamon funded the theater's construction in 160 BC, when it took on its monumental aspect. The theater's ultimate design dates to the first century BC, but extensive alterations and repairs were made throughout the Late Roman period.

A horizontal corridor divides the theater's cavea into two halves. The lower cavea comprises 27 seats and also is split into 7 wedge-shaped cunei by eight radiating stairs. 8 rows of seat cavea are split into six cunei by seven stairs, which correspond to the lower cavea's central cunei. The orchestra, which has a circumference of 18.24 m, is horseshoe-shaped, although it was first believed to have been perfectly circular. The structure housing the stage has a sizable space that faces the sun. A marble frieze that was carved in relief and ornamented the proscenium façade during the Roman era included images from The Labors of Hercules. Mostly on large stones of the eastern retaining wall, numbers of inscriptions honoring the freedom of slaves as well as actions of the Amphictyonic Association were engraved, highlighting the political and public nature of the monument [12][13].

2.7.Theatre of Eretria:

The Sanctuary of Dionysus has indeed been discovered near the southwest corner of the city, while the Theater of Eretria is situated in the west, in between the west gate, the stadium, and the upper gymnasium. According to the most recent excavation data, the monument's present shape includes components from the 3 major building periods. It is among the most representative instances of a theatre from the Hellenistic era, whose basic shape was not greatly impacted by Roman-era remodeling. Remarkably, perhaps the cavea of a theatre was built on a man-made embankment with several retaining walls rather than making use of the acropolis' natural slopes. Standing spectators appear to have been the planned use for the top levels of the seat, which corresponds to five or six levels of seats. With this knowledge, the theater's capacity would have been between 6,000 and 6,400 people.

The monument's initial construction phase dates to the later fourth century. The audience may have sat atop makeshift constructions at this point because the cavea most likely had no seats, and the theater construction was at orchestra tier. This one-story structure had a facade with an Ionian colonnade supported by two parascenia and was formed like an upside-down with the wide end facing the crowd. The second phase of construction dates to around 300 BC.

The parodoi's two strong retaining walls, stone benches, and staircases were constructed during this era. Including the elevated proscenium, one of the oldest instances of its sort, this was also the time when the stage construction and orchestra were positioned on different levels and the vaulted staircase linking the two, the "Charonian stairs", was built. After the Romans destroyed Eretria around 198 BC, this theatre was reconstructed using inferior materials and added two more side buildings, and was likely used as a venue for secular events.

2.8.Theatre of Larissa I:

Somewhere at the southern base of Frourio Mountain, upon which the old city's fortified acropolis stood, was where the Ancient Stage of Larissa I, another biggest and most significant stage in Greece, was constructed. Early in the third century BC, the theatre was erected. In addition to hosting theatrical events throughout its early centuries of existence, it also hosted Thessalian League sessions, the top administrative regional authority. It was transformed into a Roman ring by the conclusion of the first century BC, and it operated in this capacity till the start of the fourth century AD.

The auditorium is a massive structure with lavish relief artwork that is nearly entirely made of marble. The slope itself, which was terraced for seats, created the cavea. The bottom or major theaters and the epitheatre were separated by the diazoma, a two-meter-wide tunnel. Although the epitheatre has been partially damaged, we do understand that it was split into 22 horseshoe cunei containing 14 to 18 rows each by 20 short stairs. Ten little stairs split the main theatre into 11 cunei, each with 25 sets of seating. The diameter of the orchestra is estimated to have been around 25 meters. The two parodoi are kept flawlessly, along with their retaining structure.

The stage structure, which consists of four chambers connected by three entrances, is the area of the theatre that has been kept the finest. The 20 m long by 2 m broad stage construction was erected in the early part of the second century BC. Its colonnade sustained Doric pilasters, and its rows of 6 doorways and six monoliths Doric moderately supported rows of 6 jambs. The entire construction supported the wooden logeion, which served as the stage for the performers. The stage structure sustained significant damage in the first century AD, in part as a result of the theater's conversion to an arena. In addition to the second floor of yet-unknown shape, opulent marble cladding, semi-columns, pillars, and statues were installed at that time [14].

2.9.Theatre of Delos:

Utilizing marbles from a nearby quarry, local stone, as well as marble brought out from the island of Paros and Tinos, the Delians constructed the theatre on Delos using funds from the Temple of Apollo's Treasury. The theatre was built beginning approximately 310 BC and was finished about 70 years later, in 240 BC. After being destroyed in 88 BC, the theatre was no longer in use. The theatre's cavea is held up by a solid marble retaining wall. It is divided into two parts, each with 27 and 16 levels, and can hold around 1,600 people.

The 2 parodoi, two further entrances just at height of the tunnel between the two parts, and the last entrance in the center of the theatre's highest point were the only ways to enter the cavea. A stage construction with external measurements of 15.26 x 6.64 m and 3 openings on the eastern edge and one on the west, closed the semicircular orchestra on its straight side. The wrought-iron gate, a 2.67-m-high column containing columns and semi-columns, was outside the developing set. The proscenium entablature's metopes were ornamented in relief with alternately accessories and bulls' heads. Later, a portico with Doric pillars that was the

same elevation as the proscenium was erected on the stage house's other three sides. The ruins of shrines and sanctuaries to Apollo, Hermes, Artemis-Hecate, Dionysos, and Pan may still be found southwest of the theatre.

2.10. Theatre of Melos:

The historic theatre of the Cycladic Island of Melos is located in an amazing location overlooking the Gulf of Melos and is situated on the slopes of a hill that the old city formerly covered. The orchestra, a portion of the seats, the theater construction, and the west brick masonry have all been uncovered so far by excavations. The cavea has the traditional horseshoe-shaped design of ancient Greek stages in theatre and was built on the hill's natural slope. Seven wedge-shaped cunei still have up to nine rows of chairs made of white marble. There are four to five chairs in each row. To act as an arena, the orchestra is positioned around 1.70 meters below the circle's paving stones. Marble slabs covered the steep rock face that separated the arena from the circle. A portion of the theater and proscenium as well as a few random architectural pieces remain from the stage construction. The historic theatre at Melos was established during the Roman era, but its original construction may have taken place during the Hellenistic era. The stage building's architectural features are reminiscent of those seen in the theatre in Western Asia.

2.11. Theatre of Lindos:

The Lindos ancient theatre is situated just under the Athena Lindia temple, at the base of the western slope of the Lindos hilltop. It is related to the important city celebrations known as the Sminthia, which honored Dionysos and featured athletic, musical, and theatrical competitions, processions, and sacrifices. The theatre, which dates to the fourth century BC, could hold between 1,800 and 2,000 people. Eight slender stairs connected nine wedge-shaped cunei that made up the cavea. The majority of the 19 seats were cut into the rock, but some were also erected, including the last cunei as well as the lateral concrete structures, which are now gone.

The stairs lead to an alleyway (diazoma) from which the top cavea with its 6 bench seats may be accessed. Therefore to just provide even the less privileged spectators a decent view, the top seats are more severely slanted. The thrones, also known as seats of honor, were set up in a circle atop a protruding band of rock. The theater's circular orchestra is similarly cut into the rock. At approximately 4.80 meters broad and 19 meters long, the stage construction. Only the rock-cut portions of the theatre remain today, including the round orchestra, the upper cavea's three central cunei, and portions of the 2 cunei along both hand and the center area.

2.12. Theatre of Oeniadae:

The Acheloos river valley, which descends to the Ionian Sea, is seen from the amphitheater of Oeniadae, which is perched on a steep slope. The orchestra, cavea, and staircases were sourced from three separate locations, giving the monument its distinctive architectural style. Its exceptional acoustics also contribute to this. While the majority of the row seats are made of limestone, the eastern portion is dug out of the bedrock. Its layout is in the form of a horseshoe, and it still has 11 stairs dividing its 27 seats and 10 horseshoe cunei. The symphony has a covered stone rainfall drainage duct surrounding it that measures 16.34 meters in diameter. Only the 26-meter-long prosceniums and the 5-by-16-meter-long parascenia's foundations remain of the stage construction. Three distinct building phases the earliest of which dates to the middle of the 4th century BC have been found, most of which

are associated with reorganizations of the stage structure, and also the Hellenistic era saw the addition of the pavilion.

2.13. Theatre of Dodona:

One of the biggest theatres in Greece, the Dodona theatre was constructed in the early third century BC, during the reign of Emperor Pyrrhus from 297-272 BC. It has a seating capacity of over 15,000–17,000 people. It is situated in the Sanctuary of Zeus's natural setting, west of the temple. It was constructed to serve as the site of the Naia festival, which is celebrated for over 4 years in commemoration of Zeus Naios. Additionally, it could have allowed for the operations of the Epirote Organization, whose headquarters were located in the Sanctuary from 330-325 until 233/2 BC. Four construction stages are indicated by the excavation findings. The cavea, which includes 55 rows-seats, the spherical orchestra, and the stage construction, are dated to the very first phase. The cavea is divided into three sections with 19, 15, as well as 21-row seats each by four corridors called diazomata. The cavea is divided into 9 wedge-shaped cunei by ten radial stairs. For easier viewing by spectators, the top section of the cavea is split into 18 cunei by intermediary stairs. This culminated in enormous orthostats (stone slabs) on a 3 base. From the two parodoi, two enormous stairs along both sides of the cavea seats took viewers directly up to the theatre's top levels.

After the performance, the audience was allowed to flood out in large numbers through a broad exit just above the center cuneus that was protected by a moveable grille. Later, whenever the theatre was converted into an arena, the lower benches with said seats of honor and the hallway pavement were removed. The 18.72 m-diameter earthen orchestras were shaped like a complete circle. The foundation of something like the thymele, the shrine of Dionysos, is still present in the center. The parascenia, a pair of squares chambers flanking the stage building's two stories, were flanked by a line of pillars. An entrance with just an arch lintel opening to a Doric column with a frontage of 13 key pillars was located on the southern wall of a theater structure.

Following the demolition in 219 BC, the 2 square chambers on each back of the arena were joined by a stone domed ceiling made of 18 semi-columns during the second construction phase. Two imposing porticos with identical openings and Ionian semi-columns flanked the parodoi. After the stage structure was destroyed by the Romans in 167 BC, repairs were made to it during the third building phase. Rough-built walls were used in place of several of the proscenium semi-columns. Finally, the theatre was converted into an arena during the fourth development phase. The orchestra's floor was elevated and filled in, hiding the thymele, the draining duct, and the proscenium remnants, when the front seats were removed.

2.14. Theatre of Aptera:

The Aptera theatre is situated in a declivity that naturally slopes down toward the Cretan White Mountains (Lefka Ori). It is located near the equivalent entrance in the southern portion of the city. There were 3 building periods, according to excavation and architectural data so far: Hellenistic, Roman I (1st century AD), and Roman II in 3rd century AD. Only the middle section's benches and a sizable portion of their stepping supports remain of the cavea. The big quake of 365 AD was likely to blame for part of the collapse of the parodoi's retaining walls, which primarily date to the Hellenistic construction era. These paver stones are scattered around the complexing agent. The stage building's front features the standard scene frons design, with three sizable recesses that correspond to the triple entrances. The stage structure, whose walls remain intact to an altitude of 0.5 meters above the floor, combines the three stages of the cemetery's building.

2.15. Theatre of Maronia:

The theatre, which was constructed on the slope of two hills among which a periodic spring previously ran, is located in the southeast of old Maronia, up against the city wall and amid its historic structures. The stage construction is composed of local limestone, whereas the cavea of a playhouse, which faces southwest, is made of strong yellowish-orange porous stone. The very first seats are seen on the first of nine wedge-shaped cunei that make up the cavea. Only 1,300 spectators could fit within the cavea, according to estimates. A huge marble drainage duct wrapped around the orchestra's horseshoe form directed precipitation from the cavea into the flow's main channel. This theatre was an element of the city's civic design when it was a Hellenistic city around the end of the fourth century BC. The square stage structure was built during the Roman era. It was split into three sections and had a proscenium and colonnade with 13 foundations of semi-columns preserved.

An exceptional accomplishment of Ancient Greek civilization was the building of theatres, which is a reflection of the high degree of intellectual, political, and social development accomplished by that civilization during the Classical periods. In ancient times, theatres were found all across the Greek world and served as the model for several related buildings all around the Mediterranean. The initial iterations of the theatrical as a style of architecture, as it developed to meet the shifting demands of dramatic art over the Classic and Hellenistic periods, are depicted in ancient Greek theatres. They serve as the foundation for just a lengthy architectural heritage that has been continuously expanded with new additions and is still in use today. They represent a technological feat in terms of acoustics as well.

The form of the cavea allowed for optimal sound concentration while preventing sound wave deterioration by varying heights between one row and the next. Additionally, the lofty stage structure with its parascenia and the orchestra's smooth floor, which has been cemented from some other point on, served as sound enhancers. The major plays of classical drama, such as the tragedies by Sophocles, Euripides, and Aeschylus, as well as the comedians of Aristophanes, which still influence theatre today, were originally presented in Greek theater. Since Kleisthenes' reforms (508 BC) established theater as an organization in Athens, it had a direct relationship with the spirit and manifestations of democracy. As a result, it sought to maximize public involvement.

Attending performances was a multifaceted experience with a significant educational component that was meant to represent the intellectual, political, philosophical, and metaphysical problems of the day as well as serve as a link to religious tradition. Furthermore, from the fifth century BC onward, theatres were utilized as gathering places for the populace and the Council of the Demos, serving political purposes related to the concept of Democracy. Their varied function also supports their proximity to the agora, the center of civic mainstream society. Greece still has a large number of antique theatres, some of which are in very excellent condition. One of the few old monument types that are immediately recognizable by the public at large and have been remarkably integrated into modern life is the theatre.

- The idea of building theatres is unique from a structural and practical standpoint, and it has proven to be quite influential throughout history, serving as the template for many related structures up to the present.
- The placement of theatres inside the city demonstrates thoughtful urban planning. To serve the needs of the community and democratic systems, care was made to link the amphitheater to the public center, the agora, as well as the other public structures it aided. The playhouse was the epitome of Greek civilization, a way to communicate

proportion, simplicity, and symmetry, and one of the ways Pausanias identified Greek cities in the Eastern region.

- The Greek civilization's high degree of intellectual, technological, political, and social development during the Classical period is undeniably attested to by the theatres. They are intrinsically connected to the principles and practices of democracy, which emerged in an Athenian empire in the fifth century BC.
- Greek amphitheaters are the prototypical example of this sort of structure and an early example of acoustics. They provide evidence of the origins and early stages of theatrical structure, which follow and are shaped by the development of play and dramatic requirements. The theater's architectural style impacted ancient Greek and Roman public structures such as bouleuteria, ecclesiasteries, and theatres of the Roman style. It also served as the inspiration for a lengthy architectural tradition that endures today.
- Making the most use of the natural surroundings may be seen in the design of theatres. The majority of the time, the chosen position is at the base of a hill, and the majority of seating is cut into the bedrock. The location was also chosen to give a panorama, of the sea, and the lovely surroundings. They demonstrate the Ancient Greeks' appreciation for the purity and beautiful landscape nature, and they serve as vital examples of how people interact with the environment and how constructions are harmoniously incorporated into the environment.
- The wonderful plays of antiquity, such as the comedy shows of Aristophanes and tragedies by Sophocles, Euripides, and Aeschylus, were first performed in Greek theatres. These works are unmatched novelistic pieces of art that have directly impacted dramatic development all over the world and try to encourage theatergoers today.

There are different ancient famous theatres known for their design and structures in ancient Greece. The entertainment in the theatres using acts, dramas, and plays is one of the modes of information transfer with public awareness. There are many more uses of Greek theaters which help in the development of Greek civilization. Thus, the Greek civilization is an ancient civilization that is known for its art and culture with unique styles in the world. The theaters are the main mode of entertainment in their life which guides the life of people.

3. CONCLUSION

There are various types of Greek theatres developed in the Greek civilization for the Greek audience. The various plays, acts, drams, music, battles, games, and public awareness are given to the society. The purpose of developing theatre is to gather an audience to unite them in one place for communal awareness and to deploy the message. The study discusses the origin and historical approach for developing different theaters in Greece civilization. The culture of developing theatres to aware society is from Greece civilization to aware the people of their rights, duties, and work for society. The designs of theatres are unique and beautiful which shows the world real art and architecture. With change is time the design of theatres is changed in the world but the old art of cultural and historical monuments is still unique and challenging. Thus, the study of all different types of theatres in geek civilization is useful to know the indifferent techniques and laws for creating unity among the citizens.

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CHAPTER 13

SIGNIFICANCE OF BUSINESS SUSTAINABILITY ON SOCIETAL STRUCTURE

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ABSTRACT: ***In essence, corporate social responsibility (CSR) refers to the activity that a company performs as a societal obligation. Essentially, CSR initiatives are conducted to improve people's lives. Depending on the organization's functional area, different people or organizations benefit from CSR efforts. The author discussed the Corporate Social Responsibility initiatives that are carried out in various ways by various organizations. Few organizations work to structure new-borns' growth and development, but other organizations teach young people skill development to help them become self-sufficient in their ability to support themselves. The results show different firms' CSR efforts in diverse fields contribute to the advancement of society as a whole. The author concludes that the report sheds emphasis on the CSR activities carried out by different organizations in India to promote the growth of society as a whole. The work thus creates opportunities for further study of CSR initiatives by diverse firms in the future.***

KEYWORDS: ***Business, Company,Environment, Corporate Social Responsibility (CSR), Organization.***

1. INTRODUCTION

Corporate Social Responsibility (CSR) is essentially the set of rules that a firm adopts to ensure that its business practices are moral and help society [1], [2]. Organizations engage in actions to preserve the environment, offer health care facilities, help in community development, and adjust production processes to produce the least amount of trash possible as part of their corporate social responsibility programs [3], [4]. Figure 1 discloses the different years in India with CSR and without CSR.

Figure 1: Illustrates the different years in India with CSR and without CSR.

Table 1 shows the list of top 20 organizations that contributed maximum towards Corporate Social Responsibility in the year 2020 [5].

Table 1: Top 20 organizations that contributed maximum towards Corporate Social Responsibility in the year 2020 [5].

Sl. No.	**Organization**	**Contribution to Corporate Social Responsibility**
1.	Infosys Consulting	360 crore Rupees
2.	Mahindra Group	93.50 crore Rupees
3.	Tata Chemical Limited	37.81 crore Rupees
4.	ITC Corporation Limited	326.49 crore Rupees
5.	Vedanta Resources Limited	50.28 crore Rupees
6.	Wipro Technologies	181.3 crore Rupees
7.	Unilever Limited (HUL)	142 crore Rupees
8.	Godrej Limited	19.49 crore Rupees
9.	Grasim Indus. limited	47.14 crore Rupees
10.	Bharat Petroleum Corp. Ltd.	4.27 crore Rupees (contribution by employees)
11.	Tech Mahindra Limited	126.6 crore Rupees
12.	Apollo Tyres Limited	18.37 crore Rupees
13.	Cisco India	-
14.	HZL (Hindustan Zinc Limited)	-
15.	IOCL	0.24 Crore Rupees
16.	Toyota Bharat (Toyota Kirloskar Limited)	-
17.	Larsen & Toubro Limited	121.68 Crore Rupees
18.	Tata Consultancy Services Limited	602 Crore Rupees
19.	APSEZ (Adani Port and Special Economic Zone limited)	68.37 crore Rupees
20.	UTCL (Ultra Tech Cement Limited)	125ore Rupees

As shown in Table 1, Infosys Consulting: During COVID-19 wave one, the company offered a setup for 100 patients. For Bowring and LCM College and Research Institute, a facility for 182 coronavirus patients was built as part of the Narayana Health City setup. Numerous

NGOs are partners of the Infosys CSR foundation. The foundation participates actively in project implementation while acting as a nodal agency. The primary initiatives of the Infosys CSR Foundation include disaster relief efforts in the Indian states of Karnataka, Tamil Nadu, and Kerala; the GoSports Foundation, which encouraged participation in sports and the pursuit of athletic excellence; the upkeep of water resources in Karnataka; and the Aarohan Award for Social Innovation [6].

1.1.Mahindra Group:

Anand Mahindra is a member of the NSDF, the Indian Council for Sustainable Development, and the HBS Association of India (National Sports Development Fund). In 1996, Anand Mahindra launched the Nanhi Kali initiative. The project aimed to educate young girls. The project's goal was to provide the family with a girl kid with more influence. The program offered education to girls from low-income areas of India's cities and countryside. During the past ten years, millions of girls have benefited from our program. Girls who completed the Nanhi Kali program are now teaching younger girl's new skills and fostering their independence. The business collaborates with the Naandi Foundation, a non-profit organization that offers free lunches to students each day [5].

1.2.Tata Chemical Limited:

The company wants to give individuals an excellent quality of life. The company dedicates 30% of its CSR expenditure to animal protection. The firm invests its CSR money in communities surrounding its manufacturing facilities, such as Haldia in West Bengal, Mithapur in Gujarat, and Babrala in Uttar Pradesh [4].

1.3.ITC Corporation Limited:

ITC Choupal is an initiative that the company started. The program has helped more people than only farmers who lack access to digital education. Farmers have received financial assistance through the Choupal initiative. Other initiatives include providing healthcare facilities, hosting sporting events and cultural activities, educating people about computers and other digital technologies, planting more trees to create more forests, and increasing the availability of water resources [7].

1.4.Vedanta Resources Limited:

The Company provides aid for the development of rural India and agriculture carried out in rural India. The company focuses on energy conservation, water conservation, and management of carbon emissions. The company has accepted the new age of technology to reduce the wastage of water, increase the productivity of energy, analyse the change in climatic conditions and prevent the environment from pollution. The group aims at producing no waste, zero discharge, and causing no harm. The group has created 1653 units of the renewable form of energy. Solar power plants are set up to produce 22 Megawatts of power. With the aim of environment-friendly mining, almost 92% of the waste produced is recycled including slag, fly ash, and jarosite [8].

1.5.Wipro Technologies:

The organization focus on providing a primary level of health care to the citizens. Besides providing support to the primary level of health care, the organization focuses on creating awareness among the population so that they independently handle their primary level of health care needs. At the national and international levels, the organization contributed a lot to rebuilding lives after natural calamities. Few natural disasters where Wipro helped people

include floods in Karnataka, Floods in Bihar, Tsunami in Japan, Sandy Hurricane, Cyclone in the Philippines, and Floods in Odisha [9].

1.6.Unilever Limited (HUL):

The Company works with Hindustan Unilever Sustainable Plan of Living. The plan aims at making sustainable growth by using globally known brands of the company. The Company aims to help billions of people to improve their health, but the least impact on the environment during the manufacturing of its products and to work for the betterment of the lively hood of people. The company contributed 100 crore Rupees to the Covid-19 relief fund. The company worked in the areas of handling the issues of health, issues of hygiene, and issues with the conservation of water [10], [11].

1.7.Godrej Limited:

The Company focuses on the prevention of disease, managing waste, focusing on the livelihood of women. The Company has come up with a program in partnership with the Government of India to eradicate the prevalence of malaria in India by the end of the year 2030. The company named the program Elimination of Mosquito Borne Endemic Diseases. The company works in partnership with NGOs and Government to completely eradicate the diseases caused due to mosquitoes, especially in the states of Chhattisgarh, Madhya Pradesh, and Uttar Pradesh [12], [13]. The Company carries out projects to manage waste in partnership with the municipal corporation of a few metro cities. The company works intending to prevent around 50 metric tonnes of waste to go into landfills. To accomplish this company, work with Hyderabad Municipal Corporation, Kalyan-Dombivali Municipal Corporation, and Municipal Corporation of Puducherry. The company also works with a social organization in Guwahati to produce fuel from the recycling of waste. In Assam, the company works with a Non-Profit organization to recycle the waste produced from agriculture and forest to produce biofuel [14].

1.8.Grasim Indus. Limited:

The CS Responsibility area of the organization is mainly managed by the Chairperson of the organization, Rajashree Birla. The CSR activities conducted includes the construction of hospitals, construction of School, maintaining hospitals, and maintaining schools. The schools and hospitals are constructed and managed in the nearby areas of the factory. The company provides vaccination programs for infants, and children and also carries out postnatal and antenatal care activities to ensure the good health of pregnant women, infants, and children [15].

1.9.Bharat Petroleum Corp. Ltd.:

The employees of the corporation made a contribution of 4027 crore Rupees from their salaries to help the people who suffered in Covid-19 wave one. The corporation launched a mission named ‘Swachhta Pakhwada’ in the year 2020 which was in line with Government's launch ‘Swachh Bharat Abhiyan’. The corporation believes in creating infrastructure for providing good quality education. The improvement in the system of education was done by increased access to education. The corporation also focused on improving the hygiene of the community by managing the waste, constructing toilets, maintenance of toilets, and maintaining other sanitization facilities [5].

- *Tech Mahindra Limited:*

The Company has created a partnership program with government primary schools, communities, and NGOs. The program run by the organization named Skill for Market Training (SMART) enables the youth to become independent by providing training of new age technology. The skill that is in demand is taught to the youth to allow them to live with dignity and with confidence. The organization also develops skills for young children with disabilities to allow them to live with dignity independently [16].

- *Apollo Tyres Limited:*

The Company focused on two areas including Health and the development of the community and saving the environment. The organization focused on improving the health of truck drivers. The initiative led to creating awareness amongst the truck drivers regarding the spread of HIV/AIDS. To perform an awareness program in 32 healthcare centers across 19 states of India. The awareness program also includes other diseases like hypertension, tuberculosis, and diabetes. The company also provided aid to carry out 'Swachh Bharat Abhiyan'. The aid is provided to carry out programs related to waste management of solid, safety in the sanitization, CMTN (Clean My Transport Nagar), Management of sanitation, and CMV (Clean My Village). To protect the environment, Apollo Tyres Limited is carrying out the program of mangroves saving in Kannur and afforestation in various districts of Tamil Nadu [15].

- *Cisco India:*

During the time of the pandemic, the organization worked in collaboration with Akshaya Patra named NG Organization. The work included providing a cooked meal to stranded migrants via the mobile kitchen. The work provided half a million boxes of cooked meals to migrants. The work included digitalizing the kitchen of a Non-Governmental Organization, Akshaya Patra to provide more quantity of food to needy people. Cisco also provided education related to the Internet of things, Python, and an awareness program related to cyber security [5].

- *HZL (Hindustan Zinc Limited):*

The Company is working in providing a better lifestyle to villagers residing in the nearby locality of their business operations. The company has so far improved the livelihood of around 184 villages in Rajasthan and 5 villages in Uttarakhand. The relief project to provide aid to Covid-19-affected people has covered around 4.20 lakh people [17].

- *IOCL:*

Working on environment-friendly modes is the goal of the organization. With this aim, the corporation successfully initiated efforts to make the supply chain green. The goal is aimed at using local solar power instead of a traditionally used source of energy. As a result of this, the number of solar-power retail outlets increased drastically.

- *Toyota Bharat (Toyota Kirloskar Limited):*

The organization launched a program to meet the goal of the Government of ending open defecation. In Karnataka, the organization worked in collaboration with the SNEHA named NG Organizations. The work included improving the quality of health of students in the areas of Karnataka. The villagers, students, and teachers were provided an education about the necessity of maintaining hygiene, frequent washing of hands, and the importance of using clean toilets as a means of preventing infection [6].

- *Larsen & Toubro Limited:*

The Company focuses on providing development to needy population groups by providing support in a few core areas of development. The core areas include providing pure drinking water, proper sanitation to people, developing skills, maintaining good health of people, and providing good quality education. The organization provided aid to 400_{+} schools to give good quality education to 2.4 lakh students across India [18].

- *Tata Consultancy Services Limited:*

The organization along with many government and non-profit agencies ties up and provides education to the elderly population of India. The company also carries out programs to empower underprivileged students from village areas, and disadvantaged individuals and provide them training to make them independent and earn their livelihood [5].

- *APSEZ (Adani Port and Special Economic Zone limited):*

The Company focuses on carrying out work to change the life of the community of fishermen in the state of Gujarat. The company covered around 6 basic areas to improve the life of the community of fishermen. The 6 basic areas of development include: improving living standards, empowering women belonging to the fishermen community, education to kids, training required skills, improving the health of the fisherman community, and developing infrastructure. All the development was done in the nearby areas of the Kutch district of Gujarat particularly Mundra and Anjar towns [5].

- *UTCL (Ultra Tech Cement Limited*):

Doing development of 502 rural areas. The development was conducted in the localities that are in the nearby area of the production plant. The CSR initiative improved the lives of more than 1.6 million people in rural India. More than 80 villages were developed by the company and changed into the model village area. During the time of the COVID-19 pandemic, the life of people living in developed villages was very different than that of people living in other villages. In the nearby area of factories, the staff of the company distributed cooked food, dry grocery items, masks to avoid infection, sanitizers for cleanliness, and PPE kits to villagers [5].

In 1970 massive aggression by the people of the United States of America (USA) against the increasing pollution resulted in the creation of the Environmental Protection Agency (EPA). In 1970, there was a time of recession in the United States of America. In the 1970s CSR activities were understood as a result of social activities and the new government rules that were formed. In the 1980s Reagan and Thatcher aimed at reducing the pressure on the organizations. The aim was to reduce inflation by reducing the regulations on the private sector by reducing taxes. In the 1990s the concept of CS Responsibility earned global standards. In the 1990s, the United Nations (UN) summit took place in Rio de Janeiro which led to the formation of the UN summit on Env. And develop. , UNFC Climate Change, 1992, Kyoto Protocol, 1997. In the 1990s with increased globalization and increased working of multinational organizations, the organizations having a weak framework of CS Responsibility were under the immense pressure of expectations from their nation as well as a new nation where they entered their business. Many organizations understood the significance of following the path of social responsibility to sustain the path of globalization.

Corporate-Social-Responsibility (CSR) of Indian organizations is mentioned. Different organizations put their C-S-R funds in various areas to bring the development of society. Various organizations tie up with non-governmental organizations (NGOs) and work in the area where these NGOs work to bring development to society. Few organizations work as a

parent body and control the functioning of various NGOs, whereas some organizations set up their foundations and help in the development of society. Whatever the means maybe it is the responsibility of an organization and every individual to work for the progress of the society, these collaborative actions will bring the development of the country as a whole.

2. LITERATURE REVIEW

Mauricio A et al. in their study embellish that the background of CS Responsibility, Business owners began to understand the need of striking a balance between the demands of their customers, their staff, and society in the 1920s and 1930s. Mauricio A et al. applied a methodology in which they stated that the proprietors of the company were therefore designated as trustees. The results show organizations were established in the 1940s during World War II to be perceived as having a social obligation. Significant effort was done in the 1950s and 1960s to put the theoretical idea of social responsibility into practice. The author concludes that a significant contribution to changing people's perceptions of organizations is by asserting that giant corporations wield tremendous influence and that the job they perform has a significant impact on society as a whole. It was eventually dubbed the Father of Corporate Social Responsibility as a result of his work. The influence of increased social responsibility work in the 1960s was brought on by a rise in societal consciousness [19].

S. Maqbool et al. in their study illustrate that in the crisis of 1924, organizations were compelled to mend fences with their partners. S. Maqbool et al. applied a methodology in which they stated that the CS Responsibility activity must be integrated into the company as a whole and developed with the organization's long-term objectives in mind. The results show according to the study, C Social R should not be viewed as an option or an activity, but rather as a component of the operating paradigm for a firm. The incorporation of corporate social responsibility into the organization's financial and social goals. The author concludes that the authorities of the organizations where Corporate S R is not practiced see it as a fundamental aspect of pursuing long-term objectives. Government agencies should not be forced to take out CSR; this will not be successful [20].

Jawad and Abbas in their study embellish that Total Quality Management (TQM) is important for large and mid-size firms, according to research. Jawad and Abbas applied a methodology in which they stated that the research gives medium-sized company leaders an example of how maintaining TQM may help them achieve outcomes that are comparable to those of large-scale businesses. The results show that TQM initiatives are not just limited to wealthy countries but also include underdeveloped countries. The author concludes that the government has worked very hard to establish a green industrial network. However, preserving green manufacturing requires effort from both the public and commercial sectors [21].

According to the literature that was used as a source, and environmental protection agency was established by the government in the United States in 1970 as a result of rising pollution levels among the country's citizens. Organizations with inadequate frameworks find it challenging to thrive in a cutthroat market as globalization increases. Due to their positive market reputation, C-S-Responsibility businesses find it simple to conduct business with other firms. The report sheds light on the varied C-S-Responsibility activities carried out by various organizations and the effects such work is having on societal development in general.

3. DISCUSSION

The paper gives comprehensive information on the top 20 companies that made the most contributions to corporate social responsibility in the year 2020. All of these organizations are

working to improve society by assisting with healthcare, education, learning new skills, empowering individuals to become entrepreneurs, developing environmentally friendly farming methods, caring for truck drivers, raising public awareness of the importance of leading healthy lives, and many other things. An organization plays a crucial role in working to improve society's standard of living.

Few organizations concentrated on building a clean atmosphere in rural regions by raising awareness among girls and school instructors, even though practically every organization had a different role as their primary working area. As a result, restrooms were built in schools, which ultimately increased the number of hours pupils spent in class. Following the awareness effort, the attendance improved overall as well. Few businesses concentrated on using environmentally friendly production techniques and reducing the waste generated in manufacturing facilities. Few groups worked to improve the lives of Gujarat's fisherman, a group on which no other organization had focused, while fewer yet concentrated on raising awareness within the truck driver community.

Thus, it can be seen that each company has a unique core functional area. Numerous organizations can improve living conditions for the majority of people in the country if they concentrate on improving conditions for the people living close to where they operate. Better sanitation facilities for rural Indians are being built, and as part of the government of India's SBA, awareness is being raised on the usage of toilets rather than open defecation (Swacha Bharat Abhiyan). Many people in rural India are accustomed to and have practiced open defecation for a long time, yet many are unaware of the health risks associated with it. Increased cleanliness in the neighborhood was finally brought about by implementing awareness programs to educate people about the health risks and subsequent bathroom usage. The frequency of individuals becoming sick during the monsoon and other weather changes also significantly decreased as more people practiced adequate sanitization [22]–[24].

Few organizations that concentrated on giving pregnant women access to quality healthcare, caring for pregnant women, providing supplements and food packets, ensuring timely immunization of newborn infants, and many other things have created a strong framework for ensuring the health of a newborn child. So, in a sense, the company has made every effort as part of its CSR to raise a healthy child for the nation's future. Few groups worked to empower the nation's young to become independent. The organizations concentrated on enhancing the abilities of the youth by giving them the necessary training following the demands of the technology. Therefore, over the next several decades, the country will finally move along the road of growth thanks to the cooperative efforts of numerous groups operating in various parts of the nation.

4. CONCLUSION

The paper sheds light on the initiatives taken by various groups to improve the standard of living in the nation. Every firm pursues a distinct main area for development as part of CSR. Few businesses adopt environmentally friendly manufacturing processes that reduce the amount of waste produced during production. It is also common to see solar energy being used extensively in manufacturing facilities and being promoted as a green energy source. A small number of organizations concentrate on publicizing sporting events, and youth sports activities are also monitored. Provision of education to girls from economically disadvantaged backgrounds in urban and rural India has shown to be a vital CSR approach in developing the female child into an autonomous citizen of the nation. Many of the girls who were taught as part of the scheme have now come forward to mentor other young females.

This example of one CSR plan recipient motivating other beneficiaries is a great start in the direction of creating a powerful developed country.

In times of national and international natural disasters, like as the floods in Karnataka, Kerala, and Tamil Nadu, organizations also participate in CSR activities. They also help the populations of Japan and Indonesia by offering relief to those in need. Organizations also seek to save water, provide clean water to the populace, recycle garbage, maintain the forest's flora and wildlife, work to preserve mangroves, and many other things. Many organizations use their funding to carry out socially uplifting activities in cooperation with currently operating NGOs (Non-Governmental Organizations) and Government organizations.The purpose of corporate social responsibility is to encourage businesses to make efforts on behalf of society as a whole. This can be done by providing financial support for the education of students from low-income backgrounds in both urban and rural India, or by engaging in any other activity such as promoting strong healthcare for infants, pregnant women, farmers, truck drivers, fishermen, and other groups.

Every organization included a portion of its budget for the fiscal year designated for CSR initiatives as part of its CSR program. The precise function and manner of action vary from organization to organization and mostly depends on the business sector. An organization that strives to improve the quality of life for those in its primary work area is undoubtedly a worthy governing body. It is suggested that to bring harmony in the CSR activities of all organizations working in different areas and at varied locations of the country there is a need to make a government-run organization/suggestion panel that will guide all organizations to work in different areas to cover different areas of society for development. As none of the 20 groups tried to help the elderly and children who were orphans, therefore, there has to be a parent organization that will make sure that the Corporate Social Responsibility benefits every sector of society. The parent organization will also make sure that several groups do not solely assist one specific population segment. The parent company will also make sure that the Corporate Social Responsibility held by multiple organizations operating in the same industry is balanced. If just a few groups are striving to advance the interests of the truck driver association, then other groups must advance the interests of the family, children, and other dependent family members. The report thus creates opportunities for further research on Corporate Social Responsibilities conducted by diverse small businesses.

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CHAPTER 14

EXPLORATION OF CIVILIZATION AND DIVERSIFIED NUTRITION OF DIFFERENT INDIAN STATES: A STUDY

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ABSTRACT: ***India is a large country with several geographically diverse states and different sorts of crops may be grown all around the country due to the diverse geographies of the states. Diet was largely determined by the availability and palatability of foods, and the teachings and techniques that were used to obtain and prepare food came from trial and error, and an incredible capacity of human inventiveness.The author discussed the few states grow a wide range of oil seeds, and even fewer places grow a lot of spices. As a major crop, rice is grown in several states, whilst wheat and legumes are produced in other areas. The result shows the food that people consume and the traditional recipes have to do with state agriculture. The author concludes that every state's traditional cuisine comprises ingredients that were grown in that state. Pulses, grains, and spices that are primarily grown in that state are used in the traditional recipes of Kerala, Bihar, Gujarat, Uttar Pradesh, and many more states. Thus, the current paper creates opportunities for further research on state-specific agriculture and the demand for agricultural goods across states.***

KEYWORDS: Cultivated, Food, Rice, Traditional, Wheat.

1. INTRODUCTION

India is renowned for having a rich culture with unique traditions in each state. Different customs are practiced throughout the nation. The topography and agriculture of each state have an impact on its traditions. Every state has a unique eating culture, and the majority of its citizens both live there and beyond it when they travel. These cultures are often tied to the state's agricultural industries. Wheat is grown in large quantities in Delhi and Punjab. Stuffed paratha is a common dish among residents of Delhi and other parts of the country [1]–[3]. Wheat flour is used in the making of the specific dish, and wheat is widely farmed in the Delhi area nearby. Figure 1 discloses the Indian food cultivation percentage in different years effectively.

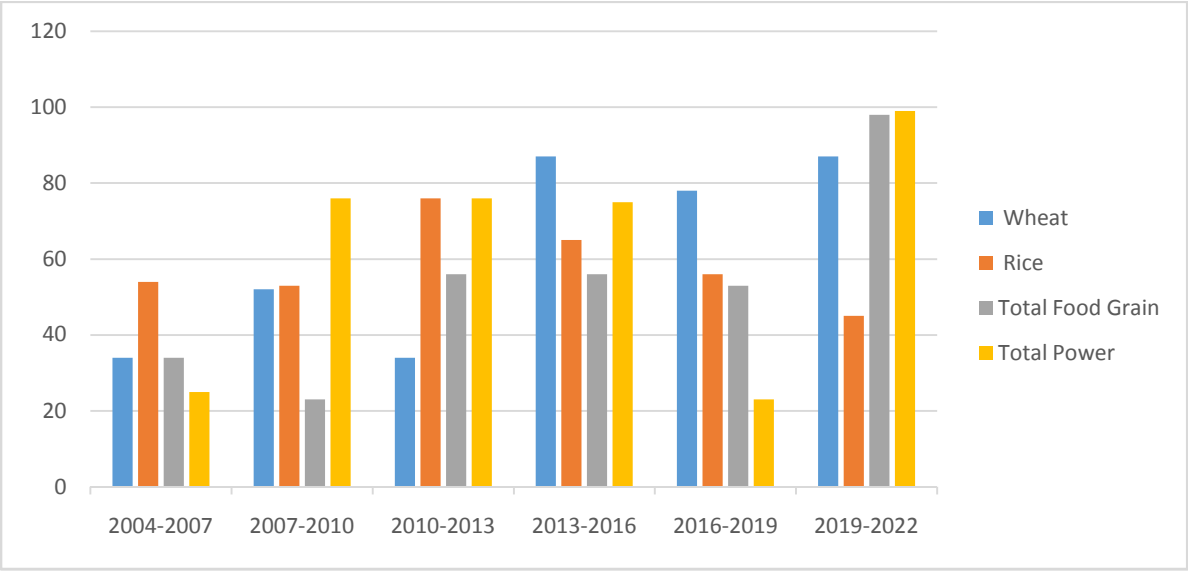

Figure 1: Discloses the Indian food cultivation percentage in different years in an effective manner.

The majority of traditional dishes in the southern region of the nation, including states like Kerala, Karnataka, and Andhra-Pradesh, include groundnut, coconut, spices, and seafood in coastal locations. The majority of Kerala's traditional dishes employ a variety of spices since they are produced there in such large quantities. Due to the existence of the two rivers Barak and Brahmaputra in Assam, the land remains fertile all year long, allowing for extensive rice farming. As a result, it has been noted that Assamese traditional dishes frequently call for the use of rice and rice flour [4]–[6].

The crops are grown and the cuisine practiced in the various Indian states and union territories is listed in Table 1. Mughal and Awadhi eating cultures are the traditional cuisines practiced in Uttar Pradesh. It has been noted that the ancient kings who ruled over certain regions of Uttar Pradesh left their mark on the food. As a result, recipes for Dum-ghost, Nihari, and Dum-biryani, which are mostly linked with Lucknow culture, are among the most often consumed ones in the state of Uttar Pradesh. The north of the state, which includes Moradabad, Mathura, and Meerut, is home to foods like Kachori, a deep-fried snack stuffed with pulses, dal curry, and Petha, a meal created with an excessive amount of sugar [7]–[9].

Table 1: Illustrates the Lists of crops cultivated and eating cultures in various states/Union territories of India

Sl. No.	States/Union Territory of India	Crops cultivation in various states and union territory
1.	Andhra-Pradesh	Cotton, groundnut, sunflower, rice, sugarcane, tobacco, and black gramme are all grown in the state. The state of Andhra Pradesh's typical dish is tamarind-rice, or "Pulihora." Pesaratu, Payasam, Rasam, Sambar, and seafood are some further classic recipes. The ancient kings known as the Nizams had an impact on Hyderabad's cuisine. Hyderabad gained notoriety for its Biryani thanks to the Nizams, the city's former rulers. Consumption of seafood, which is collected straight from Andhra Pradesh beaches, is quite common in coastal communities.
2.	Assam	Assam grows tea, jute, rice, sugarcane, rubber, potato, wheat, cotton, oil, legumes, and fruits among other crops. Due to the fertile soil created year-round by the two rivers, Barak and Brahmaputra, the state can grow more crops.57 percent of all tea produced in India comes from Assam. The traditional food mainly consumed in Assam includes dishes made up of a variety of rice cultivated in the state. Few traditional recipes of Assam are Cheera made up of flattened rice, muri are made from puffed rice, akhoi is prepared by paddy grain, sandoh Guri is prepared from fried and

		pounded rice, pithguri is made from pound rice, bora saul and komal saul are also prepared from rice. Fish, duck, pigeon, duck curry with various types of rice are mainly consumed in Assam.
3.	Arunachal-Pradesh	The crops cultivated in Arunachal Pradesh include oilseeds, maize, sugarcane, pulses, wheat, potatoes, paddy crops like rice, brinjal, chilli, ginger, cucumber, and pumpkin. The traditional food of Arunachal Pradesh includes rice and meat. Because of the variedness in the community the method of preparation of various recipes is different in various parts of the state.
4.	Bihar	The presence of the Ganga river in the state makes the land of Bihar fertile. Crops that are cultivated in Bihar include: wheat, maize, rice, Bengal gram, green lentil, pea, mango, potato, onion, sugarcane, jute. The traditional recipes consumed in the state of Bihar include Litti-Chokha, the dish is prepared by using a variety of vegetables and pulses with wheat flour. Other dishes mainly consumed in Bihar include sweet recipes – *Naivedyam, Pedakiya, Chana Ghugni* mainly uses Bengal gram for preparation of dish. Variety of pulses and sugarcane are cultivated in the state and thus many traditional recipes include pulses in preparation. In Bihar most of the traditional recipes are sweet which forms a connection with the high cultivation of sugarcane in the state.
5.	Goa	The agriculture of Goa includes cultivation of rice, maize, ragi, bajra, jowar, pulses, coconut, cashewnut, mango, jackfruit and banana. The traditional food of Goa includes sea food fish, prawn, shark curry mostly consumed with rice. Rice is grown in large quantity in the state of Goa. *Goan khatkhate,* prepared by pulses and vegetables. Many traditional recipes include use of coconut and cashew-nut which is cultivated in the state.
6.	Chhattisgarh	The crops that are cultivated in Chhattisgarh include rice, kodo-kutki, yellow lentil (*tur dal*), kulith, soybean, sunflower, and groundnut. The traditional recipes of Chhattisgarh are *Muthia* and *Chila.* Muthia is prepared by using rice batter whereas, Chila whereas is prepared by using a batter of rice mixed with lentil flour. Thus, traditional recipes include the use of ingredients primarily cultivated in the state of Chhattisgarh.

7.	Chandigarh	Wheat cultivation occurs immensely in the nearby area of Chandigarh. The traditional Punjabi food includes *stuffed paratha, roti, and naan* prepared using wheat flour. People consume *stuffed paratha, roti, and naan* with vegetables dipped in curry.
8.	Daman-Diu	The traditional recipes include seafood with rice. Seafood consumed in the union territory includes fish, prawns, and curry. Prawns and fish are mainly obtained from the nearby beach and are prepared traditionally.
9.	Delhi-National-Capital-Territory	The cultivation of jawar, rice, wheat, bajra, occurs highly in the nearby area of Delhi. The traditional recipes of Delhi include *Paratha, Chaat, and Kebab*. Paratha is prepared by using flour from the wheat crop which is highly cultivated in the nearby area of Delhi. *Chaat* is prepared by the use of various spices along with wheat flour. The culture of eating *Kebab* is linked with the ancient tradition of Mughals who ruled Delhi for many years.
10.	Gujarat	The traditional food of Gujarat includes *Khandvi, Gujarati kadhi, and Undhiyu.* All the traditional dishes include the use of vegetables and flour pulses that are mainly cultivated in the state.
11.	Kerala	Coconut, rice, pepper, cashew nut, cinnamon, clove, cardamom, nutmeg, ginger, coffee, and areca nut are mainly cultivated in the state of Kerala. The traditional cuisine of Kerala includes dishes prepared by using many spices that are cultivated immensely in the state. The use of coconut and cashew nuts in preparing a traditional recipe is widely seen across the state. People living in Kerala mainly consume dish made up of rice like idli, and dosa, and in traditional recipes spices like asafetida, chili, curry leaf, and turmeric powder is highly used [10]–[12].
12.	Karnataka	The agriculture of Karnataka includes the cultivation of maize, millets, rice, groundnut, red chili, soybean, coconut, lentil, pulses, mustard, sugarcane, and turmeric. The traditional recipes of Karnataka mainly include the use of pulses, rice, coconut, and other agricultural products that are mainly cultivated in the state.

		Neer dosa, is prepared by using rice flour *Korri Gassi* is a type of chicken curry prepared by using spices with freshly ground coconut, *Mysore dosa* is prepared by using rice, the chutney served with dosa is prepared by using coconut, *Kundapura Koli Saaru* is atype of curry of chicken includes the use of coconut milk and spices in preparing the dish.
13.	Madhya-Pradesh	The agriculture of Madhya Pradesh includes the cultivation of wheat, green pea, gram, mustard, sunflower, and garlic. The traditional recipes including Ghost-Korma of Bhopal and Seekh-Kebab show the impact of Mughal culture related to the history of the state. Street food includes stuffed snacks – *samosa, kachori, and chaat* is prepared by use of wheat flour, which is highly cultivated in the state of Madhya Pradesh. The food Culture of neighboring states like Rajasthan and Maharashtra also influences the eating habits of people. Dal-Bati which is connected with Rajasthan and Poha from Maharashtra is highly consumed across the state of Madhya-Pradesh [13]–[15].
14.	Maharashtra	The agriculture of the state includes the cultivation of rice, wheat, pulses, green lentil, black lentil, grapes, cashew nuts, jackfruit, banana, mango, orange, coconut, etc. The traditionally consumed food of Maharashtra includes the use of varied pulses in recipes like *Misal-Pav* prepared by making curry and adding *moth* pulse in it. *Puran Poli* atraditional recipe of Maharashtra is prepared by using wheat flour and gram pulse to make sweet stuffed paratha. In the Nasik area of the state, grapes are produced in large quantity which is used in the preparation of wine and exported too. In the Nagpur area, orange is produced and thus many sweets are prepared using orange as a base flavor.
15.	Uttar-Pradesh	Mainly grown crops are soybean, rice, pearl millet, maize, corn, sorghum, wheat, rapeseed, lentil, Bengal gram, mustard, green lentil, and sugarcane. The cuisine followed in the state include snacks prepared by using pulses. People consume dishes mainly prepared by use of wheat and wheat flour – roti, porridge (dalia), snacks consumed are also made up of agricultural products that are highly cultivated in the state. Traditional recipes including

		kebab and biryani are mainly consumed in Lucknow area show connection of Mughal tradition with the history of state [16]–[18].

In Assam, different types of rice are grown in different regions of the state. The traditional meal consumed consists of a variety of rice dishes as well as curries for chicken, pigeon, duck, and fish. Rice is used to make a variety of dishes, including Cheera, which is made from flattened rice, Muri, which is made from puffed rice, Akhoi, which is made from paddy grain, Sandoh Guri, which is made from fried and pounded rice, Pithguri, which is made from pounded rice, as well as Bora Saul and Komal Saul [19]–[21].

The crops that are grown in the state are also a major factor in the traditional cuisines of Gujarat, Delhi, and Goa. Gujarati Undhiyu, a traditional winter dish, is made by combining all the vegetables harvested in the state throughout the winter season. All the veggies are combined and placed in a clay pot with a clay lid. To flavor the Undhiyu, a blend of spices and oil is added to the pot. In an open area, a hole is dug manually, into which a clay pot is lowered, and into which dried wood planks are then inserted. Currently, wood sticks are burned for an hour. Vegetables put inside the clay pot are cooked by the heat produced by burning sticks. So, state-grown veggies are used to produce traditional recipes.

2. LITERATURE REVIEW

C. O'Halloran et al. in their study embellished that the impact of the consumer reactions to a speedier health-marketing campaign on perceived brand–health problems were explored, and it was discovered that accelerated businesses are particularly interested in including health and wellbeing principles in business marketing. The outcomes of this study suggest that a marketing strategy with a high product line fit elicited more positive customer reactions than one with a poor brand–issue fit, which is consistent with previous research and the contextual paradigm. Furthermore, this study looked at two different advertising messaging approaches in the high and low brand–health issue fit situations (i.e., health problem-focused vs. brand-focused). According to O'Halloran et al., under the poor fit situation, general health subject online commercials were somewhat more successful than manufacturer online advertisements, as demonstrated by the categorization technique. The findings have significance for academia and management, and they may assist practitioners to enhance current fast-food health-promotion advertising approaches [22].

J. Anturaniemi et al. in their study illustrate that this research examines the wellness bubble as well as horned influences in the context of different fast-food firms. Anturaniemi et al. applied a methodology in which they surveyed (Subway and McDonald's) employees, which are usually associated with both functional and dysfunctional cuisine, according to their study. The results show the impact of nutritional value disclosure and dietary restriction on shoppers' perceived norms was studied in depth. The author concludes that the wellness cloud is consumers' tendency to overestimate the health of specific dietary classes or commodities based on a single assumption, whereas the health horn is buyers' tendency to underestimate it [23].

K.J. Domesle et al. in their study embellished that a huge majority of people today eat a bad diet, which contributes to chronic illnesses. Despite a large number of overweight persons and severe public health issues, only a few programmers promoting healthier eating habits have been demonstrated to be effective. As a result, the goal of this study was to see how the presentation of clinical documentation, as well as its integration into a fast-food menu set, influenced young people's healthy eating decisions. A total of 142 persons between the ages

of 18 and 24 took part in the study, which had three criteria: mild, obvious, and no health-related data. When health information on nutritious foods was supplied, the degree of knowledge integration into table backgrounds had an impact, according to the findings. Participants who were given clear healthcare data about healthy foods on meals were considerably more likely than those who were given quietly incorporated health records to participate in things. For moderating variables, there was no interaction effect. According to the findings, offering particular health records on healthy goods influences eating choices in either fast food or a restaurant setting, which aligns with the fresh food advocacy paradigm [24].

This study analysis that Parents should be especially watchful of their teenager's eating habits because children do not understand or discern what is healthy or unhealthy for them, so parents are responsible for their children's eating habits. They should begin teaching their children about healthy diets while they are young and ensure that they grasp the differences between nutritious and junk foods.

3. DISCUSSION

India has a very diverse cultural population. Different regions of the states adhere to various cultures. The agriculture of different states is connected to eating patterns, especially traditional forms of eating. Stuffed paratha, a delicacy commonly eaten in Chandigarh, is often made using wheat flour. Because wheat is widely grown in Chandigarh's surrounding areas, traditional recipes frequently call for this particular grain. The influence of a state's cuisine culture on its adjacent state may be witnessed in the state of Karnataka. The sour seafood from the Mangalore and Uttar Canara regions is well recognized. Different varieties of rice are well-known in the Karnataka state's southern region. Compared to other regions of the state of Karnataka, the food that people in the north of the state eat is relatively spicy. Rice, white lentils (urad dal), jowar, ragi, semolina, and palm tree-made jaggery are among the ingredients commonly utilized in Karnataka cuisine.

Cotton, legumes, oilseeds, and sugarcane are all widely grown in Rajasthan. The traditional dishes of Rajasthan include Mohan thal, a sweet delicacy made with gram flour, and Dal-Bati churma, which is made by preparing dal with a variety of pulses. Wheat, lentils, and sugar, which are heavily farmed in Rajasthan, are used in the majority of traditional Rajasthani dishes. Due to the extensive cotton farming in Rajasthan and Gujarat, a wide range of cotton textiles are available throughout these two states [25]–[27]. The geography of the country's many states varies. Deserts like those in Gujarat and Rajasthan are uncommon. Some states are situated along the seashore. As a result, the state's traditional cuisine and eating habits make extensive use of crops that are primarily and heavily grown there. The majority of recipes employ spices grown throughout the state of Kerala since a wide range of spices are grown there.

4. CONCLUSION

India's many regions adhere to various cultural traditions and eating customs. Different regions of the nation farm different crops due to the country's diverse terrain. Due to their favorable terrain, the northeast and south of the nation grow a huge amount of rice. Thus, Andhra-Pradesh rice is widely consumed in Assam, West Bengal, Kerala, and Karnataka. Nearly all the classic American dishes employ rice directly, whether it be in the form of rice flour or in another way. Since Kerala produces a wide range of spices, the majority of recipes employ spices that are grown around the state. Snacks made with pulses are included in the state's cuisine. People eat roti, porridge (Dalia), and snacks made of agricultural goods that are heavily farmed in the state, in addition to meals that are mostly created with wheat and

wheat flour. White lentil (urad dal), rice, jowar, semolina, ragi, and palm-tree-derived jaggery are all commonly utilized in Karnataka's traditional cuisines. Crops including sugarcane, soybeans, rice, pearl corn, millet, sorghum, maize, lentil, wheat, Bengal gramme, green lentil, mustard, and rapeseed are grown in Uttar Pradesh. Wheat and wheat flour are used in traditional recipes to make roti, porridge (Dalia), and snacks. Sugarcane and wheat are two agricultural goods that are heavily farmed in the state. Thus, the current article creates opportunities for further research on state-specific agriculture and the demand for agricultural goods across states.

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CHAPTER 15

ANALYSIS OF THE IMPORTANCE OF BUILDING "THE GREAT WALL OF CHINA" IN DEFENSE AND FOR TOURISM

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ABSTRACT: ***"The Great Wall of China" is ancient and has played a very important role in the protection of china from the invaders. It is one of the Seven Wonders of the World china which is known for its huge structure and design. There is some advancement in the studies for finding the different aspects of constructing the wall of china. Thus, the focus of the study is to understand the working of "The Great Wall of China" and its importance in tourism and the economy from history to the present. Different researchers and scholars studied the different aspects of "The Great Wall of China". The study reveals that there are very fine elements used in the construction of the wall which makes it harder and stronger and makes it unique in the world. So "The Great Wall of China" attracted all the tourists in the world. The study reveals that the construction of the wall is unique which should be known and adapted in construction activities to improve the strength of any structure.***

KEYWORDS: ***China, Defense, Engineering, Military, Tourism.***

1. INTRODUCTION

As a defense against numerous nomadic tribes from the Eurasian Steppe, "The Great Wall of China" seems to be a network of barricades that was erected along the historical north frontiers by the earliest Chinese dynasties and Regal China. The first Chinese emperor, "Qin Shi Huang" from 220 to 206 BC, later connected a few selected lengths of the walls that had been constructed as early as the seventh century BC as shown in Figure 1. The Qin wall is largely gone. Later, other succeeding dynasties constructed and kept up numerous sections of boundary walls. During "the Ming dynasty" from 1368 to 1644 constructed the wall's most well-known parts [1], [2].

Figure 1: Represents the View of "The Great Wall of China" shown in the Article of National Geographic [3]**.**

In addition to providing protection, "The Great Wall" served additional objectives such as enforcing border laws, allowing taxes to be levied on commodities traveling all along Silk

Road, regulating or promoting commerce, and managing immigration and emigration. Additionally, the addition of guard towers, soldier barracks, military stations, smoke, and fire signaling capabilities, and the premise that "The Great Wall's" route functioned as a transit corridor improved the defensive qualities of the structure as shown in Figure 2 [4], [5].

Figure 2: Represents the Portion of "The Great Wall of China" during the Han Dynasty.

Distinct dynasties built different courses of border walls. They run across Liaodong there on the eastern side and the Lop Lake on the west side, from the existing Sino-Russian boundary somewhere in the northern to Tao River South, covering a total length of nearly 21,196 km, roughly delineating the border of the Mongolian steppe as shown in Figure 3. The defense system of "The Great Wall" is presently recognized as being one ancient and amazing architectural feat.By the summer and autumn of the 8th to 5th centuries BC, the Chinese have already been familiar with the methods of wall construction. The empires of Zhongshan, Zhao, Wei, Qin, Qi, Han, and Yan, all built vast fortifications to protect their boundaries throughout this period and the Warring States period that followed. These walls were formed of stone or by pressing soil and grit between wooden mounts. They were designed to withstand attacks from small armaments like swords and spears [6], [7].

Figure 3: Represents the Map of the Development of "The Great Wall of China" in the Qin Dynasty.

As the first Ruler of "the Qin dynasty", "King Zheng of Qin" subjugated the last of his foes and united China in 221 BC. He ordered the removal of the portions of the wall that separated

his dominion from the previous nations to enforce a centralized government and stop the rise of feudal lords. He did, however, direct the construction of the additional wall to join the existing fortresses all along the empire's north boundary to configure the kingdom against Xiongnu people coming from the north [8]. A key directive in building the wall was "Build and Move On", which suggested that the Chinese were not establishing an enduringly fixed boundary. Construction workers usually attempted to just use local resources since it was difficult to transport huge quantities of the materials they needed. Over mountain ranges, rocks from mountains were utilized, while in the lowlands, the building was done using rammed earth. The precise length and direction of the Qin walls are not known from any historical documents that have survived as shown in Figure 4 [9], [10].

Figure 4: Represents the Remnants of The Development of "The Great Wall of China" In The Qin Dynasty.

Few parts of the old walls still exist today because the majority have been worn away over the years. Although the exact number of lives lost during construction is unclear, several scholars have speculated that thousands or even millions of laborers perished while constructing the Qin wall. Later, to protect themselves against northern invasions, the Han, the North dynasties, as well as the Sui all rebuilt, renovated, or enlarged various portions of the Considerable Wall at great expense. No substantial work was done in the area during the Tang or Song eras. the Jurchen-led Jin, the Xianbei-ruled Northern Wei, the Tangut-founded Western Xia, and the Khitan-ruled Liao, who dominated big parts of North China for more than centuries, all built defense walls, but were situated often on the northern side of "The Great Wall" as people recognize it, in China's autonomous states of ancient Mongolia and modern-day Mongolia [8], [11].

The Great Wall was primarily constructed out of clay bricks, stones, and timber before bricks were used. However, during the Ming, bricks and other materials like tile, limestone, and rock were extensively employed in many places of the wall. Construction accelerated because bricks were faster to work with soil or stone because of their size and weight. Additionally, bricks are more durable and can support more weight than rammed dirt. While more labor-intensive to utilize, stone can support its weight more robustly than brick. As a result, the wall's base, inlet, outlet brims, and entrances were all made of rectangular-shaped stones. Most of the wall is lined with battlements, with defensive gaps that are around 23 cm broad and more than 30 cm tall. Guards could observe the surrounding area from the parapets.

It was crucial for army units to communicate with one another along the Great Wall to summon reinforcements and alert garrisons of enemy movements. For better visibility, a signal tower was erected around the wall on hilltops or other high locations. Wooden gates might be a trap for someone trying to pass through. The inside surface of the wall was where

barracks, stables, and armories were constructed. So it is necessary to the important aspects of such a great wall in the world so its study is necessary.

2. DISCUSSION

Jin R. YANG et al. stated “The Great Wall of China” is being built with computer assistance near Jinshanling. Digital modeling, component and environment building, and data representation are only a few of the useful tools that the discipline of computer graphics has offered to academic study. However, as most graphics programs tend to concentrate on recent works of construction, there is limited study on the use of computer graphics within ancient construction engineering. This study examines a state-of-the-art computer simulation of the ancient building techniques utilized to build “The Great Wall of China” inside the Jinshanling area. The most recent data on these techniques are compiled in the publication. The intricacy of the construction techniques on the structure was modeled using data from an on-site visit, literature research, and the expertise of an expert utilizing the 3D CAD program SolidWorks. Stones, bricks, lumber, rubble, and rammed earth were used to build the edifice from the ground up. SolidWorks has several drawbacks, including such processing and rendering times, but because of its cutting-edge visualization capacity, it was selected to reconstruct, render, and animate “The Great Wall of China” [12].

Jin Yang et al. discussed a set of fortifications known as the Jinshanling Section of “The Great Wall of China” that were built for important military defenses in northern China. This area was initially constructed in the Ming Dynasty in AD 1368, and then had an extensive repair, rebuilding, and building work in the late Ming Dynasty, about in AD 1569. In comparison to the full 21,200 km wall, the Jinshanling segment is quite short at 10.5 Km. The wall piece is in the Chinese province of Hebei's Luanping County. The building processes and materials used to build the nearby wall and towers are the main topics of this research article. The study process consists of site inspections, expert information gathering, and 3D graphic modeling. According to this analysis, the edifice was built of bricks, stones, mortar, wood, and rammed earth in addition to other building materials [13].

Jin Rong Yang et al. studied the Jinshanling section of “The Great Wall of China” which is a piece of ancient Chinese cultural heritage. Researching and promoting one's nation's importance, distinctiveness, and legacy is one strategy to enhance global interactions between Chinese and foreign culture academics. In particular, icons of engineering history, like “The Great Wall of China”, were excellent instances of such prominence and may help both Chinese and foreign businesses in the future by promoting tourism, education, and cutting-edge environmentally friendly building techniques. This study examines the construction of “The Great Wall of China” at Jinshanling in antiquity, from surveying through the superstructure stages. The findings enable the development of Virtual Reality (VR) in the academic background and the investigation of the many green building strategies used and their applicability to contemporary construction. The authors are hoping that by highlighting this prominent monument and other impressive examples of ancient engineering, they will raise awareness of cultural heritage among people all around the world [14].

Tanja Dettmering and Shibing Dai, stated the many kinds of lime binders used in the mortars to construct China's “Ming Great Wall” were explored, as well as their importance in developing a conservation strategy. The most striking aspects of “The Ming Great Wall” are the external masonry walls constructed from lime mortars, natural stones, and bricks. The molecular and mineralogical composition of principal bedded and pointed mortars indicates that limestone binder was mostly used in the areas surrounding Beijing and Hebei to construct "The Ming Great Wall”. In various western locales, air limestone and calcium-rich

lime, with low naturally hydraulically sensitive phases were wet and progressively mix with surrounding carbon dioxide to generate calcium carbonate. Both calcium-rich limestone and dolomitic mortars are almost aggregate-free, according to chemical and microscopic tests. The low porosity textures, rich micro-scale, and high strengths, of old limestone mortars, could be identified. The restoration of "the Ming Great Wall" as a remnant is the most recent conservation principle. As either an outcome, the conservation plan for mortars must be amended. Calcium-rich lime binders are being used to not only preserve but also rehabilitate areas of "The Great Wall" that have been originally constructed using dolomitic lime. This is since interactions between dolomitic lime mortars and air pollution contribute to part of the damage to "The Great Wall". Binders made of calcium-rich lime and natural hydraulic lime assessed by natural pozzolanic materials may be more suited than other binders for the structural stabilization of "the Great Wall" ruins.

Dr. H Rajashekar and Punitha S J, stated the Indian tourism and its expansion has a distinct history. Macro Polo traveled the world in the 13th century. Tourism declined in prominence throughout the Middle Ages as people turned entirely to spirituality. "The Great Wall of China" as well as its palaces were seen by travelers traveling the 12000-mile Silk Road from Italy to China. The eighteenth century was thereafter referred to as the Grand Tour Era. The Central and State governments, public agencies, and the private sector all played important roles in the development of tourism, according to the 1997 New Tourism Policy. The Indian government launched several measures to grow the sector.

Jin Rong Yang et al. studied about the ancient materials and techniques used in the development of "The Great Wall of China" around Jinshanling Using Fuzzy Logic and Virtuality. "The Great Wall of China" and towers at Jinshanling, Luanping County, some 153 kilometers northeast of Beijing, are the subject of this study. The investigation shows that the primary building techniques utilized to construct the wall were base stone masonry installation, compacted ground and rubble construction, and primarily Flemish pattern brick masonry installation. These techniques were applied in a bottom-up manner. In several places, particularly in Jinshanling's eastern region, foundational rocks and bricks from previous Ming Dynasty building periods were combined with existing stone masonry [14].

Rammed earth and rubble building was also the primary technique utilized to build the towers, especially for the inner core of the foundation. The towers also had an exterior layer made of fiery kiln bricks and footing stones at the base, just like the wall. Just on the outermost layer of the towers' base, fire kiln brick brickwork and foundations masonry were installed. The support structure on the first level is the primary distinction between the skyscrapers. One design supported the second level of the towers with wood pillars on the first floor, and another supported the second story with inner mud bricks, arch, and vault on the first floor. According to a statistical association, the brickwork and arch holding the studied buildings were much more able to be placed in place at a greater height. As sources for the fuzzy sets and logic evaluations, the results from book searches, site visits, and conversations with "The Great Wall" specialists were employed [15].

The fuzzy settings rotational model and the fuzzy systems angular model were the fuzzy ii models employed in the assessments. The construction project method, the sequence used during construction, and the recent form of the structure were the outcomes of the fuzzy assessments which are used as the input variables to start creating the VR model of the structure using the programs 3ds Max, Google SketchUp, SolidWorks, and Unity Pro. This VR model included a walkthrough model of the structure as well as instructions on how to build it. Within Volume I of the dissertation, it is demonstrated how the knowledge base was acquired and analyzed through site visits, expert interviews, and literature reviews. The

design and response of the VR modeling are displayed throughout Volume III of such a dissertation, while Volume II of this study presents the fuzzy evaluations.

“The Great Wall” was mostly constructed out of mud brick, stones, and timber before bricks were used. However, during the Ming, bricks and other materials like lime, tiles, and stone were extensively employed in many places of the wall. Construction accelerated because bricks were faster to operate with than soil or stone because of their size and weight. Additionally, bricks are more durable and can support more weight than rammed dirt. Stone is more labor-intensive to use, but it can support weight better than brick. As a result, the wall's base, inner and outer hems, and entrances were all built using rectangular-shaped stones. Most of the wall is lined with battlements, with defensive gaps that are roughly 23 cm (9.1 in) broad and slightly taller than 30 cm (12 in). Guards could observe the surrounding area from the parapets. Contrary to a popular belief, no human bones or parts of the body were ever included in the sticky rice mortar or any other portion of the wall. Instead, sticky rice mortar was frequently employed to keep bricks together. It was crucial for army units to communicate with one another along “The Great Wall” to summon reinforcements and alert garrisons of enemy movements. For a better visibility, signal towers were erected around the wall on hilltops or other high locations. Wooden gates might be a trap for someone trying to pass through. The inside surface of the wall was where barracks, stables, and armories were constructed [16].

While parts of the wall north of Beijing as well as close to tourist attractions have been conserved and even considerably repaired, the wall is in poor condition in many other areas. The wall is occasionally used as a supply of stones for constructing roads and homes. Graffiti and vandalism are also common in some areas of the wall, and engraved bricks have been stolen and sold for approximately 50 renminbi. To create room for mining or building, portions have been demolished. According to a 2012 estimate even by “The National Cultural Heritage Administration”, 1,961 km (1,219 mi) or 22% of “the Ming Great Wall” has perished. Sandstorm-induced erosion might cause over 60 km of walls in Gansu jurisdiction to disintegrate within the next 2 decades. The wall's height has decreased from even more than 5 m to less than about 2 m in several locations. The several square observation towers that are seen in the most well-known pictures of the wall are no longer there. Many of the wall's western sections were built with mud instead of brick and stone, making them more prone to erosion. Concrete was used in 2014 to rebuild a section of the wall close to the border between Liaoning and Hebei provinces. The piece has received harsh criticism.

The interaction and trades among nomadic and agricultural cultures in old China are reflected in “The Great Wall”. It offers substantial tangible proof of the powerful military strength and national defense capabilities of the central dynasties in Chinese History and is a magnificent example of the exceptional military architecture, science, and art of the time. As the nation's emblem for preserving national and populace security, it has incomparable significance.

2.1.Significance of The Great Wall of China:

- In Chinese history, "The Great Wall" has unrivaled metaphorical value. Its goals were to preserve China from external assault and to fight against external barbarian habits. It is one of the most important metaphors in Chinese literature, appearing in works such as Tch'en Lin's "Soldier's Ballad" in 200 AD, Tu Fu's poetry from 712 to 770, and well-known Ming dynasty novels.
- “The Great Wall” of the Ming is a true masterpiece, not just because of the massive nature of the project but also because of how well it was built. The Wall, the only structure created by humans that could be seen from the moon, is the epitome of

architecture that has been seamlessly incorporated into its surroundings on the massive size of a continent.

- Chinese construction and spatial organization principles were enforced on the construction of the defensive projects along the northern boundary during the Chunqiu period. The population transfers caused by the construction of "The Great Wall" accelerated the expansion of Sinicism.
- Despite serving a single meaningful objective for 2000 years, this complicated and dialectical cultural property is an exceptional and rare instance of a military architecture and design ensemble the constructions history highlights succeeding advancements in defense technologies and adaptation to shifting political contexts.
- The Western Han fortifications that are preserved within the Gansu regions, and the much-praised architecture of the Ming era, serve as excellent examples of how "The Great Wall" provides outstanding evidence of the cultures of ancient China. The tangible and spiritual components, historical details, and cultural knowledge that give "The Great Wall" its exceptional worldwide significance are all preserved in full.
- The whole 20,000-kilometer length of "the Great Wall" as well as the historical structures that make up the complex defensive strategy of the land, including fortresses, walls, passages, and beacon towers, have been maintained to the current day.
- "The Great Wall's" construction techniques from various eras and locations have all been meticulously preserved, and its unrivaled national and cultural value to China is still acknowledged today. The construction of tourist amenities and a cable car has had a significant influence on the aesthetic coherence of such a Wall at Badaling [10].

Given that numerous internationally renowned parts of the Great Wall, including Jiankou, Badaling, Mutianyu, Juyongguan, Gubeikou, and Jinshanling, are located in Beijing's suburbs, Beijing is typically regarded as the major entrance to the Wall. These well-preserved parts were constructed between both the 14th and the 17th centuries under the Ming dynasty. Badaling is a very well of all the Great Wall portions close to Beijing. As a response, Badaling attracts a lot of big group tours and is frequently quite busy. One of the Great Wall's three major mountain crossings is found at the neighboring Juyongguan Great Wall, which is almost as congested as Badaling. While being considerably less crowded than Badaling, Mutianyu Great Wall provides breathtaking views of such Great Wall as well as the surrounding hills. It may ride an exciting toboggan run from the top of the Wall to the bottom of the slope on this portion of the Wall [17].

Juyongguan, Badaling, and Mutianyu can all be reached from central Beijing in a half-day journey due to their closeness. It is often advisable to visit Mutianyu rather than Badaling or Juyongguan since the latter two areas may be quite crowded and make it difficult to appreciate this magnificent edifice. It typically takes approximately 2.5 hours to drive to the "Jinshanling Great Wall", which is farther distant from Beijing and is located around 150 kilometers northeast of the city center. Jinshanling is one of the most beautiful portions of "the Great Wall", despite the lengthy trip. It is strongly advised a visit to Jinshanling if schedule permits one full day to view "the Great Wall".

Within a day's journey from Beijing, visitors may also visit Gubeikou and Jiankou. Both portions are excellent options for anyone looking to trek and see the untamed Great Wall because they have not been renovated since they were initially constructed during the Ming Dynasty. Be careful that the Jiankou portion is only appropriate for experienced hikers due to its extremely hazardous and steep climbs. Huanghuacheng, Simatai, and Shanhaiguan are a few more well-known portions of "the Great Wall" that are located in or near Beijing. Nearly

all of “the Great Wall's” portions were constructed on mountain ranges because of its initial use as a military fortification; hence, even the parts that have undergone extensive restoration still need some difficult climbs and uneven staircases. Visitors can view the unrestored portion of “the Great Wall” and can trek to its end while visiting a piece that has been rebuilt [9].

Most people will find Mutianyu and Jinshanling to be excellent, moderately challenging climbs that are yet quite safe. It is recommended the Jinshanling through Jinshanling East or Gubeikou to Jinshanling pathways for people wanting a strenuous trek via untamed, unrestored sections of the Wall. Both unrestored and newly repaired Wall parts may be seen along all of these routes. Please keep in mind, too, that walks along “The Great Wall's” untamed, unrestored sections require a lot of steep ascents and loose bricks and may be quite dangerous in certain spots. On “The Great Wall”, camping is typically prohibited, especially in newly repaired portions [3].

The springtime months are ideal for climbing and offer mild weather for all portions of “The Great Wall” close to Beijing. This is a particularly lovely time of year to visit the Wall since many trees start to flower around late April to early May. The fall is indeed a pleasant season to travel because the weather is typically pleasant. The mountains seem especially beautiful from early October to late October when the tree leaves start to change color. The chilly and occasionally windy winter months of December through February are when most visitors to the Wall avoid going. Long treks are not recommended during the hot and muggy months of July and August. It is a very memorable visit to the Great Wall of China as it is one of the Seven Wonders of the World. To see the wall's hugeness and construction many tourists visit china which adds foreign currency to the Chinese economy. Thus, it is necessary to know the importance of such a wall to the world.

3. CONCLUSION

The Great Wall of China is one of the Seven Wonders of the World which was developed and constructed by the first Chinese emperor Qin Shi Huang. The idea of developing the wall was to protect the empire from foreign invaders from attacking and damaging the nation and its resources. The land of China is the land of various resources and biodiversity. The wall of china is known for its unpredicted architecture and engineering behind a construction. Millions of people are visiting china every year just to see “The Great Wall of China” which is one of the foreign income sources for the economy of country china. All over the world, different people’s study “The Great Wall of China” in their research. The books, literature, and thesis were published on the design and importance of “the Great Wall of China”. The wall of china is unique and is still unpredictable to the world so research is carried out on it. The study will help to analyze the different studies made by researchers in the world for developing such an amazing monument in the future.

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CHAPTER 16

A COMPREHENSIVE STUDY ON THE METHODS OF EXTRACTION OF ESSENTIAL OILS

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ABSTRACT: ***Essential oils are complicated, volatile molecules and essential oils come from sources of plants. The essential oil can be extracted in a variety of methods. In this paper, the author discussed a few techniques that employ organic solvents, while others use water as a foundation to extract the essential oils found in plants, and numerous techniques for extracting essential oils are explained in the study. The results show the process of extraction is carried out based on the kind of essential oil to be extracted. Essential oils are utilized in several everyday goods, such as cosmetics, soaps, cleaning supplies, medications, and culinary items. In this paper after many literature reviews, the author concludes that the most effective extraction process is crucial because of the increased demand brought on by the widespread usage of essential oils. Thus, the current work offers up possibilities for finding the best and most affordable way to extract widely utilized chemical compounds in the future.***

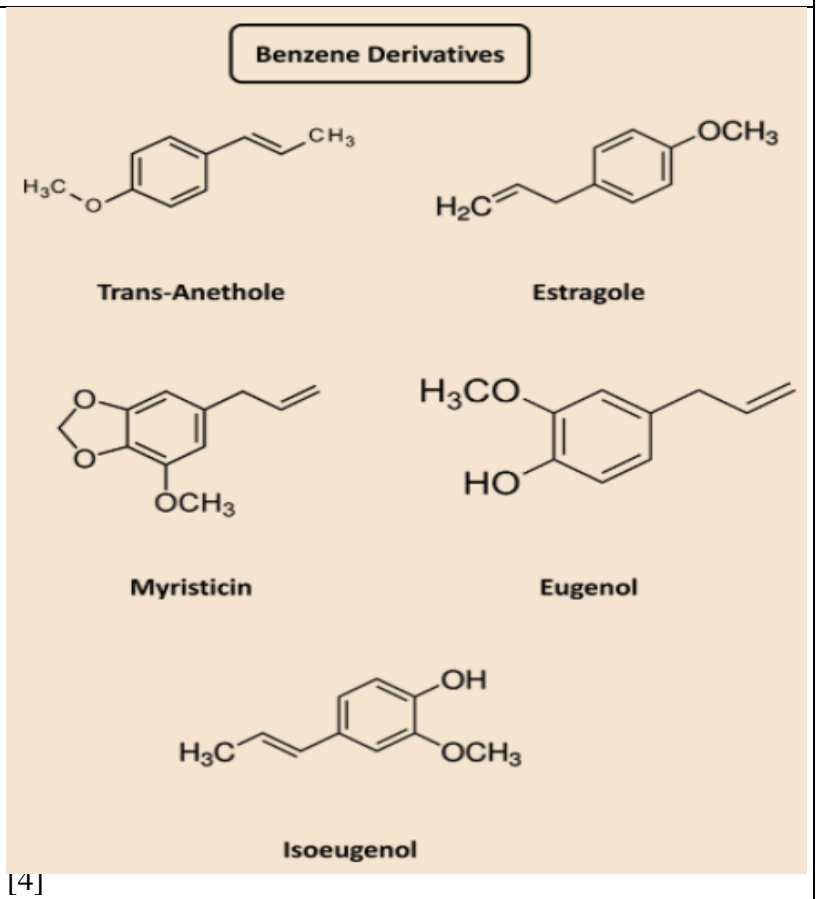
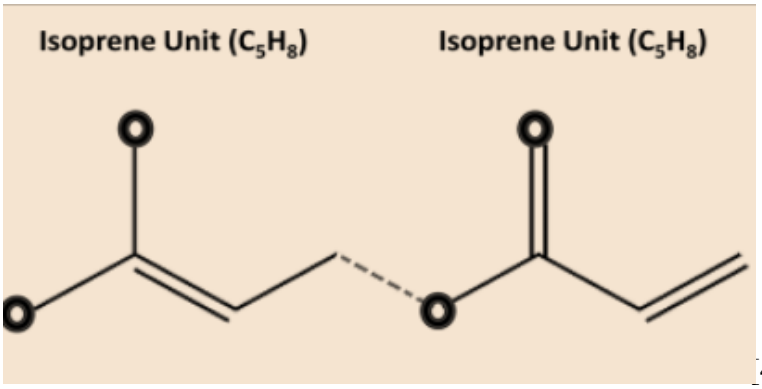
KEYWORDS: Chemical, Compound,Essential Oil, Extraction, Health.

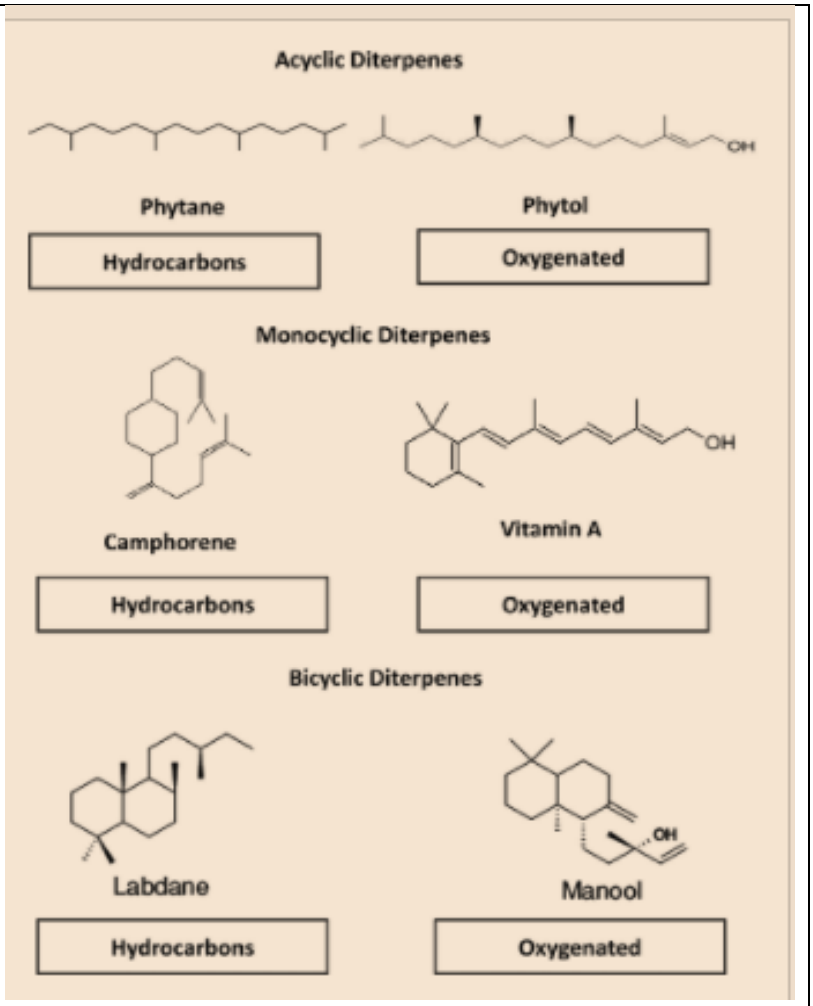
1. INTRODUCTION

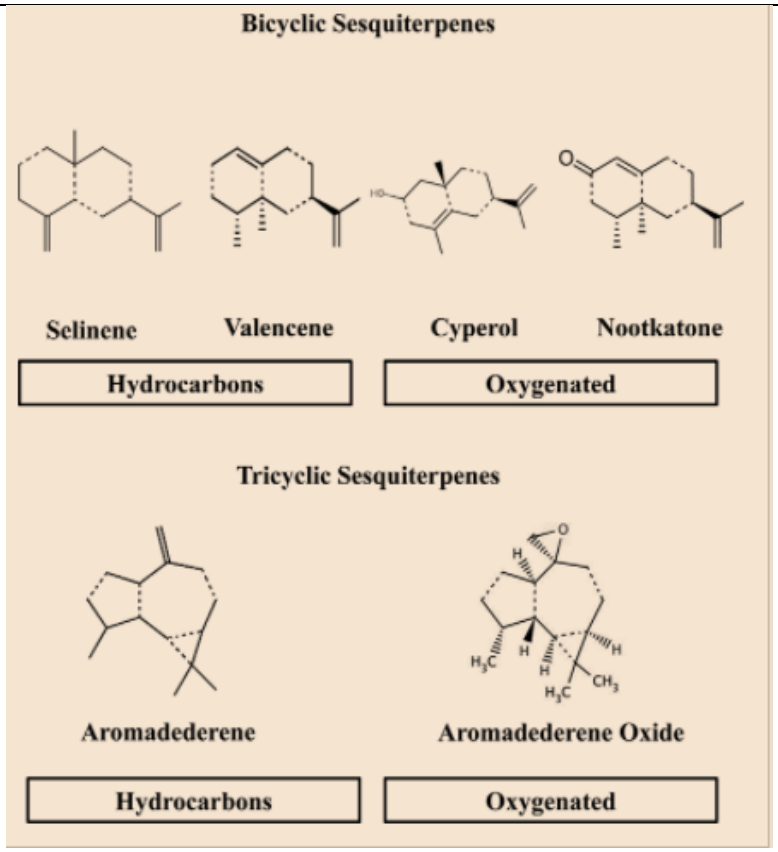
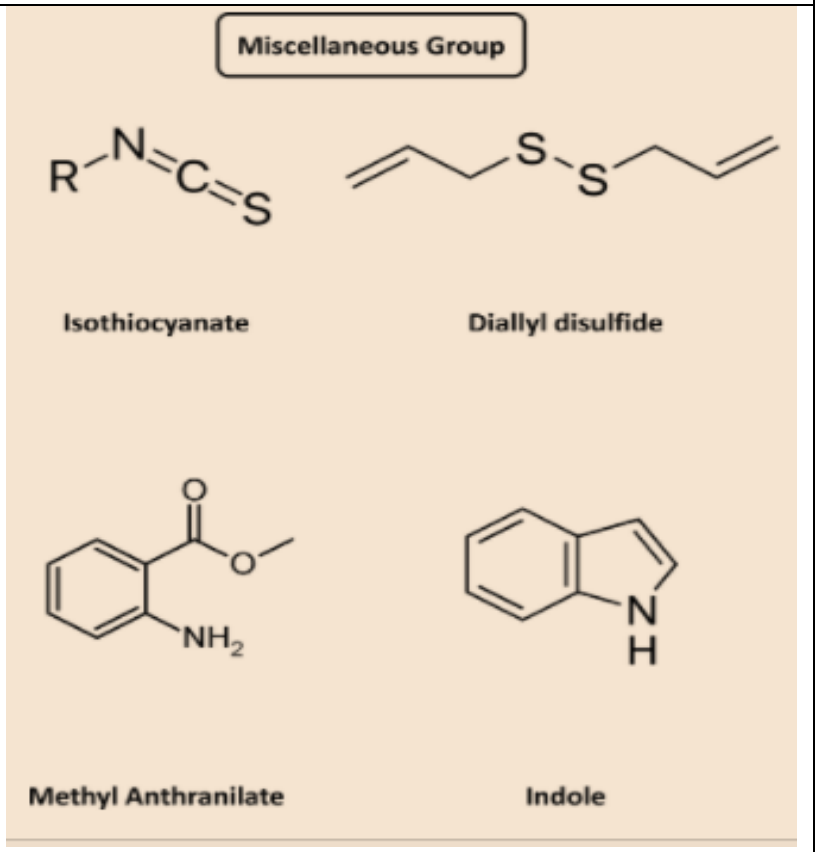
Essential oils are a combination of complicated, volatile molecules. Essential oils are produced by distillation or expression. There are more than 3000 different essential oils that are known to exist in the world, and only around 10% of them are regularly utilized in daily life. Cleaning agents, medicinal products, food items, cosmetics, perfume, and many more products all use essential oils regularly. Essential oils are well recognized for their many health advantages, such as lowering anxiety and stress levels, having an anti-inflammatory impact, promoting restful sleep, preventing migraines, and acting as an antibiotic and antibacterial. Various essential oils are extracted from various plants including Citrus limon, Cymbopogon winterianus, Citrus sinensis, Cymbopogon-nardus, Citrus-aurantifolia, Eucalyptus-globulus, Eucalyptus-Citriodora, Lavandula-Mentha, Mentha-Canadensis, Piperita, Ocotea-odorifera, etc [1]. Because of high development and significant growth in analytical means of extraction of oils, more and more authentic methods of characterizing essential oils are available [2].

Thus, a compound that is volatile and originated from terpene mainly sesquiterpenes and monoterpenes are recognized as oxygenated derivatives of hydrocarbons in the form of aldehyde, alcohol, ketone, ether, ester, phenols, and peroxides [1]. Non-terpene compounds like fatty acids, esters, phenylpropanoids, and in a few cases Sulfur and Nitrogen-containing compounds are found [1]. Different essential-oil show different chemical structures [3]. Table 1 Shows types of essential oils with chemical structures. Various Techniques to extract Essential-oils like - Isothiocyanate, Indole, Diallyl-disulfide, Methyl-anthranilate, Eugenol, Estragole, Isoeugenol, Trans-Anethole, Myristicin, Vitamin A, Phytol, Camphorene, Labdane, Manool, Phytane, cyperol, Selinene, Aromadederene, Cyperol, Nootkatone, Valencene, and Aromadederene Oxide, few examples are peppermint-oil, sandalwood-oil, rose-oil, jasmine-oil, tea-tree-oil, lemon-oil, chamomile-oil. All essential oils are extracted by following the different processes of extraction.

Table 1: Embellishes types of essential oils with chemical structure [4]**.**

Sl. SI. No.	Various Essential-Oils and their examples	Structure of essential-oil
1.	Essential oil based on straight compound	CH_3-CH_2-CH=CH-CH_2-CH_2-OH
2.	Essential oil based on derivatives of benzene i.e. phenylpropanoid	 [4]
3.	Essential oil based on terpene related to isoprene	 [4]

		 Acyclic Diterpenes OH Phytane Phytol Hydrocarbons Oxygenated Monocyclic Diterpenes OH Camphorene Vitamin A Hydrocarbons Oxygenated Bicyclic Diterpenes OH Labdane Manool Hydrocarbons Oxygenated [4]

		 [4]
	Essential oils are based on other groups i.e. Nitrogen and Sulphur constituting compounds	 [4]

The distillation process is shown in Figure 1 the process of the hydro distillation process. There are various types of hydro distillation which include steam-and-water-distillation, water-distillation, and Direct-steam-distillation. In water distillation, the plant product is entirely submerged inside the water [5]. The plant material and excess water then boil. The boiling process takes place in the presence of steam-jacket, closed-steam-coil, closed-steam-jacket, and open-steam-coil. In this process, there is direct contact of the mixture of plant-material with water. If the plant material does not agitate during boiling, agglomerates of dense material settle at the bottom, and later it gets degraded. The process allows the use of finely powdered plant material to extract essential oil [4].

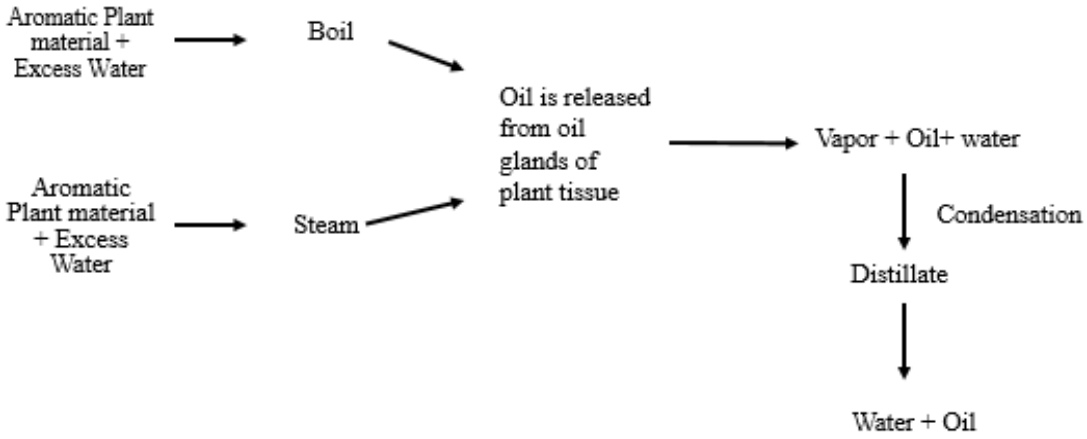


Figure 1: Embellish the Process of Hydro Distillation Process [5]**.**

In water and steam distillation the steam is generated either in the satellite boiler or inside the still. Even if separated from plant material. The yield is high and the process is fast. Extraction of essential oil by the solvent is a complicated and expensive process because n-hexane and ethanol are used as solvents in the extraction of oil from plant-material. Extraction of solvent is also termed liquid-liquid-extraction [6]. Figure 2 shows the process of solvent-based extraction of essential oil. This process is performed to separate/extract oil from flower/seed using two liquids that usually don't mix like organic-solvent-water [7]. The extraction of the solvent method is used for extracting plants that are delicate to extract a high quantity of essential oils at a very less cost [8]. The quantity of extracted oil is based on the heat applied during the process of extraction [9]. The process of extraction is quite easy, but it takes a lot of time to extract the essential oil, and the consumption of organic solvent is also high.

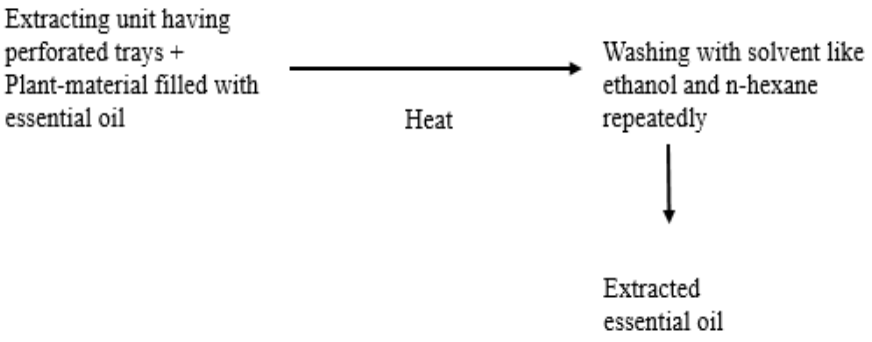


Figure 2: Illustrates the process of solvent-based extraction of essential oil [5]**.**

Expression/Cold press method this method is used only for the extraction of citrus oil. The process involves the physical process in which oil glands present in the peel of citrus fruits

are broken/crushed to secrete oil [5]. Extraction by Soxhlet process is a continuous process of extraction using hot-organic-solvent. During the process, the condensed liquid is collected in an extractor. When the extractor fills with solvent, the solvent siphons through the flask with extracted liquid. The recycling of extracted liquid takes place till the extraction process is finished. Figure 3 Shows the Soxhlet process of extraction of essential oil [5].

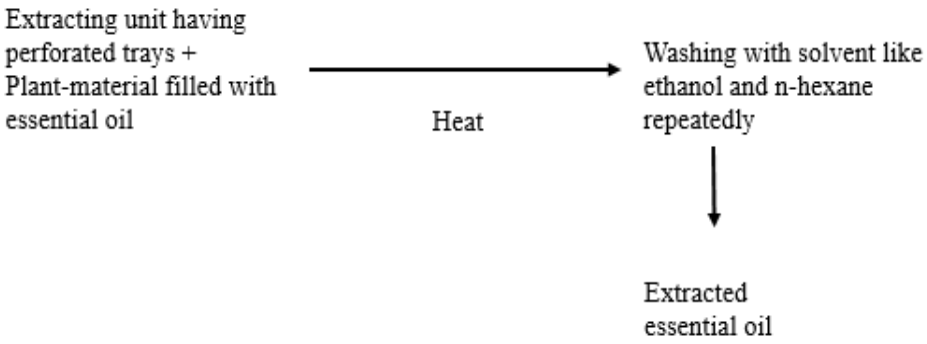


Figure 3: Shows the Soxhlet process of extraction of essential oil [5]**.**

1.1.Non-Conventional Methods of Extraction:

- Microwave-assisted hydro-distillation (MAHD) in this process is performed by using the microwave oven. The process is performed at normal atmospheric pressure. To heat, 100gm plant material for 30 minutes, 300ml water is used [10]. Thus, extracts all the essential oil from the plant [5].
- Solvent-free-microwave-extraction (SFME) is the dry heating of plant material that takes place inside the microwave. The plant material is made wet by adding water. The moist plant material is then placed inside the microwave. Dry heating releases essential oils inside plant-material [5].
- Ultrasound-assisted extraction (UAE) is the ultrasonic wave that puts mechanical force on the cell wall. This increases the transfer of material. Thus the method is used in solid-liquid-extraction [5].
- Supercritical-fluid-extraction (SFE) is the process that involves separating one component from another by using super-critical fluid as the solvent for the extraction [9]. Till now, almost 90% of all SFE performed, carbon-di-oxide is used. Carbon-di-oxide is used with solvents like methanol and ethanol. The process involves, a high yield of essential oil, low viscosity, and a high coefficient of diffusion [5].
- Microwave-hydro-diffusion-and-gravity (MHG) is the most efficient technique and takes less than 20 minutes to extract essential oil from plant material [5]. Various research has been conducted that proves the benefits of various essential oils.
- Peppermint oil is used to increase the energy in patients suffering from low energy and also helps in the digestion of patients suffering from ailments related to digestion [11].
- Sandalwood oil is used to treat nerves, sandalwood oil is proven to calm down the nerves of a patient and proves to increase the power of focus, thus, aiding in concentration [11].
- Lavender oil is used in the treatment of anxiety and stress in patients [10]. A massage of lavender oil has proved excellent effect in treating stress and anxiety [11].
- Chamomile oil is used in the treatment of a patient suffering from mood swings and gives a soothing effect to the patient. The message of chamomile oil improves mood [11].
- Jasmine oil is used in the treatment of a patient suffering from depression especially depression during pregnancy and post-pregnancy depression [11].

- However, more research on the underlying reason behind the health benefits of essential oils is yet to be conducted [11].

2. LITERATURE REVIEW

Sharmeen et al. in their study embellish that the choice of cosmetics by customers is frequently influenced by fragrance, which is an essential component of cosmetic goods. The author applied a methodology in which they stated that frequent ingredients in cosmetic formulations like fatty acids, oils, surfactants, and fragrances also play a significant role in disguising unpleasant odors. The results show the cosmetic business relies heavily on essential oils since they not only provide products with nice smells but also function as preservatives and active ingredients while also providing the skin with several health advantages. The author concludes that additionally, the revitalizing market for natural components has greatly boosted interest in plant derivatives, particularly essential oils, in the beauty and wellness sectors. Popular cosmetic firms have responded by endorsing natural scents and choosing [12].

Sharma et al. in their study illustrate that Food packaging may be thought of as a detached barrier that shields food from harmful environmental elements including heat, pressure, oxygen, and water vapor. The author applied a methodology in which they stated that properly transported and stored while preserving them from microbial and chemical pollutants, extending their shelf life. The results show Food's shelf life is increased through active packaging (AP), which gives the chance for communication between the outside environment and the food. The author concludes that Chemoactive material affects the food product's chemical make-up. Essential oils are a natural addition that may be utilized in active packaging in the form of packaging films [13].

Zhai et al. in their study embellish that the urge to stop using antibiotics as a preventative food supplement for livestock and reduce their use asks for alternative alternatives to maintain the effectiveness of the existing livestock production. The author applied a methodology in which they stated that the substitutes, natural compounds have a lot of promise and are typically regarded as organic, less harmful, and residue-free. The results show numerous in vitro investigations have shown that essential oils have antibacterial properties on a variety of microorganisms. The current review included the fundamentals of essential oils as well as their effects in vivo on development, intestinal microbiota, anti-oxidation, immunological function, meat quality, as well as potential mechanisms of action in pigs and poultry. Future study areas were also suggested [14].

This paper elaborates the prolonging their shelf life by adding chemical contaminants. The findings demonstrate that active packaging, which enables interaction between the food and the environment outside, extends food's shelf life. The author concludes that the chemical composition of the food product is impacted by their active substances. Natural additives like essential oils can be used in packaging films for active packaging.

3. DISCUSSION

Essential oils are derived from plant material and are a type of plant product. Different techniques can be used to extract the essential oil. When attempting to extract essential oils from plant material, few procedures employ water, and even fewer require the use of an organic solvent. Although there are many ways to extract essential oils from various plants, it is still required to calculate the amount of plant product and essential oil that will be taken from it. Essential oils are used in almost every product of our day-to-day life, thus increasing the production of essential oil and choosing the process which is more economic and

convenient, current paper puts light on various methods used to extract the essential oil. The use of essential oil is increased immensely because of numerous health benefits associated with essential oils which include oil. Anxiety and Stress it is observed that 43% of people suffering from anxiety and stress opt for some of the alternative treatment ways of treatments that help in reducing symptoms of anxiety and relieving stress. It is difficult to analyze the exact effect of essential oil because of the effect of smell. Evidence has proved that the use of essential oil during massage shows reduced anxiety-stress in patients. However, reduced anxiety is observed in patients when the massage is being conducted.

3.1.Antimicrobial and Antibiotic properties:

With the development of technology, many species of bacteria are arising that are resistant to antibiotics. This has encouraged me to do more research on drugs that can kill antibiotic-resistant microbes. Studies have been conducted on various essential oils and have proved that tea tree oil and peppermint oil show high antimicrobial effects. Insomnia and Sleep are several research has been done to prove the effect of lavender oil in improving the quality of sleep in women after pregnancy. Lavender oil has also shown a positive effect in improving sleep quality in heart-disease patients. It is suggested that lavender oil puts a calming effect on patients, however, more research is required to analyze the effect of lavender oil.

3.2.Less Inflammation:

Research has proved that essential oils are highly effective against inflammation. Essential oils show an anti-inflammatory effect. Oils like oregano, rosemary, and thyme, show a significant reduction in inflammation. The research conducted has proved high efficacy on the mouse and very less work is done to prove the anti-inflammation action of Essential-oil in human beings. However, more work is required to prove the efficacy in the case of humans [15]. Migraine and headache in the early 1990s research was conducted that proved that, putting peppermint oil on the forehead of patients suffering from headaches [16]. The mixture of ethanol-peppermint oil has shown high efficacy in treating headaches in patients. Few recent research has proved that lavender oil and peppermint oil reduce headache and body ache when applied to the body.

As per the traditional healing method of Persia, a mixture of chamomile and oil of sesame when applied to the forehead. But, more in-depth research is required in this field. Thus to increase the yield of extraction of essential oil it is required to choose the extraction process which is best suited. Out of the distillation processes, the water and steam distillation process is considered to be the most effective and yield-giving method. While the microwave-hydro-diffusion-gravity process is considered the most effective method of extraction, as the process does not require a high-cost organic solvent. Large set up of extraction equipment, filtration, and drying no other process is required when the essential oil is extracted by the microwave-hydro-diffusion-gravity process.

4. CONCLUSION

Numerous goods that the author uses every day, including food, cleaning supplies, cosmetics, pharmaceuticals, perfume, soaps, detergents, and many more, include essential oils. Essential oils are quite popular right now due to their many health advantages. The advantages of essential oils for health include Stress & Anxiety it has been noted that many people who experience anxiety and stress search for different treatments that will lessen their symptoms and reduce their tension. Because of the opposing effects of essential oil's fragrance, it is challenging to determine exactly how it works. Using essential oil during massage shows reduced anxiety-stress in patients.

The author concludes that however, reduced anxiety is observed in patients when the massage is being conducted. Antimicrobial and Antibiotic properties in many species of bacteria are arising that are resistant to antibiotics. Thus, drugs are synthesized that can kill antibiotic-resistant microbes. It is proven that tea tree oil and peppermint oil show a high antimicrobial effect. Insomnia and Sleep can be cure with the lavender-oil that improves the quality of sleep-in women after pregnancy. Lavender oil has also improved sleep quality in heart-disease patients. It is suggested that lavender oil puts a calming effect on patients. Less Inflammation in essential oils is highly effective against inflammation, Oils like oregano, rosemary, and thyme, show a significant reduction in inflammation.

Migraine and headache are the mixture of ethanol-peppermint-oil has shown high efficacy in treating headaches in patients, research has proved that lavender-oil and peppermint-oil reduce headache and body-ache, when applied to the body. Therefore, the best-suited essential oil extraction procedure must be used to provide a high yield of extraction. The water and steam distillation process are known to be the most efficient and high-yielding technique out of all the distillation procedures. The most efficient extraction method, however, is the microwave-hydro-diffusion-gravity approach since it doesn't use an expensive organic solvent. When an essential oil is extracted using the microwave-hydro-diffusion-gravity technique, a substantial setup of extraction equipment, drying, and filtering are also necessary. Thus, the current study offers opportunities for finding the best and most affordable way to extract widely utilized chemical compounds in the future.

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CHAPTER 17

EXPLORING THE IMPORTANCE OF ANCIENT ART AND ARCHITECTURE TO MODERN INDIA

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ABSTRACT: ***Indian art and architecture is well known in the world for its unique style of architecture. The different monuments and historical museums are there which are secures these masterpieces of ancient times. Hence the author focusses to explore the different architectural works in the different parts of India. There are various studies and researches made by different experts on the different aspects of arts and architecture in India. In studies, it is found that stone carving, sculptures, wall painting, and architecture styles are the unique techniques found in Indian culture which is studied all over the world. There are still many places in India that are still not explored in the world due to various reasons. Further studies can be done to decode the different messages given by the different cultures in India through their unique style of work which they carry from generation to generation.There will be a need for architects in the future since the demand for advancements, urban planning, architecture building, and real estate development will always surpass the number of individuals available to do the same job.***

KEYWORDS:Ancient Art,Architecture, Heritage, Modern,Paintings.

1. INTRODUCTION

India's really and unquestionably heterogeneous national identity is explored, incorporated, and asserted via culture. Every aspect of human existence is influenced by culture, which also shapes and controls Indian civilizational patterns. The word "culture" comes from the Latin word "cult," which meaning to plow, cultivate, refine, or adore,[1]. In general, it refers to developing and honing anything to the point that the result inspires awe and respect in us. This is quite similar to the Sanskrit word Sanskriti [2],[3]. In its simplest form, culture is a man-made environment that includes all of the material and immaterial consequences of communal existence that are handed down from one generation to the next [4],[5].The three-letter term for art includes a wide variety of human expression and development. This fact makes it not so bad to remark that our ancient predecessors were eccentric artists. Some might be surprised to learn that simply taking nice images on your phone counts as being one of them. Coming back to history, there are several eras and periods in art.

Behind every work of art are human-made materials and stuff. Their significance encompasses intellectual, symbolic, symbolical, narrative, and spiritual dimensions [6],[7]. Friends may be familiar with some of the subcategories and broad categories [8],[9]. Prehistory, Antiquity, Middle Eastern, American, Asian, and European kinds are grouped together. The chapters on art are entertaining to read, but because of their extensive curriculum, it might take a while to analyze and appreciate them. Art encompasses all forms of human creation and includes works of architecture, handicrafts, theater, and photography. It also provides information on our social and emotional activities.By sculpting the rocks into waterfalls as water flowing from heights, nature has also created art. Therefore, it is obvious that art plays a crucial role in our environment and is not only limited to certain locations or objects. It is astonishing to realize that it may also treat psychological conditions including anxiety, Alzheimer's disease, and depression. It was clear that the languages, religions, dancing, music, architecture, cuisine, and customs of India varied from region to region. The

Indian subcontinent's culture, which is sometimes described as an amalgam of different civilizations, has been affected by ancient history, during which several monarchs reigned and changed the art and architecture.The varied cultures of India have had a significant influence on many aspects of the globe, including cuisine, philosophy, and religion. The caste system is a significant component of Indian society. The indian caste system goes back to 1200 BCE which is an important aspect of traditional Hindu practices. Portuguese visitors to India inside the 16th century used the term "caste" for the first time. There are four castes that are organized in a hierarchy in Hinduism. The Brahman Varna is indeed the highest. Priests and well-educated society members belong to this class. Kshatria seems to be the Varna that follows them in the hierarchy. The aristocracy and those in positions of authority in society belong to this class.They are followed by the Vaisia. The landowners and businesspeople of society belong to this class. The Sudra are above them in Hindu hierarchy. Members of this class are indeed the working class and peasantry who have non-polluting professions in society.

The present paper is a study about a brief introduction to ancient art and modern Indian architecture. This study is divided into several sections, the first of which is an introduction, followed by a review of the literature and suggestions based on previous research. The next section is the discussion and the last section is the conclusion of this paper which is declared and gives the result as well as the future scope.

2. LITERATURE REVIEW

G. T. Papanikos et al. has explained that Ancient Athens' version of democracy was distinct from how it is practiced now, even in the most developed democracies. Five democratic principles have been outlined in research to assess this disparity, and they have been applied to both contemporary advanced democracies and ancient Athens. Modern democracies were inferior compared to what the eligible inhabitants of Ancient Athens had in contrast and according to five criteria. Five conditions for democracy were outlined in the relevant ancient Greek literature, none of which were entirely met either then or now. It was observed that the term many in the Pericles text as it now stands is problematic since it lends itself to two meanings.The first refers to the ever-present political system of majority voting when all eligible voters elect representatives and when any political entity, like the parliament, makes decisions. In conclusion, a government for the public that was governed by representatives in ancient Athens might have been derided as a farce of democracy. Similarly to that, indirect democracies does not exist.

Thomas Oommen [10] has examined the origins and consequences of a little-known but significant ideological conflict between competing regionalist and modernist groups of architectural practitioners that took place in Kerala, South India, during the 1970s. In order to better understand the differences between Laurie Baker, a British expat and Gandhian, and J. The research examined the opposing viewpoints of both encampments as they discussed the design of the modern home under the guidance of C. Alexander, a well-known contemporary and luminary of the architectural business across all of Kerala after independence. It was observed that the background of a radical political and cultural atmosphere of the 1970s in Kerala is explored in relation towards the disproportionate presence of one subgroup as well as the relative obscurity of the other group. Now let's turn to the architecture history of modern India. The investigation comes to the conclusion that a complicated web of factors and participants, taken from the omitted fringes of India's modern architectural histories, are at play in this particular case study.

Navin Piplani [11] has builds on the idea that knowing classical design principles, in particular the maala, is important for modern design education.Modern educational institutions have eroded the importance of traditional design concepts and techniques. The theory and practice of the psychology of design are examined via the examination of buildings and locations that exemplify both traditional and contemporary orientations to design, as well as literary references from antiquated treatises on architecture.It is possible to establish if conventional design concepts and techniques are appropriate for use in contemporary architecture education using a properly constructed framework of quantitative indicators. An examination of the components of the instructional framework for the present architectural pedagogy indicates the areas where the integration of traditional knowledge material may occur. The vstu purush madala is said to be a practical tool and philosophical vision that, because of its various qualities, is well suited to design teaching. In conclusion, a thorough understanding of the madala will give value to the crucial context relevance and historical theory components of design education.

K. Kiruthigan and K. Thirumaran [12] has explained how urbanization is a widespread and unavoidable process worldwide. Despite the fact that development and expansion are good for many individuals and businesses, there is a chance that historical sites that have cultural significance to people might disappear. This study's main goal was to determine how urbanization can alter a temple town's heritage traits. The old temple town of Kumbakonam in Tamil Nadu, India, has undergone a study to examine the impacts of urbanization on its heritage structures. The heritage town of Kumbakonam's urbanization statistics was examined using an ordinal estimation technique.Our study explored particular physical, economical, and sociocultural urbanization elements that led to discernible and substantial alterations in the Kumbakonam heritage traits. These elements are important and would support the Local Development Plan's (LDP) implementation for Kumbakonam's heritage characteristic conservation and sustainable urban expansion.

Chika Udeaja [13] et al. have explained the main challenges affecting heritage in the Indian city of Surat, including growing urbanization, rising housing demand, and sociological and climatic changes. Although some attempts on the part of the local authorities, urban culture and heritage is being ignored and old buildings are being rapidly replaced with newer, conventional concrete structures.A qualitative dataset that combines observation as well as a photo survey of two heritage landmarks with in-depth semi-structured conversations and focus groups encompassing local government leaders, management staff, and heritage professionals provides support for discussions on challenges and difficulties in less than Surat's urban area.The results of this study highlight a number of issues, including the inadequacy of heritage-focused urban conservation management processes and policies the lack of decision-makers' skills, resources, and training, and the ongoing conflict and competitive pressure between developers' interests and heritage conservation requires. In conclusion, Surat has a critical opportunity to strengthen urban identity for both the present and future generations by utilizing the full potential of its legacy.The above study shows the main challenges affecting heritage in the Indian city of Surat, including growing urbanization, rising housing demand, and sociological and climatic changes. In this study, the author discusses a brief history of Indian art and types of Indian art.

3. DISCUSSION

Despite the fact that a large amount of Indian secular art was created, it has not lasted since it was mostly fashioned of fragile materials. Religious art has persisted in the stone media. In both Buddhist and Hindu art, gesture, posture, and attribute symbols have several degrees of significance. Different hand gestures are depicted in Buddha pictures to represent various

religious states, including enlightenment, contemplation, and preaching.Hindu deities are sometimes shown with several hands to demonstrate their capacity to do different tasks at once, and each hand has a unique quality.Except for Mughal art and architecture, which require distinct consideration, the three main tendencies in Indian art—Hindu, Buddhist, as well as Jain—are discussed.

3.1. Indus Valley Civilization:

Some of the earliest pieces of Indian art were created in the Indus River Valley around the second quarter of the third millennium BC. Mohenjo-Daro and Harappa, the former of which was demolished in the nineteenth century, were the most well-known sites. Housing, marketplaces, storage areas, businesses, and public facilities were arranged in a grid-like pattern. A complex drainage system was also present.The Indus civilisation produced a large number of statuettes made of steatite and limestone.Some statuettes are made in the smooth, flowing form that serves as the model for later Indian sculpture, whereas others are made in the hieratic style of modern-day Mesopotamia (prana). You may also discover square steatite seals in this area that are ornamented with a variety of animals, including realistically represented bulls, ceramic storage jars, toys without wheels, and sometimes even mother goddess representations. Bronze sculpture, tools, and weapons display a high level of workmanship rather than a significant aesthetic advancement.

3.2. A Brief History of Indian Art:

Archaeologists have discovered evidence of at least 290,000-year-old ancient carvings on cave rocks and rock art in this area. The oldest specimens are, in fact, the Bhimbetka petroglyphs, which have been found in chhattisgarh. These would be composed of cupules, which are similarly hammered-out, unproductive depression episodes that resemble spherical cups. This type of rock art largely dominated cave painting all throughout Paleolithic, Mesolithic, and Neolithic periods and typically included both animal and human motifs. The Indus Valley Civilization, which flourished between 2,500 and 2,000 B.C., created the first recognized sculptures of Indian art. And 1,800 B.C.They crafted little terracotta and metal sculptures that included representations of cows, monkeys, and people. Buddhism's ascent in the sixth century B.C. opened the door for religiously-themed art, frequently in the form of marble and bronze statues. Religious painters also experimented with building enormous stone temples with Greek-inspired columns at this time.

The activity of sculpture was widespread among Hindus and Buddhists in India. Hinduism remained a major theme in Indian art for many years, as statues of gods like Shiva were frequently made. Islam underneath the Mughal Empire had become more significant by the 16th century, and Islamic monarchs had increased artistic output. The arts flourished during this time, and in 1631 work on the Taj Mahal started. In the 18th century, the British first became involved in India and set up art schools that promote European designs. In order to appeal to European purchasers, indigenous art forms were sometimes idealized or exaggerated, while local art styles fused with foreign elements.India's separation from the British Empire in 1947 encouraged native artists to look for a new aesthetic. The rich history of Indian is reflected in traditional components and inspirations in contemporary art.

3.3. Types of Indian Art:

Each of India's many regions has an own aesthetic. Religious themes are among the most well-liked, and they typically include legendary both human and animal characters in addition to elaborate design. In Post - independence India, the three most prevalent art forms have been paintings, architecture, and sculpture.

3.3.1. Architecture:

Like painting, Indian architecture evolved over time into many different styles and shapes. Many of these buildings, like the Taj Mahal and South Indian Temples, have gained international notoriety. As a consequence of India's current discourse, architectural trends have altered throughout time and contemporary constructions now incorporate inspirations from many other nations. Hindus, Jains, and Buddhists created one of the oldest styles of building, constructing whole temples entirely out of rock.The Kailasa Temple, one of the most well-known rock-cut temples, is renowned for its grandeur and sculptural treatments and is found in the Ellora Caves throughout Maharashtra, India. Massive, free-standing temples first appeared about the fifth century B.C. Indian architecture sometimes featured spiritual components like an altar and a place for devotees looking for awareness.

When Muhammad of Ghor declared Delhi the Muslim headquarters in 1193, Islamic architecture for Muslim clients began to appear during the 12th century. The Delhi Sultanate, which was established in 1206 and ruled over a sizable portion of both the Indian subcontinent spanning 320 years, originated in Central Asia through Afghanistan and favored an architectural style heavily influenced by Iranian elements. Large buildings, notably different from those previously constructed in India, were created by local craftsmen that Muslim authorities engaged. This included churches, which had covered passageways leading to open grounds that were directed toward holy cities.Modern Indian, Pakistani, and Bangladeshi architecture have been affected by the many Indo-Islamic architectural forms that developed as a result of the fusion of regional and Islamic heritage. While addressing the demands of an expanding population, contemporary Indian architecture nonetheless respects and protects heritage. Modern buildings didn't start to exist until 1947, when India won its independence from the British. Le Corbusier, a renowned Swiss-French architect as well as designer, was then hired by the Indian Development authority to oversee Chandigarh's urban development. With the project, there was a resurgence of interest towards Indian architecture.

3.3.2. Sculpture:

In India, sculpture is still a popular form of religious art and a preferred medium for creative expression. Buildings were lavishly decorated, and the majority of the subject matter included abstracted human figures intended to represent the beliefs of Hinduism, Buddhism, and Jainism. In Indian sculpture, female goddesses like Shakti, Kali, even Brahma were frequently portrayed. Terracotta figurines were among the earliest sculptures made in the Indus Valley, wherein Indian art originated. At intersections and significant locations throughout the Mauryan Dynasty that lasted from the fourth to the second century B.C. huge stone pillars could be seen.They frequently included lion statues and lotus-shaped tops that were emblems of royal sovereignty. During this time, several big stone images of the gods were created, then smaller variations were used to decorate Buddhist structures.

Burial mounds known as stupas were encircled by elaborately carved gates decorated with a variety of religious emblems. The second and first centuries B.C. saw the emergence of more advanced Indian figurative art. A vast variety of styles and customs then developed in various regions throughout the succeeding decades. The Elephanta Caves, and group of cave temples built between the middle of the fifth and the sixth century A.D. and mostly devoted to the Hindu deity Shiva, represents one of the most notable buildings. Indian sculpture had attained a form by the ninth and tenth centuries that had altered little from what it is now and was mostly utilized as part of building embellishment.Early in the 20th century, Indian sculpture conformed to western academic art techniques, and realism artists who worked on secular topics in British art schools had a significant effect on styles. Significant shifts were made

from the old and conventional forms used to represent tales and deities. Ramkinkar Baij, a painting and sculptor, experimented with unusual materials including concrete, gravel, as well as cement in his work throughout the 1940s and 1950s in an effort to combine Western art and customary Indian forms. Contemporary Indian sculpture continues this exploration by incorporating both traditional methods and themes with novel ideas.

3.3.3. Paintings:

Every painting trend that emerged in India was a direct result of the cultures, ideologies, and practices that had been transmitted from one generation to the next. Although the initial paintings were murals or wall paintings, more modern materials like paper, canvas, as well as other media were eventually used in the art. Several of the most popular painting techniques used in traditional Indian art.

- Madhubani Paintings:

Amongst the most well-known Indian paintings are the Madhubani paintings. This kind of large painting initially originated in the Mithila region of Bihar, but it was not until British govt employee turned art historian W.G. While surveying earthquake damage near to the India-Nepal border and Nepal in 1934, Archer came into their ingenuity. The Madhubani style is characterized by a straightforward and emotive depiction of tradition and culture frequently using scenes from myths. Artists sometimes use flower, animal, or bird themes as a way to contrast stark patterns with bright images. There are several variations of the art form being practiced, include Bharni, Katchni, Geru, Godna, and Tantra.

- Miniature Paintings:

Originally discovered on palm leaves, those miniature paintings from the 10th and 12th centuries probably made for merchants who took them on their journeys around the subcontinent and were used primarily as manuscript illustrations. All throughout Mughal and Rajput kingdoms, the art style gained importance. Persian methods were used to create beautiful miniature paintings that were quite detailed. Themes included representations of ordinary life as well as religious and historical settings.

- Pattachitra Paintings:

This type of early painting originated in the area of Orissa, north eastern Indian state on the Bay of Bengal, around the 12th century B.C. This kind of painting is being created today in the nearby little settlements. Pattachitra, which means "cloth picture" in Sanskrit, accurately describes this conventional, cloth-based style of scroll painting. The paintings, which are renowned for their exquisite intricacies and legendary themes, use angular, aggressive lines and heavily reference Mughal-era influences.

- Warli Paintings:

Indigenous Indian art known as Warli folk paintings has been around for 2,500 years. The form was developed in Maharashtra, a province that spans much of Central India's western region, and it is still commonly used today. Warli paintings, which are often made on the hut walls, are executed in a simple manner with linear and monochrome colors that evoke cave art. This kind of tribal art uses earth tones and moderate hues instead of the vibrant colors found in other indigenous art forms to show local people's daily activities like farming, performing, and hunting.

3.4. The salient aspects of Art Forms in India:

It is well known that India has a lengthy and illustrious past. Indian arts, and later those of the rest of Asia, have been molded over the course of history by a fusion of native and foreign inspirations. Paintings, architecture, literature, music, dancing, linguistics, and movies are all considered forms of the arts. The majority of the arts in ancient India were influenced by the Vedas. Analysis of ancient Indian art reveals that every period had a distinctive civilization all its own. Indian art traditions have also developed continuously over countless generations. Different art forms, including paintings, architecture, and sculpture, developed in ancient India. According to theoretical literature, paleolithic cave drawings mark the beginning of Indian art history.With the assistance of rulers, the arts flourished after the emergence of the modern religions of Hindu religion, Jainism, Buddhism, and Sikhism. New types of Indian architecture and art became seen throughout the Islamic era. Eventually, the British combined the Indian design with their own Gothic and Roman elements. Their art has a strong cultural influence. The employment of symbolic shapes dates back to the time of the Harappan seals in India. The creation of the later temples is greatly influenced by the flame altars of the Vedic era, with its astrological and mathematical importance.

It was succeeded by a crucial time in Indian art history for the construction of rock-cut caverns and temples. The rock-cut caves were first built by Buddhists, then by Hindus as well as Jains in Badami, Aihole, Dwarka, Salsette, Elephanta, Bombay, and Mahabalipuram. Since the very first rock-cut caves, rock-cut art has evolved continuously to accommodate various needs, social and religious settings, and geographical variations. Along with the development, modification, and alteration of the folk and tribal artistic tradition in India, there have been other art forms including architecture, paintings, and sculptures. These artistic expressions are produced by members of India's many cultural and societal groupings.It is the interaction of individuals whose lives are synchronized with the cycles of nature and its rules of cyclical change and whose lives are intertwined with natural energy. Gods and tales are given contemporary shapes and recognizable imagery in Indian mythology. The evolution of these art forms was also significantly influenced by fairs, festivals, and regional deities. In this form of art, creativity and living are intrinsically linked. India's tribal arts are particularly sensitive because tribal people have a keen awareness that is very different from that of settled and urban populations. Their minds are open and intense, filled with myth, legend, and tidbits from the birth of vast, numerous gods. Their work conveys the fervor and mystery of their lives and serves as an expression of them.

3.5. Basics of Modern Indian Architecture:

After India gained independence from the British around 1947, modern Indian architecture began to emerge. However, there was a time after independence when there was little advancement in the art of architecture. Everything started when Chandigarh was created by the renowned architect Le Corbusier. Afterwards when, his work served as an inspiration to Indian architects, who started putting his ideas into practice. This was a revolutionary change in Indian architecture. The traditional Indian architectural is still taken into consideration in current Indian architecture. Modern Indian architecture nevertheless reveals traces of traditional elements. After defining and explaining modern Indian architecture, let's examine the country's shifting culture and the difficulties this profession faces.

3.5.1. A Shift in Design Sensibilities:

An expanding population also implies that more dwelling space is needed. There are now many chances for architects in India because of this greater demand. Additionally, this is a key factor in the sharp increase in the number of international architectural companies

operating in India. Now because the cities lack the fundamental infrastructure, there is a critical need to plan and effect change. In addition, a large number of Indian architects who earned their degrees abroad are returning home to take part in the transformation that the nation is undergoing. In the realm of architecture as well, the repercussions of globalization are evident. With the arrival of several international architectural companies working in India, the idea of glass and designer-shaped structures emerged.The Indian architects quickly chose to go local despite the fact that this style has been popular for a while. Bamboo, timber, stone, brick, mud, clay, and other natural and alternative materials are increasingly more frequently used in modern Indian architecture. The "modern Indian sensibility" is a broad umbrella term that broadly refers to the work of young Indian architects. It indicates that Indian architecture's historical origins have been incorporated into modern terminology.

3.5.2. Look at Cities:

India's largest cities are all struggling with infrastructural problems and other associated problems. Contrarily, smaller cities are shown to be superior town planning models. A lot of architects have realized that focusing on their specific projects is useless. Instead than considering the city as a whole, consider specific neighborhoods. A city's sociological and cultural imprint may be influenced by architecture, and architects are becoming aware of their societal responsibilities. More and more organizations of architects are taking proactive steps to preserve the historic structures as they become aware of their obligation to the community.The architects are also showcasing the enormous ability of Indian artisans and assisting with their lifters. Nonprofit groups in addition to architects are contributing. They are developing workable solutions to the infrastructure-related issues as well as expressing their opinions on those issues.

4. CONCLUSION

Our prime objective in using such a condensed form of language was to introduce you to India's significant contributions to international art and architecture. India is a country that values spirituality as much as culture and history. In conclusion, India's modern architecture has all it needs to advance while preserving its cultural history. All that is needed is a positive move and some assistance from other sources such as the media. Through diverse media outlets, the general population may become more informed, which can increase both their financial and intellectual contributions. Such contributions will undoubtedly help the profession grow to greater heights than previously thought.It is past time for the architecture business to go in the direction of understanding people's wants and expectations. Modern Indian architecture should effectively maintain the values and uniqueness of Indian culture in addition to adapting to changing lifestyles. That construction will undoubtedly be long-lasting and sustainable. It implies that Indian architecture has been well-known for millennia. It has been divided into several styles and shapes, each with a distinct personality and area of expertise. Indian ancestry, culture, and religion are all strongly ingrained in the nation's architecture. It has components that have endured for millennia and are still important in the contemporary world.

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CHAPTER 18

AN ANALYSIS OF THE FACTORS BEHIND TIME AND COST OVERRUNS IN CONSTRUCTION PROJECTS

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ABSTRACT: ***The term delay in the context of construction means the need or expense of additional time, either beyond the specified time frame for completion or beyond the time limit set by the stakeholders of the project. Due to poor timing and cost management, construction companies are now facing substantial fees and schedule overruns. Timely completion of the project is a testament to the efficiency of all the project participants;however, the construction process suffers from many unforeseen circumstances due to various reasons. The goal of this study is to identify the variables that lead to complexity, cost and schedule overestimation in construction projects. Rapid infrastructure development has necessitated the planning and execution of projects with wide scope, high expenditure and levels of complexity. It is important to study, analyze and evaluate the specific causes and consequences of exceeding the limits of "time and cost". It should be necessary to provide the best and most suitable mitigation strategies to address these problems.***

KEYWORDS: ***Construction, Cost Overrun, Infrastructure, Management, Projects.***

1. INTRODUCTION

Design mistakes are among the main causes of capital costs in most projects, according to studies. It's important to keep in mind that project designs are often utilized as a guide to achieving good technical contributions to project execution and correctly reflecting the client's needs. A faulty design thus effectively conveys inaccurate or insufficient project results. When the project's actual execution phase begins, this might lead to the improper use of processes to obtain the intended outcomes, which would result in delays and cost overruns. Because project estimates are based on the produced designs, design errors that manifest as omissions or misrepresentations will cause the estimation for the project cost to also take these omissions into account. This will result in extra work, change orders, etc., and which will cause a delay and cost overrun. Similar to this, it's possible that designs that were made without thoroughly analyzing the site were flawed. This is because these designs may lead to more work, a changed scope of work, and a new contract once the project's construction phase begins and the actual site conditions start to emerge. These certainly will affect the project's overall delivery time and cost [1]–[3].

The majority of projects cite inadequate field research, defects in the design and specification, mistakes in the plan, design modifications, etc. as the root of their design issues. The primary consideration is the employment of qualified personnel and the use of skillful equipment throughout the project to control project delays and cost overruns caused by design flaws. A well-designed design process that includes integrating effective communication with the whole design team and allowing adequate time for corrections, in-depth study, and reviews are requirements for achieving error-free design. Like this, effective planning, managing, and monitoring of projects are crucial to improving project performance throughout the project life cycle. To guarantee that all site aspects are taken into account in the design, a thorough site analysis should be conducted. Figure 1 explains the causes of cost overruns and how value management may be used to identify the most affordable design possibilities [4]–[6].

A weak contract management system and insufficient and inappropriate procurement are two other significant variables that cause cost overruns and project delays. Nearly every facet of a commercial relationship is outlined in contracts, including payment terms, costs, and service needs. A contract that does not sufficiently describe every element of the project may as a consequence lead to disagreements inside the contracting system. For instance, if the initial contract does not adequately specify each important component of the project work, this may lead to drawn-out discussions, arbitration, including mitigation owing to work modification orders, and the establishment of a replacement legal contract with new costs and deadlines. Consequently, there will undoubtedly be budget overruns and project delays [7], [8].

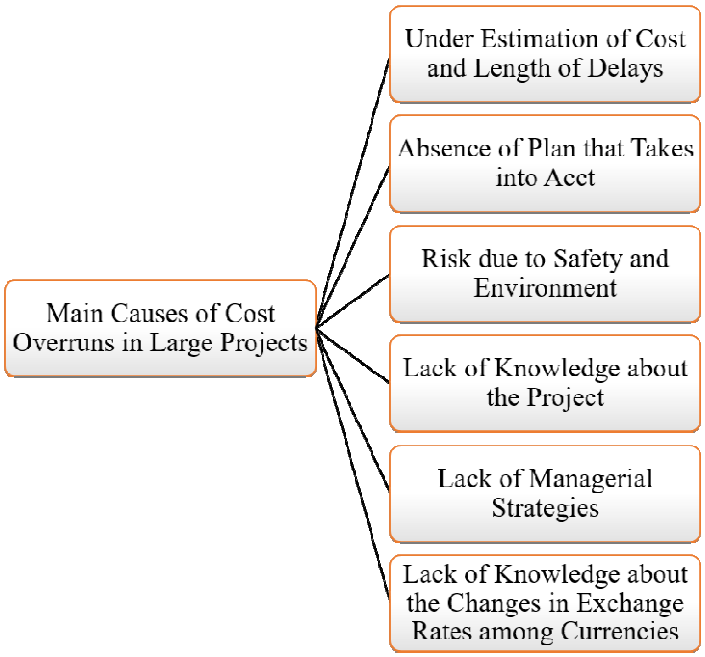

Figure 1: Illustrating the Reasons that are Responsible for Fee Overruns in Large Projects.

Bad contractor selection brought on by cheap bids and a lack of technical competence will result in cost overruns, timetable delays, poor quality, and an unfavorable completed product. There may be delays and cost overruns when managing contracts with customers that have sluggish payment schedules. It is essential and ethically correct to first pick the most qualified contractor via a fair selection process, design the contract form that best meets the project's aims, and precisely specify the terms and conditions that will govern it to handle these difficulties. These clauses should specify who is accountable for accepting the risk, and the repercussions of delays, and cost overruns. Likewise, any significant sections in contracts that might lead to disputes should be stated in plain, unambiguous language.

The project's complexity might potentially play a role in the delay and cost overrun. The scale of the project may be used to determine complexity; for example, most megaprojects have longer implementation times than small projects. The original budget may need to be increased to finish the project due to inflation, changes in material prices, and variations in currency rates. The outcome might be cost overruns and protracted negotiating processes that cause delays. Construction projects are unique endeavors with many distinguishing characteristics, including complex organizational structures, lengthy timelines, unfavorable environments, and high financial stakes [9], [10]. These characteristics have led to significant risks, such as delays in project completion and cost overruns.

The planning, initiation, and procurement phases are only a few of the many stages that make up the lifespan cycle of a construction project. During each of these stages, project managers must continuously assess their plans, measure their progress, and take the appropriate measures as needed. Every second and any rupee (paisa) counts in building projects. Not only that, but in every project that has to do with the economy, delays in costs and schedules mean lost opportunities for project profits. It is common knowledge that many infrastructure projects in India have experienced delays as a result of a variety of problems. The development of our nation's economy depends heavily on the state of its infrastructure. India is now one of the world's top outsourcing centers.

Cost overruns are the differences or deviations between the costs initially anticipated during the design phase and the costs incurred during the building phase. These are the criteria that will determine if a project is successfully finished. The project completion time will be significantly impacted, and several problems will also arise if the actual cost exceeds the budgeted cost projected during the design stage. Therefore, cost management is crucial for improving performance. An effort has been made to research the reasons for cost overruns to prevent pointless expenses. Time overrun occurs when a construction project is not completed in the allotted amount of time. It happens when the work under the contract is not completed in the allocated time. Time overruns are the most typical event that impacts practically all construction-related undertakings.

The possibility of overruns and schedule delays rises when the scope of a building project is poorly defined at the beginning. As a result, the original project scope is often used to compute all project plans, schedules, budgets, quantity projections, procurement, and quality procedures. Project scope changes may be the consequence of several things, such as inadequate initial project description, incorrect calculation of inherent risks and uncertainties, issues with project funding, a change in both party’s interests, and other extreme situations. A review of the complete original project setup, including the budget, construction techniques, construction schedule, procurement plan, quality assurance plans, etc., will be necessary for every modification or change to the project's scope throughout execution. Due to this, more time, resources, and money will be required to do the task than originally estimated.

Understanding that change is inevitable in projects and could even be advantageous to their success is crucial for managing change in project scope efficiently. Therefore, implementing a full shift in scope management is the most important thing to strive to do. Including involved parties and considering their wishes throughout the project, will provide a proactive strategy that can be put into action. Setting up milestones as key performance indicators early in the project's planning process is crucial for gauging how well the project scope will be accomplished, the client should be involved in this process. In this country, building projects often experience delays and cost overruns. The study adds to an understanding of the factors contributing to cost escalation and time overruns as well as the dissemination of questionnaires, methodologies, literature reviews and desk research on public works projects such as construction industry stakeholders.

2. LITERATURE REVIEW

Murali et al. [11] conducted the questionnaire survey, and interviews conducted with consultants, contractors, and a variety of professional personnel from various businesses. By gathering information, analyzing it, and determining that there is insufficient usage of software in the construction industry, cost control methods are seldom used in preference to time control approaches, and this results in cost and time overruns, the main impediments may be identified.

Santosh kumar Prajapati et al.[12] determined the variables influencing cost overruns in building construction projects, thirty consultants were polled for this study. According to authors each factor's severity index and frequency index were then examined. To determine the most impacted cost estimation aspects in building construction projects, severity and frequency were categorized on a five-point scale.

H. A. M. Abusafiya and S. M. A. Suliman, conducted a questionnaire survey and risk mapping of several variables causing cost overrun by looking at 40 real building projects in Bahrain [13]. Authors rated them according to the examination of the top ten cost overrun causes, severity index, frequency index, and significance index (II). Al-Hazim et al. [14] compiled the data for that study, and infrastructure projects in Jordan were investigated. In Jordan, 40 public infrastructure projects were undertaken between 2000 and 2008, and the final study identified 20 key reasons for cost overrun elements. The outcomes indicate that terrain and weather are the main reasons for Jordanian infrastructure projects' completion delays and cost overruns.

Mevada and Devkar [15] conducted a research, and a qualitative investigation of delays in mega projects was carried out by a study of the "Ministry of statistics and project implementation" (MoSPI). Additionally, word frequency analysis may be used to determine the cause of the megaproject's delay. Additionally, cluster analysis reveals a link between overruns and complexity.

A. Narayan Shete and V. D. Kothawade [16] conducted a descriptive research to gather opinions on the causes and impacts of cost and schedule overruns in building projects in India from consulting firms, regulatory bodies, and construction companies. Critical success variables are found after reviewing the available research in this regard. They serve as the basis for the preparation of survey and interview questions using severity and frequency analysis. This author discovered that political climate, unpredictable material pricing, currency exchange, degree of competition, and economic instability are the top five variables influencing the budget gap in building construction projects.

Subramani [17] discussed the causes of construction cost overruns. The author claims that the infrastructure of the country, which is essential for robust economic growth, must be built. Cost overruns in "construction projects" are common and place a heavy financial strain on the customer or owner. This study sought to understand the reasons behind building projects' overruns. The reasons for cost overrun were found using a survey and a desk study. Thirty completed surveys were obtained from customers, consultants, and contractors in total. The investigation of the information uncovered that respondents' perspectives on the explanations behind cost overwhelms were for the most part in understanding. The discoveries uncover that the primary drivers of cost overwhelm are slow independent direction, unfortunate undertaking plan, rising materials and hardware cost increments, an unfortunate agreement between the executives, unfortunate plan or a postponement all through giving plan, improvement because of inaccurate work, issues with procuring land, incorrect assessment or an assessment technique, and the drawn-out period among plan and the hour of offering or offering.

R. Singh [18] claimed that several media publications have documented instances of large cost overruns and protracted delays in infrastructure projects. Rarely are projects completed on schedule and within the allotted budget. There aren't many examples of projects that were executed well, like the building of the "Delhi Metro Rail". In India, time and cost overruns are a big and common issue. However, there isn't much empirical research on the topic. Studies that are based on finished work are even less common. The magnitude and reasons

for delays and cost overruns are thus uncertain. The different concerns about delays and price hikes in publicly sponsored infrastructure projects are examined in this research.

Typical time and expense overrun causes were examined in this study project after analyzing earlier studies that were published internationally by Ismail et al. [19]. The severity level, index calculation, and risk matrix level of each element along with each phase were all factors that experts were questioned about. The results showed that six variables had a high chance of expense overrun, compared to five elements' high risk of time overrun. The study's results help construction professionals better understand the risk factors for schedule and expense overruns at each stage of building projects.

According to research and surveys, cost and time overruns are the main factors contributing to building delays. Project scale, project type, weather, price inflation, erratic government policies, unskilled labor, design modifications, bad contract management, funding and payment delays for finished work, material shortages, and equipment and machine problems are some of the elements that relate to these. The factors that caused more cost overruns than time overruns were found to include a lack of employees, poor site management, errors made during construction, a lack of tools and equipment on-site, inadequate inspection, poor quality assurance/control, and deviations. They are determining the primary reasons for schedule as well as expenditure overruns, as well as their overall consequences on building projects.

3. DISCUSSION

Construction projects often have time delays and expense overruns, but they may be minimized or completely avoided by implementing an effective performance monitoring mechanism as well as a control system that is integrated with all the crucial elements and activities of each phase (Figure 2). The timely completion of the project is a sign of the effectiveness of all project participants, but the building process is susceptible to several unexpected variables that have a variety of origins. All nations' economies are more significantly impacted by the building sector.

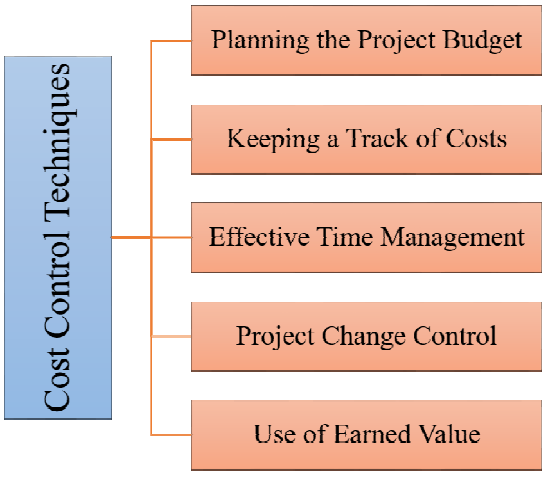

Figure 2: Illustrating the Different Techniques for Controlling the Cost in Construction Project.

It is one of the industries that offer essential components for the economy's growth. The construction sector is now experiencing significant cost overruns and schedule overruns as a result of inadequate time and cost management. For the building sector, this has grown to be

a significant issue. Nearly all projects need to be directed from beginning to conclusion to get the desired and anticipated results. The team in charge of the project is in charge of regulating expenses effectively, but the project manager is ultimately in charge of this. Yearly data are shown in Figure 3 that elaborate on the cost overrun as well as delay in "construction projects" in India.

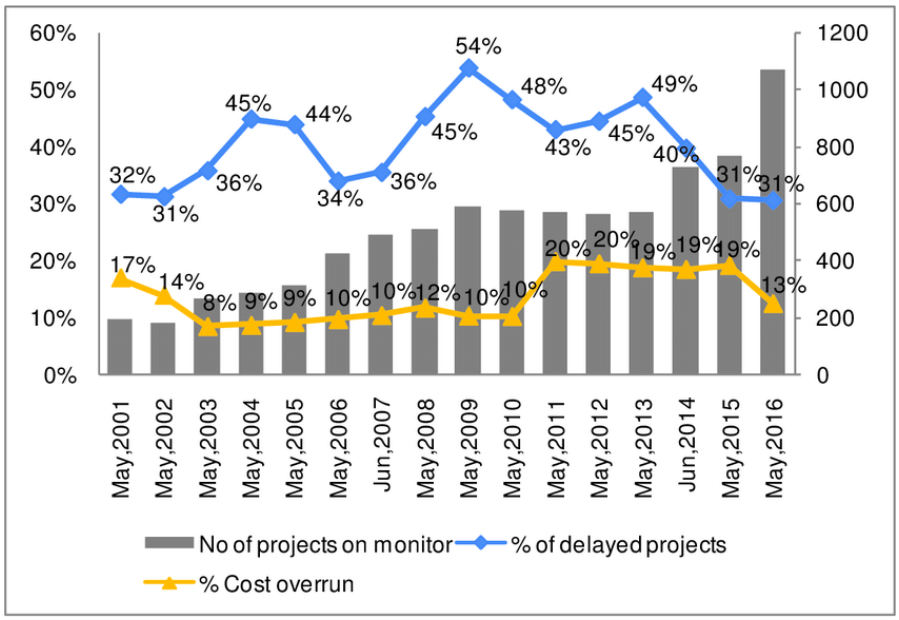

Figure 3: Graph Shows, Over the Years, India's Building Projects have Tended to be Delayed and Over Budget [20]**.**

Cost overruns pose a risk to a project's success since they signal that a company will first have to spend money on completely unrelated things to continue project operations. In the context of restricted finances, unexpected expenses could also lead to organizational department expansion. Therefore, it's crucial to understand the reasons behind cost overruns and take the necessary measures.

3.1. Problems and Solution of "Cost as well as Time Overrun" in Projects:

Various causes are related to time as well as cost overrun in the construction projects as shown in Figure 4. Various problem that are responsible as shown below:

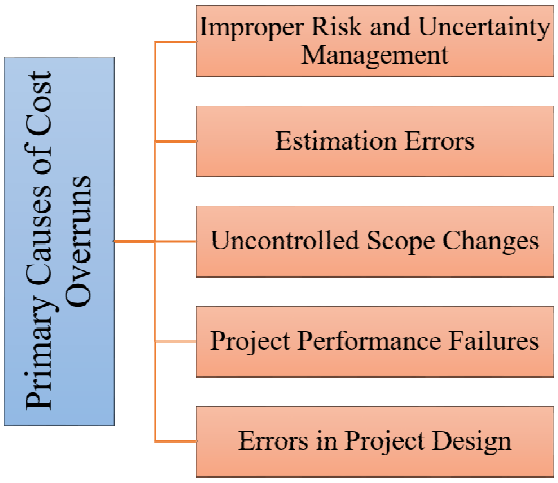

Figure 4: Representing the Causes that are Accountable for the Charge Overruns in Construction Project.

3.1.1. Unsuitable Management and Risk:

Every goal-oriented manager hopes that project operations will go according to a set plan and be finished without incident. It's not easy to achieve this precision, however. Deep commercial seas include a variety of hazards, and although they may sometimes be encountered very easily, they can be difficult to control. Additionally, in a society that is always evolving and giving rise to new trends, it is highly difficult to predict the outcomes of planned events. The best way to mitigate their harmful consequences is to implement a comprehensive risk management plan that takes environmental threats and uncertainties into consideration. comprehensive risk analysis enabling the most probable and relevant external threats to be identified, Plans for risk mitigation and response that have a focus on strengthening the internal components of the business and increasing its receptivity to external changes The purpose of the contingency reserve was to set aside a fair amount of money to help reduce possible risk overruns.

3.1.2. Estimation Faults:

Underestimating future costs is the main cause of project overruns in the vast majority of cases. Whether intentional or unintentional, forecasting biases are the main factor in estimating errors. Those who have never managed a project before are far more prone to have cost overruns. Since they have nothing to measure their current efforts against, inexperienced managers are more likely to make mistakes and fail to take some important risk factors into account. To avoid cost overruns, work to increase accountability for forecasting errors within your projects and enhance the skills and knowledge of your cost estimators. More specifically, it would be advantageous to entrust the task of estimating to qualified specialists to increase rigor and minimize the influence of "gut instinct" on forecasting outcomes. Encourage interprofessional interaction among many stakeholders throughout the estimation process. Determine who would be liable for any potential cost overruns. Review and evaluate the several cost estimates you have generated.

3.1.3. Uncontrolled Possibility Variations:

Because of how unpredictable the business world is and how seldom things go as we anticipate, changes in projects as well as their scopes are sometimes difficult to prevent. Scope creep, often known as the uncontrolled growth of the project's scope, is a serious issue that project managers contend with. The degree to which the change is managed will determine whether the project succeeds in an environment of ongoing change creating a lean project process to reduce superfluous complexity at work and improve responsiveness to changes in the environment.

3.1.4. Project Performance Failures:

The execution of project operations may result in both minor mistakes and deadly blunders for a variety of causes, including a project execution strategy that is ineffective due to poor resource coordination, a lack of requisite knowledge and technology, a lack of staff enthusiasm, and insufficient employee communication. The primary responsibility of project managers and leaders is to address the underlying reasons for the performance failures described above. As a consequence, a structured approach to leadership, as well as project management, is necessary to lower the likelihood of cost overruns as a result of poor execution.

3.1.5. Faults in Project Design

The project design serves as the basis for the management as well as execution processes. It details the mandatory contents for the project, how it should be carried out and overseen, and

the kinds of outputs that should be produced. As one would expect, creating a good, thorough project design is a remedy for cost overruns brought on by inadequate project planning. The creation of an exact project budget and a thorough cost breakdown is very essential. These two procedures are essential to efficient project cost management and are a necessary condition for good expenditure control throughout project implementation.

4. CONCLUSION

The most frequent and prevalent element in all building projects is cost and schedule overrun. Additionally, throughout this investigation, attempts were made to identify the most important component that was primarily affecting the development of metro and mega projects. These delays may be minimized with adequate management, technological know-how, and strategies. Fortunately, postponement and financial plan overwhelms might be moderated or completely tried not to by utilizing a dependable undertaking the executive's control and observing framework that will consolidate every one of the critical exercises of each period of the venture. This framework may be set up to such an extent that from project origination to a conclusion, shut circle data criticism and a feed-forward bundle are procured. Since the control cycle frequently incorporates arranging, estimating, observing, and making a medicinal move, it is for the most part attractive. The establishment of project success elements and criteria is another approach used to complete a project with little to no delay and expense overrun. By combining these aspects, the project manager will be better able to comprehend the problems that need to be solved and create a control scheme to keep track of them. Even while cost overruns and schedule delays may be inherent in most projects, they may be minimized or completely avoided by carefully regulating and monitoring initiatives. In this regard, it is significant to determine the root reasons for interruptions and overruns and to take remedial action as early as possible.

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CHAPTER 19

EXPLORING THE IMPACT OF ANCIENT CIVILIZATION ON THE MODERN ARTS OF THE MODERN WORLD

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ABSTRACT: ***The ancient civilizations are known for their style and legacy since history. Their culture, art and various practices are the blessing to the world. The Greek, Rome, Mayan, Egyptian and Indus civilisation are the ancient civilizations which are known to the world. Thus, the focus of study is to know the importance of these ancient civilization on the modern culture. Different historians have studied on these cultures and publish their work by different ways which explored together to know its importance. Thus, the study revealed that the modern civilisation is still trying to maintain the standard as old masonries as well as Italian architectures. Thus, the study further helps to know the different aspects in the ancient civilisations and their cultures with the modern world and modern civilisations with time and advancement in the technologies.***

KEYWORDS: ***Ancient, Art, Civilisation, History, River.***

1. INTRODUCTION

A birthplace of civilisation is a place and a culture where humanity independently developed civilization without reference to other civilizations in other lands. The main attribute of a civilization that may be called "civilised" is the development of urban settlements (cities). A stationary, non-nomadic community, monumental structures, the establishment of social classes and inequality, and the development of a written language are other traits of civilization. A civilisation gradually evolves from basic cultures to more complex ones.

Six cradles of civilisation are generally acknowledged by scholars. The Old World's oldest civilizations are thought to have existed in Mesopotamia, Ancient Egypt, the Indus Valley, and Ancient China. The Caral-Supe or Norte Chico culture in coastal Peru as well as the Olmec civilization in Mexico are considered the cradles for civilization in the New World. Agriculture was the only means of subsistence used in all of the cradles of civilization. To finance the centralised government, political figures, priests, and infrastructure improvements of the civilization's urban centres, farmers had to produce an agricultural surplus [1][2][3].

Most notably, Ancient Greece, which has been dubbed the "cradle of Western civilisation," is one of the numerous historical civilizations to which the term "cradle of civilization" is frequently applied. In the Levant, sedentary culture may be traced back to as early as 12,000 BC, when the Natufian civilisation did so. By 10,000 BC, it had developed into an agricultural community. Due to favourable conditions for obtaining resources, such as grains, through hunting, fishing, and other activities, including water, there was initially a diverse economy that led to the establishment of permanent communities [4][5][6].

The Neolithic period, which started in Western Asia approximately 10,000 BC, is when the earliest proto-urban towns with thousands of residents first appeared. By the 31st century BC, Kish, Uruk, Ur and Eridu in Mesopotamia were the first towns to have many tens of thousands of residents. Susa in Elam and Memphis in Egypt next followed[7][8][9].

When "documents of the past begin to be retained for the benefit of future generations" in either written or oral form, historic eras are distinguished from prehistoric ones. The Near Eastern Chalcolithic and the development of primitive in Harappa in the Indus Valley of

South Asia all over 3,300 BC are the first instances, followed by Chinese primitive evolving through into oracle skeletal script and thereafter by the beginnings of Mesoamerican written languages from about 900 BC, if the rise of human civilisation is taken to coincide with the advancement of composing out of proto-writing [10][11][12].

In the absence of written records, archaeological analyses that record the emergence of institutional structures and material culture provide information on the majority of early civilizations' development. In the end, conditions resulting almost solely from intensive agriculture are related to a "civilised" manner of life. The Neolithic Revolution of Western Asia, which led to the emergence of permanent settlements, as well as the Urban Revolution, which also first appeared in Western Asia, which strengthened tendencies toward dense settlements, specialised professional backgrounds, social groups, enslavement of surpluses, momentous government areas, and writing, were Gordon Childe's definitions of the development of civilization [13][14][15].

Few of those assumptions, however, are supported by the records: this same Incas appears to lack writing, since they could keep a record with Quipus that might also have used to have textual uses; and frequently monumental architectural style preceded any evidence of village settlement. Dense cities just weren't confirmed in Egypt's Old Kingdom (unlike Mesopotamia), but instead cities had a distributed inhabitants in the Maya area. Researchers have discovered, for instance, that tribes who were mostly nomadic organised over generations to create earthwork mounds at temporary settlements as early as 3400 BC in Louisiana, a region that was then largely uninhabited. The emergence of civilization may have been viewed as an accelerated process that began with early agriculture and ended in the Oriental Bronze Age, rather as a series of circumstances and occurrences.

2. DISCUSSION

The degree of development during which people coexist peacefully in communities is generally understood to be what is meant by the term civilisation. The term "ancient civilization" especially refers to the earliest stable and established settlements that served as the foundation for succeeding governments, countries, and empires.

The earliest parts of the much larger topic known as ancient history are the focus of the study of ancient civilisation. Ancient history spanned more than 35 centuries and began with the development of writing about 3100 BC. Humanity existed long before the invention of writing, but it was only via writing that historical records could be preserved.

The first ancient civilizations emerged in Egypt and Mesopotamia in the Mid East, the Yellow River valley of China, the islands of Crete inside the Aegean Sea, Central And south america, and the Indus valley territory of what was then Pakistan and India. These civilizations all shared some characteristics. They created writing systems and established cities.

They acquired metalworking and pottery-making skills. They tamed animals and established quite sophisticated class-based social structures.

In addition to written accounts and carved inscriptions, archaeologists' work is a major source of information about ancient peoples.

In the last 200 years, the majority of important archaeological discoveries have been discovered. Some of the most significant archaeological discoveries in China were found in the late 1970s, while the Sumerian civilisation of Mesopotamia was discovered in the 1890s.

2.1.Mesopotamia:

Between both the Euphrates and Tigris rivers is Mesopotamia, which is now a part of Iraq. Small farming groups had arrived in the river basins by 5000 BC, roughly. They cultivated wheat, barley, and peas on the floodplains. To allow water to reach lower lying land for their crops, they hacked through the riverbanks. The Sumerians in Mesopotamia further refined these early water supply. They also dug canals, dikes, and ditches while draining wetlands.

Government and law were developed as a result of the requirement for collaboration on these significant irrigation projects. Thus, it is believed that the Sumerians created the first ancient civilisation. The Sumerian people's homeland was known as Sumer. Their historical beginnings are obscured. They were not Semites, unlike the most of the local populations. The Sumerians just spoke language that was distinct from other spoken languages. Before 4000 BC, they could have travelled from Persia to southern Mesopotamia.

2.2.Babylon:

Their Semitic neighbours subjugated the Sumerians. But their descendants, the Assyrians, Babylonians, Chaldeans, and Akkadians, continued their civilisation. The civilizational advancement was significantly influenced by the Babylonians. They increased our understanding of mathematics and astrophysics. They constructed Babylon, the world's first major metropolis. The Hammurabi Code was established by the Babylonian King Hammurabi in the 18th century BC. It was one of the earliest really outstanding legal systems in history and the most comprehensive compendium of Babylonian law.

2.3.EGYPT:

By 5000 BC, Egyptian farmers had established themselves along the Nile River's long and narrow valley. Within 2,000 years, the Egyptians developed writing and constructed extensive irrigation systems. They had developed a civilisation that left the pyramids and other great structures as a legacy for future generations. The Nile River was extremely important to the ancient Egyptians. In the desert that surrounded it, the river's creation of an oasis brought water for cultivation and drinking. The river overflowed, surged, and dropped every year. Due to the sediments that were left behind by the flooding, the riverside is now suitable for cultivation. Farmers were able to harvest a lot of grain from a single crop each year because of the fertile soil and the Nile's flooding, which was generally predictable. Eventually, the Egyptians were able to preserve significant grain surpluses for trading and as a backup in case of crop disasters. The main source of ancient Egypt's vast riches would be extra harvests. The Nile served as society's main transportation artery.

2.4.India:

The Indus River Valley is regarded as the cradle of Indian civilisation. The Indus valley civilisation was located on the Indian subcontinent, primarily in what became Pakistan, and was not found by archaeologists until 1924. Legend has shrouded this area's prehistoric past. However, it seems that by 4000 BC, small-scale farmers were cultivating grains, veggies, and animals next to rivers. Two significant cities, Harappa and Mohenjo-daro, as well as countless minor villages, had grown by 2700 BC.

There seems to be some evidence suggesting Mesopotamian traders sailed from Sumer to the Indus valley and met the early inhabitants there. The Sumerian people and the inhabitants of the Indus Valley shared certain innovations, such as intricate irrigation and drainage systems and the creation of writing. But the inhabitants of the Indus valley also created a distinctive cultural aesthetic all their own. The little that's also known about the Indus civilisation points

to the existence of huge, carefully planned, and defended cities. There were governmental structures, palaces, restrooms, and enormous granaries to store agricultural goods.

The abundance of artefacts and artwork discovered by archaeologists suggests that the Indus Valley people had attained a respectable level of civilisation before their civilization was obliterated. Beginning around 1500 BC, the Vedic people, who've been nomads from of the Eurasian steppes, moved to the Indus valley. They established a caste system, which is still in use today. All individuals are divided into social classes under the caste system, each with a different set of duties and entitlements. It was a formal representation of the overlapping division of work that exists throughout all cultures. On the Indian subcontinent, at least 16 states existed by the sixth century BC.

2.5.Crete:

A civilisation had developed on the Aegean Sea Island of Crete by around 2500 BC. After a mythological monarch named Minos, researchers labelled the civilisation they discovered during excavations at Knossos in 1900 as Minoan. In Crete, the Minoans most likely arrived before 3000 BC. Indications of foreign influence may be found in Crete; it seems that Egyptian traders arrived in the Aegean Sea before the Minoans did. But the Minoan culture also acquired its own distinctive characteristics. Around 2000 BC, large towns with ornate and lavish palaces were constructed, and maritime trade was booming. The Minoans and other ancient peoples both used graphic writing. The mother goddess, as well as the representations of the bull and serpent, appear to have been central to Minoan religion. The Minoans are renowned for their exquisite ceramics and stunning, multicoloured wall murals. The Minoan civilisation started to deteriorate about 1400 BC. Greek mainland intrusions accelerated the end.

2.6.China:

By 3000 BC, the Chinese had established themselves in the Huang He, or Yellow River, basin of northern China. By that time, they already had silk, farms, pottery, and wheels, but they had not yet learned how to write or utilise metals. The earliest known period of ancient China is the Shang Dynasty. The complex social structure included a monarch, nobility, commoners, and slaves. The nation's capital was Anyang, in what became north Henan region. According to some academics, agricultural techniques introduced to China by migrants from Mesopotamia or Southeast Asia helped the development of ancient Chinese culture.

The Shang peoples were noted for their use of ancestor worshiping, gemstones, metal, horse-drawn chariots, and well-organized armies. The Chinese evolved distinctive characteristics, much as other ancient peoples. Their writing system was a complicated system with letters that stood for words or portions of words that was most likely formed about 2000 BC. These ancient Chinese dialects were discovered by archaeologists who were looking for oracle bones, that were bones with inscriptions on them. In chinese History, they were employed for document and fortune-telling.

2.7.Mesoamerica:

The ancient cities of Mexico and Central America are referred to as Meso-America. The Olmec from central Mexico was the first known sophisticated civilisation in the Americas. Beginning around 1200 BC, the Olmec people resided in the plains of what are becoming the states of Veracruz and Tabasco. They left behind items ranging in size from tiny pearl carvings to enormous structures like the San Lorenzo volcanic rock figures. These

monuments imply the existence of a complex, organised society with rulers who could direct the labour of slaves and artisans.

3. CONCLUSION

The ancient civilizations are noted for their style and legacy since history. Their traditions, culture, and art are a gift to the entire world. The world is familiar with the ancient civilizations of Greece, Rome, the Mayans, Egypt, and the Indus. The goal of the research is to understand how these ancient civilizations have influenced current society. Various historians have researched these civilizations and published their findings in a variety of methods that have been investigated together to determine their significance. The study so shown that contemporary civilization is still making an effort to uphold the same standards as traditional Italian architecture and masonry. The study therefore contributes to our understanding of the various facets of ancient civilizations and their cultures as they relate to the present world and modern civilizations over time and as a result of technological growth.

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CHAPTER 20

TECHNOLOGICAL ADVANCEMENTS AND CHALLENGES IN DIAGNOSING PLANT DISEASES

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ABSTRACT:*Losses due to plant viral infections amount to several billion dollars annually, making them the greatest danger to sustainable agriculture. There is a pressing need for novel methods that could accurately identify the causal agents of viral infections to effectively prevent and control them. As a result of bacterial, viral, and fungal illnesses, farmers all over the world have had to deal with chronic crop failures for generations. Improved crop disease identification and monitoring are essentialfor reducing disease-induced crop damage during germination, harvest, and post-harvest processing, increasing yield and maintaining agricultural sustainability. This study provides a concise description of the main plant disease detection methods now in use and how they have developed to meet the modern challenge. "Enzyme-linked immunosorbent assay (ELISA)", high-throughput serological methods, and molecular methods like "polymerase chain reaction (PCR)", have allowed the discipline of plant diagnosis of diseases to advance beyond visual examination and diagnosis to detection (PCR). Bioinformatics' use in plant pathology has allowed for the determination of motif- sequence-specific DNA, which has improved the precision of current methods for diagnosing plant diseases. Even though there have been improvements in all areas of plant disease detection, boosting sensitivity and specificity has continued to be the main focus of growth.*

KEYWORDS: *Bioinformatics, Enzyme-linked immunosorbent assay (ELISA), Flow cytometry (FCM), Plant Disease, and Polymerase Chain Reaction (PCR).*

1. INTRODUCTION

Recent epidemic incidents highlight the significance of the quest for better diagnostic methods for plant pathogen identification and control in a period marked by climatic changes and expanded global trade. Numerous "alien" species, such as viruses, phytoplasmas, bacteria, fungus, insects, nematodes, and weeds, move rapidly over the globe and cause severe issues in agriculture when they hitchhiker on the backs of humans and their possessions (including plant materials). Monitoring plant health increasingly requires early identification of plant pathogens so that disease infections may be managed at various phases of development, hence reducing the likelihood of the disease propagating and preventing the emergence of new diseases [1].

The stability of global food supply and demand has emerged as a critical topic of discussion on the world stage in recent years[2]. Some poor nations experienced political and economic turmoil as a result of the 2008 global food price crisis. As the world's population continues to grow, experts predict that grocery bills will continue to climb for the foreseeable future. Forecasts indicate that by 2050, an additional 70% of food production would be required [3].Approximately twice as many individuals have inadequate access to the minerals and vitamins needed to maintain optimal health, and over a billion people are malnourished as a result of food shortages. The issue is a result of the ongoing loss of farmland, which in turn reduces output. Even though there are many causes of falling agricultural output, pests and diseases are major contributors to global crop losses. It is estimated that pathogen infections may cause a 20% - 40% drop in crop productivity [4].

Infectious illnesses pose a significant risk to global agricultural sustainability and productivity, costing several billion dollars annually in losses [5]. Emerging illnesses, which are characterized by a sudden rise in disease occurrence, geographic distribution, and pathogenicity, have the greatest effect. Insects, fungi, and molds have an easier time infesting and weakening plants in monocultures since there is less variation in the plants themselves. Climate changes affect the range of both hosts and vectors, ii) international commerce ofmoving plant material (germplasm and live plants) to a new place or environment might introduce new viral infections, hosts, and diseases, and iii) viruses are responsible for the rapid adaptation and evolution attempting to make them more virulent[6].Significant economic losses due to phytopathogenic fungi are a worldwide problem. Fungi may cause significant damage to plants, therefore it's crucial to identify them quickly and accurately so that they can be treated and managed effectively. DNA-based methods have become more popular for the accurate detection of plant diseases. “Polymerase chain reaction” (PCR) assays, including nested, multiplex, quantitative, bio, and magnetic-capture hybridization PCR, post, and “isothermal amplification methodologies”, DNA, and RNA-based probe advancement, and “next-generation sequencing (NGS)”, have emerged as powerful new tools in the field of precision medicine for detecting and differentiating fungi.

These molecular-based detection methods can identify unculturable and culturable fungal diseases inthe effectiveness of both single and double infections.Even though molecular diagnostic procedures have advanced substantially in recent years, there is still a great deal of work to be done in the study and use of these methods in plant diseases. The molecular approaches employed in diagnosing plant diseases must be more precise, expedient, and user-friendly than current practices. Scientists must now overcome these obstacles by creating workable methods for molecular plant disease diagnosis.

Damage due to plant pathogens not only reduces agricultural yield, but also poses a danger to global nutrition and food security, alters population trends, and has an impact on animal health. A sensitive and specific detection method for phytopathogens is essential for the successful and efficient management of plant diseases. If plant diseases are misdiagnosed, management methods may fail, resulting in lost crops and diminished economic activity. Underachieving sanitary and phytosanitary (SPS) regulations exacerbate the trade deficit. While governments must take steps to safeguard the natural and agricultural plant systems at home from alien infections, they must also take precautions to ensure that their endemic diseases don't spread to neighboring nations [7].

The evolution of next-generation sequencing (NGS) technology has revolutionized plant virus detection. These techniques are capable of sequencing billions of nucleotides simultaneously without any background experience with viral sequences, making them ideal for detecting any viruses, including ones that have not been reported before. A new area of study is developing around the integration of historical data on the virus and its diagnoses with such cutting-edge methods as a means of comprehendinghow viral infections are likely to spread, progress, and change in the natural environment.For diagnosing viruses, metagenomics is getting a lot of interest in NGS-based approaches. Third-generation and second-generation sequencing platforms, as well as other types of sequencing technology, are widely used in medical diagnosis. High sample turnover rates on second-generation sequencing techniques, therefore, make them inefficient [8].

2. LITERATURE REVIEW

Magdline Sia Henry Sum et al. stated in their study that dot-blot and “enzyme-linked immunosorbent assay (ELISA)” indirect tests were designed and refined in this work to

detect Rice Tungro Disease (RTD). Both techniques were compared to a standard PCR test utilizing well-characterized primer sets to determine how well they detect target molecules. When compared to a standard PCR test, the dot-blot test has a sensitivity of 97.5% while also maintaining a specificity of 86.4%, while that of the indirect ELISA was 97.50% and 96.60%. Due to their excellent levels of sensitivity and specificity, both tests should be used as alternate techniques for diagnosing RTD. Dot-blot assays are simple, robust, and quick diagnostic assays that may be performed without expensive laboratory equipment, making them ideal for use in the field. This is particularly helpful for identifying RTD in rice fields outside of urban areas [9].

Evaluation of fluorescence spectra of laser-irradiated watercress and grass was performed by Yury Fedotov et al. in a controlled laboratory setting. A 532 nm-emitting YAG: Nd laser was used to stimulate the fluorescence spectra. It was found that the geometries of the spectra changed under the impact of stress brought on by mechanical damage, overwatering, and soil contamination. Two fluorescence maxima were predicted to be about 685 and 740 nm, and their ratio was calculated along with confidence ranges. The authors argue that the fluorescence ratio is a valid indicator of plant stress [10].

Q fever patient sera have been demonstrated to detect an outer membrane protein of 27 kDa (Com1), which Hua-Wei Chen et al. examined in their research author-prepared recombinant antigen. Immunofluorescence assays (IFA) validated serum samples were utilized to evaluate how well recombinant Com1 performed in an ELISA.Biotinylated anti-human "IgG" or "IgM" with streptavidin-HRP polymer was used to boost signals from traditional ELISAs and detect the low levels of IgG and IgM in Q fever patients. Marines in Iraq were able to collect sera from 88% of those with Q fever using the modified ELISA. Sera from individuals suffering from various febrile disorders responded with the Com1 in less than 5% of cases (5 of 156). These findings provide some support for the hypothesis that a modified ELISA using Com1 has the possibility of improving the identification of Q fever monoclonal antibody [10].

The study seeks to identify cataract illness employing convolutional neural networks using a publically accessible picture collection, as discussed in a study by Md Kamrul Hasan et al. Through the use of the TensorFlow object identification framework, this study utilized four distinct these are some examples of meta-architectures for convolutional neural networks (CNNs): InceptionV3, InceptionResnetV2, Xception, and DenseNet121. The state-of-the-art diagnosis of cataract disease was achieved by the author using InceptionResnetV2. This model predicted and diagnosed cataracts with a 98.17% prediction performance, a validation loss of 6.22%, and a training loss of 1.09%. The sensitivity of this model is 96.55%, and its specificity is 100%. The model also drastically reduces the amount of loss during training while simultaneously providing accuracy [11].

Lilian A. Okiro et al. conducted a study that to establish the pathogen's prevalence in Kenya, seeds must be lab-tested before planting. Loop-mediated isothermal amplification (LAMP) was used to scan seed potatoes for R. solanacearum strains. To test specificity and sensitivity, DNA from R. solanacearum as well as other soil and potato diseases was used.Throughout two growing seasons in Kenya, field samples were collected from a wide variety of potato-growing regions to verify the LAMP test. There was R. solanacearum DNA at a level of 2.5 pg/l, as determined by the IpxC LAMP assay. Among the 47 samples suspected of harboring R. solanacearum DNA, 90 percent were positively identified using IpxC LAMP and qPCR, followed by "PCR Technique (86 percent)" and "ELISA (75%)". This IpxC LAMP assay is a potential diagnostic technique for swiftly screening for R. solanacearum in Kenya [12].

3. DISCUSSION

Secondary metabolites are plant-produced organic chemicals that help plants defend against herbivores, pests, and diseases and adapt to their environment. They are not intimately involved in development and growth. Their various functionalities have increased demand in medicines, cosmetics, insecticides, and food ingredients. The quality of commercial goods containing secondary metabolites impacts their activity. 34% of modern medications are natural, according to Cragg and Newman [13].However, pharmacodynamics investigations need straightforward, select, and sensitive analytical methods for tracking the therapeutic concentration, adverse reactions, and metabolism that ultimately improve patients' well-being.Wide-ranging analytic approaches, most of which rely on high-performance liquid chromatography (HPLC), have been developed for similar purposes up to this point. ELISA, on the other hand, has significant benefits over these other methods because of its ease of use, specificity, and selectivity.

Unlike bacterial or fungal infections, which may be treated with antibiotics or fungicides, viral infections in plants currently have no known cure. Thus, disease management depends on a variety of tactics that must be designed particularly for each virus, host, and ecosystem to prevent keeping viruses out of plants or making plants more immune to them (pathosystem). Diagnosing and identifying viruses with the right equipment is crucial to planning and assessing disease control strategies. Here, the author takes a look at where viral detection methods now stand and where they've come, examining key aspects includingthe capacity to quantify viruses and build new vaccines, as well as their sensitivity, specificity, flexibility, portability, multiplexing capabilities, and mobility.

There is a plethora of commercially available tools for detecting plant viruses. The cost, sensitivity, speed, availability of equipment, and illness stage are all important considerations for putting any of the common methods into practice. If a plant is infected with a virus, it may show any number of physiological signs. Historically, similar visual examinations have been employed as a diagnostic tool for viral diseases using indicator plants. Quantitative high-throughput imaging has also been used in the development of some other approaches. As molecular biology research and technology progress, technologies based on nucleic acids and antibodies are becoming more useful in diagnosing plant diseases. Developments in NGS technology in the last several decades have also offered a platform for viral diagnostics, allowing a vast variety of viruses may be detected and identified using this method [14].

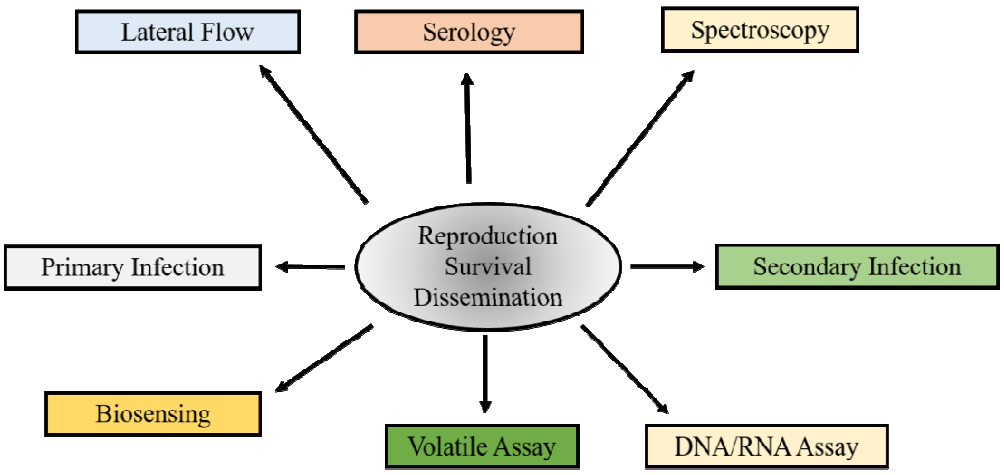

Figure 1: Displays the Methods for identifying plant pathogens at different disease progression phases.

Quantifying the pathogen inoculum calls for the identification of phytopathogens in hostsin addition to soil, water, and air, the environmental variables (Figure 1). efficacy of pathogen management strategies, seed and planting material certification, pathogenic population and output estimates, pathogenic variability, new race development, and resistant source selection, unravel the causes of illnesses caused by many pathogens and investigate plant-pathogen interactions to learn more about pathogenesis and gene functions [15].The diagnostic or quarantine detection procedures you utilize should be consistent and reliable, with as few false positives as possible. There has been a lack of similarity between the target and other species' systems, therefore all detection techniques should be responsive to pathogenic concentrations and genetic diversity within a targeted pathogen population. The field of plant phenotyping has recently seen the emergence of quantitative elevated image-based approaches. These techniques aid in the investigation of how pathogen infection modifies plant physiology and, by extension, the processes behind the emergence of disease symptoms. Figure 1 shows a few examples of plant pathogen detection techniques.

3.1.Current Crop Disease Detection Methods:

Both direct and indirect approaches existused mostly in the assessment and diagnosis of agricultural illnesses. In cases when a large number of samples must be evaluated, the high-throughput analysis might benefit from genetic and serological approaches utilized for direct disease identification. These techniques allow for to identification of pathogenic microbes such as bacteria, fungi, and viruses. In contrast, indirect approaches detect plant illnesses by measuring changes in factors including morphology, temperature, transpiration rate, and volatile organic chemicals.

3.1.1. Direct Methods:

In Table 1, the Author examines the benefits and disadvantages of the various direct detection techniques for plant pathogens and their respective limits of detection.

Table 1: Illustrates the Analyzing the existing techniques for identifying bacterial infections that cause plant diseases.

Methods	Limitations	Advantages
Polymerase Chain Reaction (PCR)	The efficiency is affected by factors such as DNA isolation, inhibitors, polymerase activities, PCR buffer concentration, and deoxynucleoside triphosphate concentration.	Mature and widely used technology that is portable and simple to use.
Fluorescence In Situ Hybridization (FISH)	Photobleaching, Autofluorescence,	High sensitivity.
Immunofluorescence (IF)	Photobleaching	Target dispersion may be seen with high sensitivity.
"Enzyme-Linked Immuno Sorbent Assay (ELISA)"	Negligible effect on bacteria.	Visual color change may be employed for detection at a low cost.
Flow cytometry (FCM)	Expensive, overburdened with needless information.	Measurement of many parameters at the same time, with quick detection.

- *Flow cytometry (FCM):*

Methods for protein engineering, biomarker detection, cell sorting, and cell counting are just some of the many applications of flow cytometry (FCM), an optical technology based on lasers. Flow cytometry (FCM) is used to quickly identify individual cells as they movein a liquid stream, through electronics sensing system. This technology's strength lies in its capacity to detect multiple variables all at once. The method involves analyzing thelaser beam unintentionally shining on a substance leading to scattering and fluorescence. Counting bacteria, differentiating viable from non-viable bacteria, and characterizing bacterial DNA and fungal spores are only some of the many applications of flow cytometry (FCM) in various fields. Although FCM has been around for a while, it has just lately been put to use in the diagnosis of plant diseases[16].

Pathogens like bacteria may be detected using serological techniques like ELISA, however, the vitality of the pathogens cannot be determined by these methods. Both the presence and the continued existence of the pathogen should be verified since these are both crucial factors in determining the likelihood of illness. As a result, FCM might have been used in plant pathology, namely for assessing bacterial pathogen viability and detecting their presence.

- *"Polymerase chain reaction (PCR)":*

In vitro, enzyme polymerase chain reaction (PCR) generates exponentially DNA amplification in response to designated primers. Numerous subfields within biology may benefit from this method. Tests for detection using the polymerase chain reaction (PCR) are highly specific, efficient, quick, flexible, and cheap. These techniques are convenient for de novo pathogen identification since they don't need to isolate the pathogen in pure culture, which would take time and money to do. While all forms of the polymerase chain reaction (PCR) rely on DNA as their primary nucleic acid, there are many other types of PCR.

- *"Enzyme-Linked Immunosorbent Assay (ELISA)":*

To begin with, scientists have developed an indirect enzyme-linked immunosorbent test (ELISA) that can identify plant viruses. Protein A is used in two different ways to create a sandwich of antibodies, antigens, and more antibodies.After a layer of protein, A has been added, the plate is prepared for the coating antibody layer. To identify the second antibody layer, protein A is coupled with the enzyme. Antibody coating layers cause the orientation of the IgG that blocks further reactivity with the attached protein A.Homologous virus isolates were detected by employing a protein A sandwich ELISA (PAS-ELISA) with seven different antisera, and the A405 values of the sick plant homogenates were at least one absorbance unit greater than those of the healthy controls. To provide just one illustration, utilizing the revolutionary PAS-ELISA technique, antiserum to beech isolates of cherry leaf roll virus described 4 related isolates, but by employing the conventional method double antibody sandwich type of ELISA, it detected just one (DAS-ELISA). Furthermore, the endpoints of dilution for the homologous virus were similar across the two approaches. Another antibody-based molecular approach for illness diagnosis is the enzyme-linked immunosorbent test (ELISA). Antibodies coupled to an enzyme are used to create a particular binding with the targeted "antigens (epitopes)" shared by viruses, bacteria, and fungi.When the substrate reacts with the immobilized enzyme, a color shift may be seen, confirming the identification. There are a variety of commercially available monoclonal and recombinant antibodies that have the potential to significantly improve ELISA performance.

- *"Fluorescence in-situ Hybridization" (FISH):*

Fluorescence in-situ hybridization (FISH) is a molecular method of diagnosis used only for bacterial identification in plant materials that combines microscopy with the hybridization of DNA probes and molecular targets. As plant pathogens often leave behind ribosomal RNA (rRNA) sequences that can be recognized by FISH, this technique may be used to identify plant pathogen infestations. It is possible to utilize FISH to identify not only bacterial pathogens but also fungal and viral pathogens, as well as other endosymbiotic bacteria that infect the plant [17].Despite these benefits, FISH does have several drawbacks that limit how well it can identify plant diseases. An example of an issue that reduces specificity is autofluorescence materials, which often provide false positive findings. The specificity of the nucleotide markers is crucial to the precision and reliability of FISH.The detection limit may be decreased due to factors such as insufficient penetration, the target's or probe's complex cognitive structure (such as the three-dimensionality of rRNA, loop and hairpin form, and rRNA-protein interactions), a low rRNA content, or photobleaching.

3.2.Bioinformatics' role in diagnosing plant diseases:

Using information and communication technologies, bioinformatics is used in the study of living organisms. New findings in this field are being used in biotechnology and molecular genetics. It's a subfield of biology that draws on ideas from other fields including computer science, statistics, mathematics, chemistry, biochemistry, physics, and even language to solve problems in medicine. The field of bioinformatics may be used to create 3-D structures of molecules and perform tasks such as mapping, analyzing, and aligning DNA and protein sequences. In addition, bioinformatics resources may be utilized to organize and analyze data for scientific discoveries, especially in the fields of agriculture and medicine. Features of interest for the creation of plant diagnostic tools include resistance to biotic and abiotic stress, traits of interest connected to the development of particular symptoms in a disease, and traits unique to the pathogens responsible for those symptoms.The most basic method used today to acquire the DNA, RNA, and protein sequences from a genome is sequence analysis. Genome sequencing is an essential first step in unraveling the mysteries of how various species work. Coding and non-coding sections in a genome's entire sequence data serve as essential building blocks for each functioning gene that defines an organism's distinctive characteristics. Each part of the genome is represented in the resultant sequence, including exons, introns, regulators, and promoters.Numerous databases and software programs exist in bioinformatics for researching plant biotechnology. The years of plant genome bioinformatics analysis and next-generation sequencing (NGS) have produced a mountain of data. There are several internet databases where all of this information may be found. Every database serves a certain purpose. To provide just one example, the CottonGen database is devoted entirely to gathering genomes and breeding data on any cotton species of interest. The construction of such a database facilitates academics engaged in cotton genomic studies by allowing them to concentrate on utilizing a single database rather than scouring the internet for relevant datasets [18].

4. CONCLUSION

To control the spread of viruses and promote efficient management, it is crucial to keep an eye on the plants and catch any infections as soon as possible. Traditional diagnostic approaches for plant infections include drawbacks such as limited sensitivity, the inability to identify many pathogens at once, and the need to know the genome sequence in advance. The entire nucleic acid content of biological samples may now be determined thanks to the advent of cutting-edge DNA sequencing methods. Viral diagnostics provide the greatest opportunity for the widespread use of omics approaches, such as third-generation sequencing platforms like Oxford Nanopores, to the study and treatment of plant diseases.Possible replacements for

time-honored methods include molecular techniques such as “polymerase chain reaction (PCR)”, “quantitative PCR serological testing”, and flow cytometry. These methods are fast but very sensitive and targeted. However, standardization of these techniques is necessary to ensure they meet the aforementioned sensitivity and specificity benchmarks. In addition, established procedures are required before the approach may be widely used as the standard practice for quarantine purposes across the world.

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CHAPTER 21

INVESTIGATING THE ROLE OF TECHNOLOGY IN URBAN FARMING FOR FUTURE FOOD SECURITY

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ABSTRACT: ***Now-a-days, more folks constantly migrating towards the cities from the rural regions for living and in search of work and better living facilities. Nutritional inequality as well as climate devastation have been identified as major urban concerns that may be addressed by urban agribusiness in various nations. Urban agriculture is widely practiced in emerging nation's metropolis and several studies have been conducted to answer the difficulties associated with it. This paper presents a study investigating the role of technology in urban farming for future food security. Due to the ongoing process of urbanization, a greater number of individuals may move to as well as reside within urban regions. Urban cultivation is thus becoming more sensible in today's urbanized society. Urban agribusiness differs from rural agribusiness in certain ways which promote the creation of novel techniques, such as restricted accessibility to space, alternate growth medium, distinctive legislative frameworks, and many more.***

KEYWORDS: ***Agribusiness, Artificial Intelligence, Crops, Farmers, Food Security, Livestock, Urban Farming.***

1. INTRODUCTION

Urban agribusiness has been originally characterized as farming generating consumable goods within peri-urban areas, such as veggies, livestock commodities, and even plants. Both foodstuff chains, as well as urban surroundings, have come under a lot of strain as just a result of the world's rising urbanization, particularly in places that are growing quickly. This idea of urban agribusiness as well as the related operations is constantly evolving because of the fast urbanization trend as well as emerging economic needs. Regarding goal, labor, and administration, including marketplace connection, urban agribusiness takes on a variety of shapes. With the potential for overlapping, it's indeed challenging to classify individual instances of urban agribusiness into a particular group. As a result, there's an overall dearth of consistency in the concept of urban agribusiness. Several academics now concur with urban agribusiness constitutes a type of contemporary farmland, highlighting its numerous benefits for guaranteeing nutritional sovereignty, and preserving urban ecological operations, including raising the standard of living in cities [1], [2].

Compared to agricultural areas, urban areas have such a greater demographic concentration presently; until 2040, a huge number of the globe's inhabitants are projected to reside within a metropolis, with that figure expected to rise further by 1.47 % over the following ten years. Moreover, up to 2045, 85% of development would occur in Asian and African continents. Agricultural growth in as well as around communities is becoming more as well as more common all across the globe, with a variety of shapes, histories, and even emotions. Furthermore, there has been a significant increase in writing as well as discussion regarding both media including academia's rising attention towards urban agriculture which asserts that urban cultivation is recognized as just an agrarian practice that emphasizes expanding plants just in suburbs of urban centers, particularly for financial benefit, as well as being energetic and carried out by specialists with a variety of allocation streams, tend to range from straightforward advertising to worldwide inventory linkages [3].A variety of terminology, including "urban agribusiness," "commercial urban agribusiness," "proficient ranches," and "urban farming as well as cultivating products on the edges of municipalities," is employed

by several experts to describe the cultivation in metropolitan areas. Urban agriculture is defined as foodstuff or livestock products or procedures conducted out inside the metropolis region or near urban areas to create money in business employment. Urban agribusiness, therefore, relates to extensive plants including animal husbandry to generate, manufacturing, including delivering foodstuff and commercial goods, as well as techniques like landscaping, fisheries, and more that provide fresher foodstuff inside and near towns for the surrounding people to eat.Figure 1 illustrates the articles available on urban agriculture from 2001 to 2021.

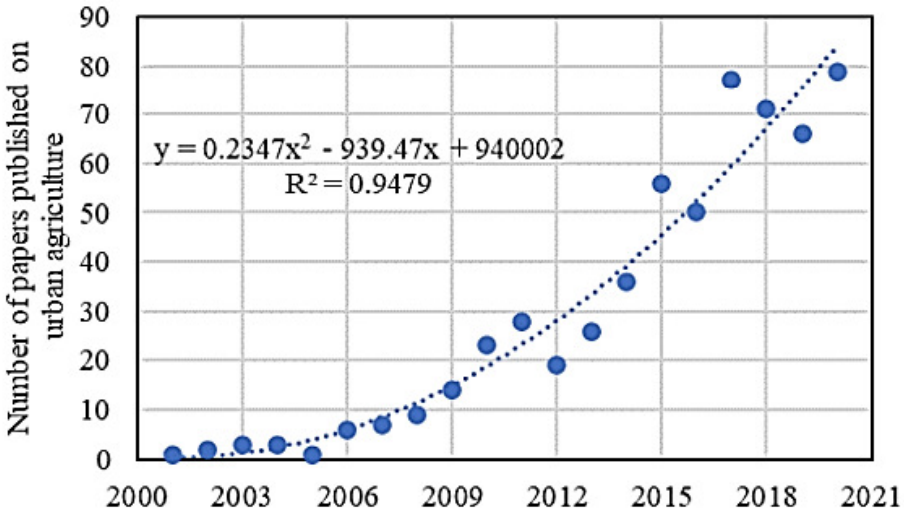

Figure 1: Illustrates the articles available on urban agriculture from 2001 to 2021.

Vertical cultivation, interior agriculture, aeroponics, fisheries, as well as polyculture are examples of urban agricultural methods. Vertical cultivation is indeed the idea of cultivating up rather than outward. In vertical agriculture, fishery, as well as vegetable harvests, are usually cultivated in levels that are piled upwards on wall surfaces, roofs, and within eateries, supermarket shops, conservatories, depots, or cargo boxes. In contrast to aquaponics, which includes occasionally misting the planted stems with nutritionally-rich fluid, hydroponics includes cultivating crops in soil - a free medium with its bases immediately immersed in nutritional liquid. Salmon as well as shellfish are raised in many sorts of aquatic habitats via agribusiness. Contrarily, polyculture mixes hydroponics with fishery inside a locked-loop ecology. The trash excreted by goldfish is nitrogen. Urban agriculture has shown to be better than traditional planting throughout recent times. Latest technical advances are being investigated as well as put into practice more often to fully exploit the possibilities as well as advantages of urban agriculture [4].

It might be difficult for producers that aren't tech-savvy to use artificial intelligence (AI) technology within agritech. People don't understand why Artificial Intelligence may be employed as just a pragmatic solution for different agricultural operations as well as believe it to be merely a component of something like the electronic realm. Since agrotech companies sometimes neglect to describe whether their products are effective on the ground or even the precise steps involved in applying them, technological innovation sometimes looks incomprehensible. There have been examined a few of the enduring issues that AI inside the agricultural sector is facing [5].Figure 2 illustrates the available articles on various technologies used for urban farming from 2015 to 2021.

With certain intelligent portable gadgets, IoT allows farmers to constantly check actual agricultural parameters in legitimate moments in almost any place. IoT dataset analytics

identify patterns in the dataset and retrieve fresh knowledge about agricultural development, and animal wellness, including possible operational enhancements, which help people solve issues as well as make decisions more effectively by reducing individual mistakes. IoT could also improve the use of electricity, freshwater, as well as soil assets while reducing wastage. IoT connections as well as gadgets, meanwhile, are susceptible to safety as well as data intrusions. Also, devices are reliant on electricity as well as online connectivity. Green IoT schemes, as well as technologies, like reducing network capacity, using preferential detecting, putting combination network design into usages, and even the acceptance of privacy-focused blockchain-based remedies with conventional wisdom methodologies, could be taken into consideration to benefit electricity intake throughout IoT as well as decrease emission footsteps [6], [7].

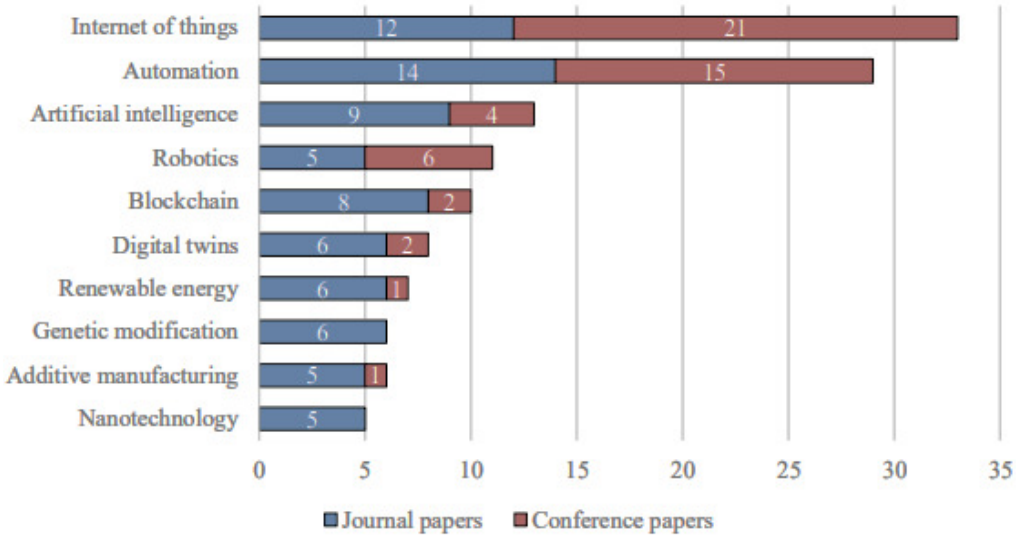

Figure 2: Illustrates the available articles on various technologies used for urban farming from 2015 to 2021 [8]**.**

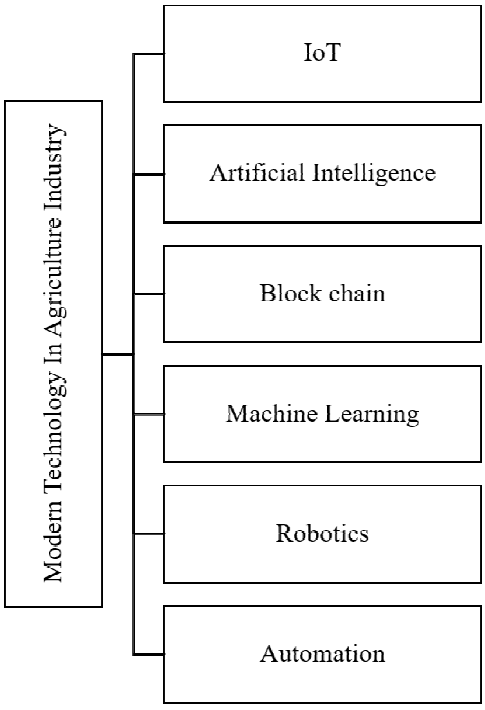

Figure 3: Illustrates the modern technology for urban farming.

Producers could now gather as well as handle information simply yet quickly using AI (Artificial Intelligence) owing to forecasting. Several of the key activities that producers may do using AI include pricing predicting, marketplace demands analysis, and figuring out when to plant as well as collect. Using AI throughout agribusiness may also assist with gathering information on the condition of the land, keeping check of the climate, making fertilizer suggestions, including monitoring the development of a specific crop. At each step of the agricultural operation, the producers may improve overall choices thanks to all essential aspects. Livestock as just a profession has always faced difficulties related to operating on agrarian terrain. Throughout this business, manpower scarcity is nothing unusual. Yet, robotics may be used to find a solution to this widespread agriculture issue. A few of the finest applications of AI throughout cultivation include clever drainage processes, self-driving combine harvesters, intelligent fertilizing mechanisms, top and bottom cultivating tools, intelligent sprinkling, as well as AI-rooted robotic systems for seedlings as well as extracting. These technologies allow growers to handle their crops without requiring hand-operated labor. AI-driven solutions are generally quicker but also greater precise than human-driven ones.Figure 3 illustrates the modern technology for urban farming [9], [10].

2. DISCUSSION

India's urbanized farms mostly cultivate flowers, veggies, as well as similar culinary products for marketplace sale. Urban agriculture, urbanized horticulture, and subsistence cultivation are indeed mixed together. It helps businesses, people, as well as communities in many aspects. Urbanized gardening provides organic produce which supports a healthier life as well as additional items. Also, it promotes revenue production and smaller company expansion. Getting nutritious foodstuff relatively affordable remains urban agriculture's key benefit. As a result, it's gradually increasingly fashionable as well as an important aspect of civilization. From the point of creation to the point of consumption, it helps civilization. Depending upon the sort of urbanized farming, these advantages vary. Urban agriculture takes careful preparation as well as effort to succeed. Urban agribusiness has enormous obstacles from contaminants as well as lack of area, yet they are driven to create innovative agricultural techniques as well as technology. But, urban growers may readily as well as rapidly serve neighborhood eateries including the neighboring shops with organic vegetables [11], [12].

Urban agricultural practices such as backyard gardening, where foodstuff is grown on private land, are common. If there is an excess of the harvested foodstuff, it is distributed to associates or the marketplace. It may also be maintained as well as kept in storage. Home gardening is crucial because it develops novel agricultural techniques which result in higher yields. This sort of urban agriculture involves the production of vegetation, horticulture, avenue plants, foliage, as well as other things on residential roadways within a community or town. In addition to being attractive, roadside gardening offers nourishment for the community or region. Also, because they're cultivated on the sidewalks, this contributes to lowering urban rainwater runoff that generates a cleaner ecosystem as well as cleanses the atmosphere. Growing plants layered is called vertical horticulture. It moreover offers agriculture in a regulated setting. Optimal plant development is the goal of vertical agriculture. Approaches for growing without earth, such as aquaponics, as well as hydroponics, may also be used. Those are all examples of urban agricultural practices. This technique of growing plants inside urban forestry is known as forestry landscaping. Several kinds of commodities are grown in this kind. Similar to how berries, as well as veggies, are produced in cities. One may discover a good setting for agricultural cultivation inside the forests. Furthermore, it promotes reforesting, which is crucial in the battle over urban heating.

Rooftop gardening offers functional advantages such as climate management, structural improvement, animal passageways, ecosystems, as well as leisure activities. The main benefit of rooftop gardening is that they provide nourishment. Thus lately, it has become a popular urban gardening technique. Green buildings are upwardly constructed buildings that are purposefully filled with fresh produce. Since it contains growing media that are applied upwards, such as hydroculture, dirt, and another replacement platform [13], [14]. Figure 4 illustrates the types of urban farming.

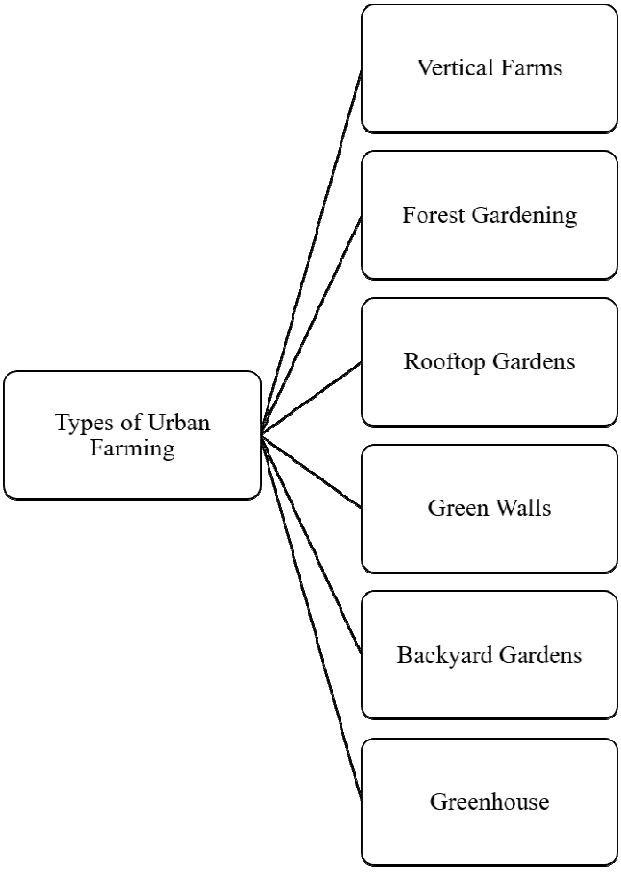

Figure 4: Illustrates the types of urban farming.

Producers may save money by employing fewer tools to produce harvests with the use of precision agribusiness. Artificial intelligence-powered agribusiness has recently gained popularity in the agricultural industry. Producers may save costs as well as increase production by integrating the finest land treatment techniques with efficient data administration techniques. The use of AI in farming makes it easier to locate regions that require pesticides, watering, or fertilizer. For example, vertical agribusiness increases grain yield while using less energy overall. Enhanced crop freshness, reduced herbicide usage, considerable cost reductions, but also larger profitability are the results.

Increasing levels of artificial intelligence acceptance inside the agribusiness sector significantly altered the general results of cultivating operations, with the preponderance of entrepreneurs inside the sector embracing AI-based methods to boost farmland output productivity. There have been explored numerous ways that AI is used in agribusiness. Researchers have seen a sharp rise in pollutant levels increasing unpredictability inside the weather over time. Producers have found it challenging to predict the ideal moment to plant seedlings due to the changing environment, which is wherein AI can help. It's indeed simple to acquire knowledge regarding what climate, annual sunshine, wind direction, as well as

precipitation, may affect agricultural growing seasons by employing artificial intelligence. Producers can use climate predictions to examine as well as determine whenever the seedlings must be sowed. Among the key elements affecting every plant's development and overall well-being is indeed the environment. The viability of something like the plant is influenced by the topsoil nutrient content. As a result of reforestation, overall soil conditions gradually decline, making it more complicated for producers to determine which soils are ideal for certain crops.Figure 5 illustrates the key factors involved in urban farming.

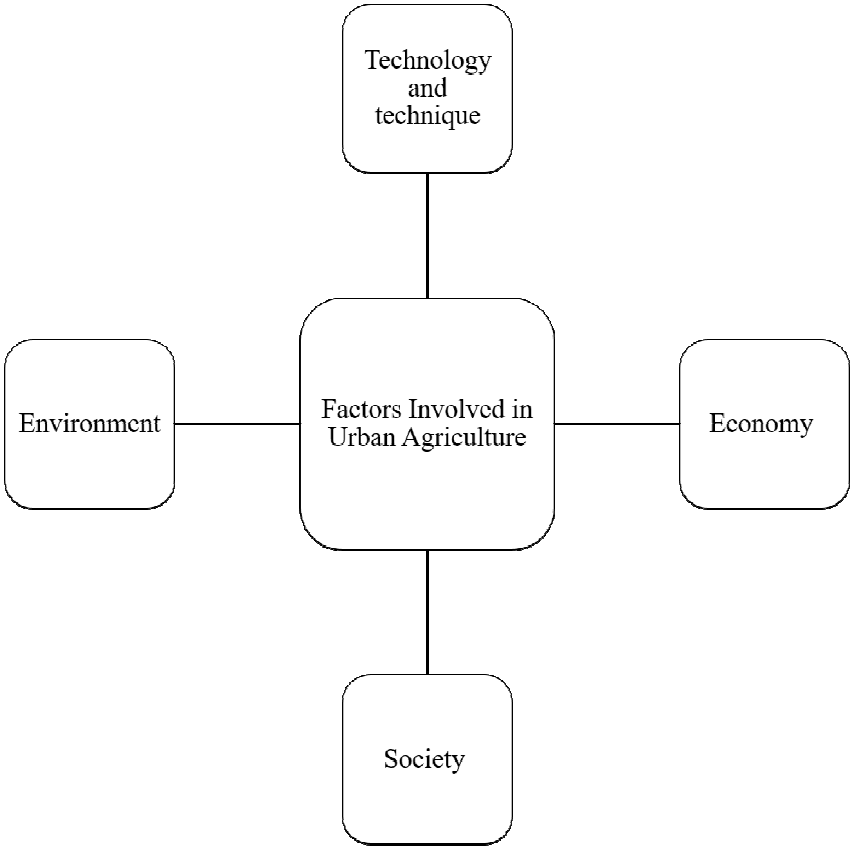

Figure 5: Illustrates the key factors involved in urban farming.

Agricultural output may be increased by real-time sensing information including visual insights via UAVs, owing to AI as well as machine learning within farming. Real video monitoring from UAVs may be used to examine agricultural development trends. Intelligent devices, on the opposite extreme, may provide information on humidity, fertilizer, including organic nutrition concentrations. Despite this, there is no denying whether UAVs are indeed a trustworthy instrument for gathering information about whether certain fertilizers, irrigation schedules, as well as pesticide application techniques, are enhancing agricultural production. Programs that offer producers accurate direction on irrigation administration, crops cycle, early harvests, optimal fertilization, insect assaults, etc. have been made possible through the usage of AI within farming. Researchers can forecast temperature, control feeding, and even assess agricultural viability by employing neural networks using photographs taken by spacecraft as well as UAVs. Precision irrigation is indeed a method that uses input information in precisely the right proportions to get the highest agricultural harvests. Producers may obtain personalized planning for agricultural farms using cell phones as well as AI software. Producers could satisfy the needs of both present as well as prospective worlds, including greater agricultural supply responsibly, expanding income, and doing so without diminishing either precious environmental asset, using such IoT as well as AI-based alternatives.Figure 6 illustrates the key advantages of technology in urban farming.

Entrepreneurs using AI are creating agricultural robots that can do a variety of duties. Autonomous machines would be taught to manage plant development that is out of line as well as gather produce. Producers are also receiving training in crop picking as well as packaging. The objective would be to automate these laborious processes so that they may be completed considerably more quickly and also in greater quantities than they could be by people. In agriculture, artificial intelligence (AI) technologies allow the use of aerial photos to match these with historical records to identify livestock or person incursions. That lessens the possibility of either domesticated or wild creatures destroying plants. AI systems are also capable of spotting tiny insects like grasshoppers and locusts. Notifications are promptly delivered to the growers' cellphones as soon as an incursion is discovered to undertake the necessary safeguards.

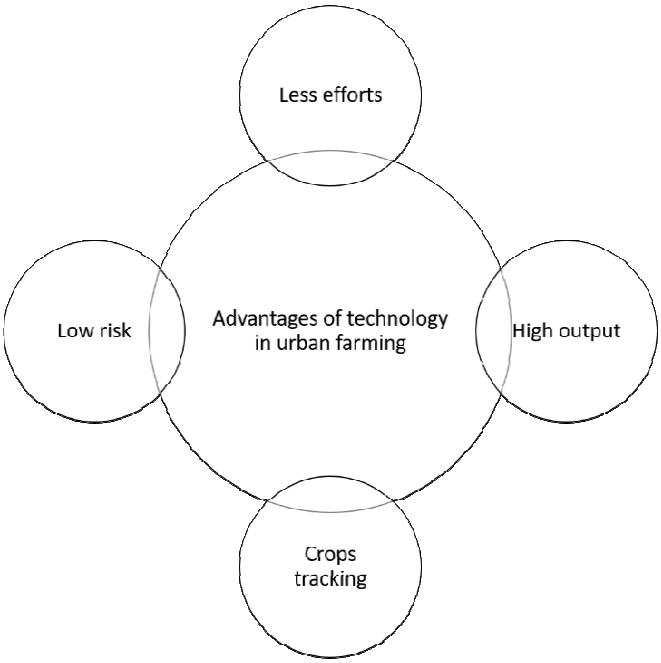

Figure 6: Illustrates the key advantages of technology in urban farming.

Producers may use aerially collected photographs for sophisticated assessment of agricultural harvest production as well as various agriculture-based issues that must be handled right away with the help of airborne photography solutions. The potential of AI in agriculture is essentially the sophisticated robotics as well as automated software technologies but also technologies. This same agriculture industry could guarantee maximum productivity with the lowest amount of gardening work owing to such high-tech methods. By applying cutting-edge techniques for managing interior climatic variables including agricultural outputs, producers may easily administer both interior as well as vertical farming in metropolitan areas with the help of agricultural technology systems. Companies may now create farming technology applications that automated existing commercial processes, such as animal or crop surveillance, insect control, and water administration, including personnel integration, with the help of farm IT consulting companies. Integrating pinpoint agricultural technologies from the top agricultural technologies advisory company helps, to maximize asset usage, reduce wastage, as well as preserve an acceptable price balance.

AI technology has been employed to address a variety of issues in agriculture, including harvest, cattle, irrigation, as well as environmental difficulties. It encompasses agricultural health, animal identification, illness as well as pest identification, harvest forecast, animal rights, as well as output. As an illustration, some farmers claim to believe plants pose the

greatest risks to agricultural productivity. Since herbicides are hard to tell apart as well as separate among plants, effective pest identification is crucial for healthy agribusiness. With the use of detectors as well as ML systems, plants can potentially be accurately detected as well as identified neither endangering the ecosystem nor having any negative side effects. Weedkiller use has been reduced thanks to the creation of technologies including robotics that can eliminate plants thanks to machine learning (ML) enabling plant recognition. Precise agricultural grade attribute identification and categorization have raised output revenues as well as decreased wastage.

3. CONCLUSION

Urban agribusiness has emerged as a response to rising urban dietary consumption, inefficient traditional agricultural methods, with shrinking agricultural space. Vertical agriculture, indoor agriculture, aeroponics, as well as aquaponics are examples of urban agricultural methods. To fully realize their possibilities as well as advantages, such strategies must be combined with technological advancements since they could not indeed revolutionize agriculture on their own. Large agricultural output is aided by urban agriculture. This paper provides a comprehensive review of the role of technology in urban farming for future food security in various highly populated nations. Additionally, people have started re-engaging with agriculture by growing their food as well as accessing farmers' businesses as just a result of the newer agricultural technology inside and near urban regions. Technology opens up monetary gates as well as swiftly establishes and maybe maintains relationships. Urban farming has therefore been widely recognized for a considerable amount of period.

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CHAPTER 22

A COMPARATIVE STUDY ON DIFFERENT TECHNOLOGY USED IN MODERN AGRICULTURE

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ABSTRACT:Conventional farming relies on treating plants and soil with chemicals that are almost certainly toxic and were probably created synthetically in a laboratory. These materials protect against plant blight caused by disease or pests. The use of agricultural inventions and farming techniques known as "modern agriculture" helps farmers become more productive and use fewer natural resources to produce enough fuel, food, or fiber for the whole world's population. Utilizing cutting-edge technology in agriculture boosts output and ensures high-quality work in a shorter amount of time. In this study, the author discussed modern agriculture and its various benefits. The main objective of the study is to learn more about the importance of modern agriculture. It will assist a beginner in understanding the agricultural process and ensure profitability by helping farmers comprehend the needs and expenses and calculate worker compensation based on their labor.

KEYWORDS: Agriculture, Fertilizer, Management, Sophisticated, Technology.

1. INTRODUCTION

Innovative farming techniques used in modern agriculture assist to improve agricultural productivity and lessen the waste of natural resources. Farmers can boost their production and output while also increasing their income by using this sophisticated technology. Modern techniques are often used by farmers, including carefully selected hybrid seeds for a single crop, bio-pesticides, bio-fertilizers, cutting-edge machinery, or energy subsidies in the form of irrigation water. Thanks to the sensors used to assess soil moisture, farmers may build irrigation systems for crops based on temperature and soil moisture. Working in low visibility field conditions like rain, dust, and fog is possible with the help of modern technologies. Agricultural robots automate a variety of agricultural chores, including fruit picking, soil management, crop harvesting, and irrigation, weeding, plowing, and planting. For farmers, these robots automate tedious and repetitive activities so they may concentrate on raising overall output yields [1].

The introduction of technical, chemical, or biological innovations into agriculture is part of land-augmenting technology developments. Agriculture is the art or science of cultivating the land, growing crops, or keeping animals. It entails preparing both plant and animal products for consumption by people and delivering them to markets. Agriculture is used to create the majority of the food and textiles in the world. Wool, leather, or cotton are products of agriculture. Various species of termites, ants, and beetles are thought to have been cultivating crops for more than 60 million years prior to the appearance of humans. It is described in its widest meaning as the use of natural resources to produce goods that sustain life, such as food, fiber, forest products, horticultural crops, and the services that go along with them. This includes forestry, horticulture, animal husbandry, and arable farming [2].

As is common knowledge, India is an agriculturally based nation. About 70% of Indians are employed in the agricultural sector. Future agricultural practices will need the usage of

modern technologies. Thus, the use of cutting-edge technology is called "Smart Farming." Smart farming is more effective than conventional farming since it is carefully thought out and structured. This system can quickly and easily detect additional grass, which is then trimmed with a laser. It also improves soil fertility and sprays pesticides on crops to make them resistant to insects. It can also be adjusted to provide security monitoring of the region. Agriculture in India plays a crucial role in meeting the nation's food needs and contributing to its enormous economy, although the country's agricultural practices are not as sophisticated as they are now. A smart agricultural robotics system based on the Internet of Things is utilized in work which supports enhanced economic growth and productivity. The productivity of farming has repercussions on the climate. Support for smart agricultural systems using contemporary technology.

The productivity, quality, and efficiency of agricultural sectors are all increased through smart farming systems. With the use of sensors, the Internet of Things provides real-time monitoring of the agricultural harvest sectors. Using this Internet of Things technology, data is stored in cloud storage, which will be used in subsequent research to deliver accurate information on predicting accurate harvest and ultimately develop the best agricultural practices. For many years, much study and experimentation have been carried out in this sector. Technology based on sensors and the Internet of Things is assisting in this sector's conservation agriculture process expansion to boost agricultural output (production). By using modern sensors and Internet of Things technologies in agricultural practices, all points of conventional farming problems, such as flooding, dry spells, crop optimization, soil utility, and harvesting, may be addressed. In smart agriculture, automated systems, sensors, and the Internet of Things are integrated to improve farming to previously unimaginable levels. The goal of smart farming systems using the Internet of Things with automation and robotics systems is to improve productivity, quality, and irrigation facilities of the crop field, as well as harvesting and weeding, which produces better revenue for farmers and increases the economy and GDP of the country [3].

1.1. Machine Learning Methodologies Improved Soil Health Promotion:

Since the beginning of human civilization, farmers have been fighting a continual struggle with pets and illnesses that has led to poor harvests. The cause of these lethal yields is typically found in the soil where crops are grown. Even though machine learning algorithms are well known for their work in medicine, they are now giving farmers the answer they have been waiting for. Pattern Ag, a startup company located in California, is a prime illustration of this. Its machine-learning discovery platform is built on a thorough knowledge of soil and is capable of identifying pest and disease signs as well as suggesting the best herbicides to employ to solve the problem [4].

In terms of using pesticides to fend off pests and illnesses, machine learning algorithms have proved beneficial in aiding farmers to operate at their highest level of efficiency. A wireless smart trap from DTN that has pheromones and enables real-time monitoring of the insect population through an app is one example. The business claims that by automating the labor-intensive process of calculating the quantity of insecticide necessary, agricultural insect damage in the United States would be reduced by $20 billion. In this study author talks about the importance of modern agriculture, and how it is beneficial for farmers now a day, and also talks about the various techniques that can help the farmer.

2. LITERATURE REVIEW

Rashmi N et al. [5] Studied the many Internet of Things (IoT) technologies, gadgets, as well as sensors used in smart agriculture. Lastly, a quick discussion of the benefits and difficulties

of smart agriculture as a result of the industrial revolution and population growth, smart agriculture uses an increasing number of innovative technologies. Every area is paying attention to the IoT, which is expanding quickly. Everyone's lifestyles or every sector of business, including agriculture, are changing as a result of IoT. Traditional agricultural practices undergo a radical transition thanks to smart agriculture, which also opens up new options.

Supriya Wadhone et al. [6] Studied Applications for agriculture that are being developed with the primary goal of giving farmers improved agricultural practices. The agriculture software we created offers features like current market pricing, weather predictions, agricultural ideas, clever farming techniques, and crop information. However, the primary issue farmers currently face is in selling their products, where middlemen benefit. As a result, seller platforms are launched, and in addition to these characteristics, they also provide news on the agricultural sector in different locations and government programs.

Ritika Srivastava et al. [7] Studied the creation of a system that uses sensors as well as an Arduino UNO board to track temperature, moisture levels, water levels, and even movement that might harm crops in an agricultural area. IoT sensors can provide information about agricultural areas and subsequently take action depending on user input, making smart agriculture an emerging idea. The initiative attempts to employ smart agriculture utilizing automation and emerging technologies, such as IoT. After the hardware has been created, the software has to be updated based on evolving requirements and technologies.

Praveen Kumar and Bhavesh Kumar [8] Studied the utilization of artificial intelligence. The population of the world is expected to exceed 2 billion people by the year 2050, according to the UN. As the human race grows, so do our basic needs and wants, but one of the most important ones is food, which is necessary for both the body and the brain to function properly. Following the green revolution, people saw an increase in agricultural output.

Sidditha. G et al. [9] Studied a water-saving irrigation system that is intelligent. One-third of the nation's revenue comes from agricultural techniques, while more than 60% of Indians are employed in agriculture. As a result, it is essential to the nation's growth. Numerous farming-related problems are always impeding the nation's progress. Consider modernized agriculture, which incorporates contemporary tendencies, as a potential answer to these issues. As a result, IOT as well as other technologies may make agriculture smart. Increased crop productivity, less water waste, or balanced fertilizer usage are all benefits of smart agriculture.

Avhad Priti et al. [10] Studied Water and fertilizer waste decreased with smart agriculture, as well as crop output increased. Smart farming is a novel concept since IoT sensors may offer information about their agricultural lands. The goal of the article is to leverage IoT and smart agriculture utilizing emerging technologies. The main component to increase the production of productive crops is to monitor environmental conditions. For centuries, farming has been the main kind of employment in our nation. Agriculture is now being hampered by the movement of people from rural to urban areas. Therefore, they use IOT-based smart agricultural solutions to solve this issue.

Prateeksha Kulkarni et al. [11] Studied about mart Agriculture with Cloud Computing an IoT. Numerous procedures are carried out in the agriculture sector. Seeding is a crucial procedure. However, the current seeding methods are flawed. Sowing seeds requires a lot of equipment and is not an easy operation. Therefore, it could be necessary to create technology that can reduce the work required of farmers. This technique presents an efficient system that aims to scatter seeds at a given location while maintaining a healthy gap between the seeds or

features. Through the use of this automated method, the shortcomings of the current gadget will be effectively eliminated.

Kam-Weng Tam et al. [12]studied about have presented a system that makes use of ZigBee technology. This study explores the software, hardware, network coordinator, sensor, or anode, of the Internet of Things. Theoretical and experimental results demonstrate that the system can effectively capture greenhouse climatic factors, such as temperature, carbon dioxide concentration, and humidity, and they also make clear that there is normal communication among nodes or the network coordinator, resulting in good network stability. Implementation research on the values utilized in the sophisticated greenhouse environmental monitoring.

Pooja Patil et al. [13] Studied about Mobile technology is essential to both farmers' and other people's everyday lives. Farmers who formerly relied on clouds for rain are now turning to cloud computing for ways to cultivate better crops in the contemporary agricultural sector. Unusually, farmers in India utilize sluggish but comprehensible conventional ways. Even though most individuals can see the advantages of utilizing more expensive methods to manage crops.

S. Pragadhy Susain et al. [14] studied The “Agriculture Marketing System” which is a piece of software that allows farmers to sell their harvested goods directly to consumers at prices that are accessible to them. The three main modules in this project are admin, farmer, and user. The user module will assist the user in seeing the agricultural product and, if desired, in making a purchase. The user may also provide comments on the product, which the administrator will consider for product improvement. Only the administrator has access to the data, wherein user and farmer information is kept.

3. DISCUSSION

The agriculture industry has seen a considerable transition during the last 50 years. Because to technical developments, farm machinery has become bigger, quicker, and more productive, enabling the more efficient cultivation of vast areas. Fertilizers, irrigation, and seed have all significantly improved yields for farmers. A new revolution, fueled by connectivity and data, is now taking place in agriculture. Artificial intelligence, networked sensors, analytics, and other emerging technologies might increase yields even more, improve the efficiency of water as well as other inputs, and promote sustainability and resilience in both agricultural production and animal raising.

3.1. Acceptance of Contemporary Agricultural Technology or Its Importance:

Agriculture continues to play a significant role in the creation of income and provide food for a large number of people worldwide. The various agricultural systems and techniques have seen significant adjustments and progress in recent years. For instance, modern farming practices include the use of various tractors and equipment, decreased pesticide usage, and inorganic fertilizer. Due to the availability of these inputs, it has become necessary to harness natural resources and processes to increase agricultural production and lower costs. There are several advantages of using contemporary technology in agriculture. Learn more about the significance of using contemporary technologies in agriculture by reading this study [15].

3.2. Acceptance of Technology in Agriculture:

Technology in agriculture may be used for a variety of agricultural practices, including the use of fertilizer, better seeds, pesticides, and herbicides. Technology has shown to be very beneficial to the agriculture industry throughout time. Currently, crops can be grown in

places where it was previously believed they couldn't, but this is only feasible because of agricultural biotechnology. For instance, genetic engineering has made it feasible to insert certain genes into different crop or animal genes. Such engineering increases the crops' resilience to pests and drought. Farmers may electrify every process with technology for increased productivity and efficiency [16].

There has been a limit to how quickly contemporary technology can be used in agriculture. This may be explained by the fact that accelerating this idea requires extensive information and an awareness of some of the factors that affect farmers' decisions to accept contemporary technologies. A few of the elements that affect how quickly or slowly agricultural technology is accepted include institutional, social, and economic. Some economic elements that affect the pace of adoption of agricultural technology include the size of the land, the cost, and the advantages of the technology. The likelihood that a farmer will embrace contemporary agricultural technology is influenced by a variety of social variables, including the farmer's education level, age, social standing, and gender.

Small-scale farmers have both internal and external limitations when using new agricultural technologies. This aspect might explain why the adoption of this technology has been slower than expected. Despite the challenges, what matters is if modern technology benefits the farm sector. The portion that follows emphasizes the value of modern technologies in agriculture.

3.3. Agriculture Technology Use:

The following are a few examples of how technology is used in agriculture.

The necessity to satisfy labor is one of the issues that farmers now confront. The cost of labor is rising, necessitating smarter strategies to assure lower labor costs. Processes are made simpler by the invention of integrated harvesters and planters. A few of the key components in agriculture are time and production. Therefore, it's crucial to plant early, harvest on schedule, and make sure the crop is stored at the proper time. Farmers can produce a large amount of food in the shortest amount of time because of the usage of contemporary technologies in agriculture.

Sprayers and tractors that operate on autopilot and don't need a driver have been developed using GPS technology. Such technology is crucial to agriculture because it encourages better, more productive agricultural methods. For instance, tracking systems are included in autopilot tractors and sprayers, which prevent human mistakes and ultimately save money on fuel and equipment [17].

3.3.1. Agriculture Sensors:

Agriculture still faces challenges in determining which fertilizer is best for certain plots, when and where to use it, and how much. When it comes to pesticides, this is particularly accurate. By employing crop sensors, farmers may find it easy and practical to apply as much fertilizer and pesticide as their crops need. Variable rate technology is useful in these situations. People will be able to reduce the possibility of leaching as well as surface runoff by using such technology to detect the emotions of their plants. Crop sensors are intended to inform the application equipment of the amount and timing of a particular resource that a particular crop needs.

A prevalent technology in agriculture is GPS. For instance, contemporary agriculture uses GPS to record the condition of the field. It is simple to ascertain and record the yields from a certain farm using GPS, as well as to note the application rates. These technologies are advantageous because they allow farmers to make choices based on information that has been

gathered and documented. The yield map, which may be used to provide an overview of all year's activities, is the recommended documentation technique. Such maps are quite helpful since they may provide a broad variety of information, such as the condition of the drainage system in your area. Genetic engineering and the practice of enhancing a crop's genes are two more names for biotechnology. Most often, genetic engineering is done to make specific crops more resistant to agricultural inputs like the use of herbicides. Farmers are now able to grow in locations that were previously thought to as deserts or arid. Lower agricultural inputs imply that the farmer also spends less on-farm resources [18].

Among other things, modern agricultural technology aims to accomplish two crucial objectives: a successful economy and improved production. Therefore, it's crucial to exercise caution while setting goals and objectives for the use of various technologies in agriculture. People should consider several factors, such as how fertilizer is applied and organized, irrigation, staging, heavy tillage, monoculture, and the use of other resources. Nevertheless, to accomplish these objectives, farmers must comprehend contemporary farming and its use of technology.

3.4. Several Modern Agricultural Technologies:

The largest industry in the world that produces food for people is agriculture. After the service industry, which accounts for 28% of worldwide employment, the agricultural sector is the second largest employer. The agricultural industry employs almost 1.3 billion people. Nowadays, farming is heavily reliant on contemporary agricultural technologies.

- The agricultural industry is reliant on the natural world. This industry is at risk in many regions of the globe owing to drastic climatic changes brought on by global warming and other factors.
- To employ modern agricultural technology, which may make farming simpler and more inexpensive, a farmer has to be educated.
- An early warning may allow us to reduce the likelihood of losses and strengthen the global agricultural industry.

3.4.1. Sensors for Soil and Crops:

More agricultural equipment is now available with intelligent sensors that can detect anything from crop health to critical water nitrogen levels. The sensors then allow for on-the-go input applications depending on current field circumstances. Additionally, sensor technology is available to assess the electrical conductivity of the ground, the amount of organic matter present, and even specific soil properties like pH. For instance, numerous kinds of soil sensors are produced by Varis Technologies, Bionics, or Tulum. This is a crucial advancement in agricultural technology.

3.4.2. Wi-Fi-Connected Crops:

Electronic sensors that can monitor a variety of variables are often dispersed across modern farms. In some circumstances, devices transfer data to a server or cloud that is located on the farm (network servers are widely used for computing or data processing). It combines soil analysis, satellite imaging mapping, or rather harvest data to assist develop unique variable rate prescriptions for your farm. These data are automatically analyzed and instructions are sent to the farm's automatic irrigation system. In some cases, the irrigation system may even add the appropriate amount of fertilizer when necessary, before the appropriate amount of water is distributed through drip tape, with hollow rows of holes running along the crop. People may receive agricultural homework assistance and more freedom while studying by typing do my homework for me. It increases productivity, evenly distributes water regularly,

may decrease waste, and minimizes the quantity of fertilizer water used. Through the use of a tablet or smartphone, farmers may obtain this data, which formerly required a labor-intensive, sluggish soil-testing method. Wifi-enabled crops are a highly advanced kind of agricultural technology.

On the farm, the development of autonomous vehicles is also increasing. Robots or self-driving tractors are becoming increasingly widespread as a means of autonomously regulating the cost of payroll, which is sometimes performed by humans. Robots are available to choose lettuce, strawberries, grass, oranges, and grapes that have been cut. While some are very adjustable with sensors and attachments that carry out extremely precise activities, including locating the locations where the cows are pollinated and treated to encourage the injured grass to grow again, others are tied to a human-powered tractor. These robots often use sophisticated GPS tracking to guide them so they may go through the tight area between crop rows with ease.

Farming automation is a major factor in increasing agricultural productivity, which lowers costs for consumers, reduces the impact of farms on the environment, and reduces labor expenses. A growing number of conventional agricultural businesses are beginning to incorporate farm automation into their operations, from autonomous tractors and robotic harvesters to automated watering and seeding robots. It has created a completely autonomous Robot-as-a-Service (RaaS) solution that continually monitors, digitizes, and analyzes assets in real-time using advancements in AI and robotics. The only drone system in the AgTech sector capable of continuous, unattended operation is the autonomous robotic data platform.

Robots are also being used by Rowboat Systems to gather important data that will help with current and future projects. Their first commercially available robot is a small, self-driving, versatile platform that travels between rows of corn, removing any height restrictions brought on by the crops' quick development. The robots cooperate in teams to plant cover crops into tall corn and provide nitrogen fertilizer when maize needs it. Over the last ten years, modern agriculture technology has taken a solid hold on agricultural growth. Without this innovative farming method, farms' productivity would decline but crops will still be produced with devastating effects on the environment, damaging the limited area that will be needed to cultivate crops for years to come.

3.4.3. Wavelength Control

Growing in popularity is urban or vertical home farming, which provides farmers of certain crops with a year-round method of growing independent of the weather outside. But one of the difficulties is figuring out how to tailor sunlight's perfect wavelength to the expansion of condensed interior areas. Light-emitting diodes (LEDs) have advanced in recent years, offering a more cost-effective and superior alternative to full-spectrum fluorescent lighting, which has historically been used inside to encourage plant development. Modern agricultural technology facilitates and improves farming.

3.5. Areas of Application in Agriculture:

By integrating sensing and Internet of Things (IoT) technology into the agricultural process, traditional farming methods may be altered. The future of farming may be shaped by IoT in a few major application areas. Farm vehicle monitoring is part of fleet management. GPS tracking gadgets are now a standard feature on automobiles and other equipment. This GPS-tracking gadget keeps track of the equipment and vehicles constantly, preventing theft. The farmland and crops may also be organized with the aid of this equipment [19]. Precision farming, also known as precision agriculture, makes agricultural practices more exact and

regulated. Sensor data is processed, and actions are then taken with intelligence in response to the data. There are many different precisions farming methods, including managing irrigation systems, keeping an eye on animals, tracking vehicles, and more.

- *Monitoring Climate:* Agriculture depends heavily on the climate. IoT apps are dispersed around the field and they gather varied environmental data that aid in crop selection. IoT solutions make it possible to know the weather in real-time.
- *Water management:* Ample water is necessary for cultivation. IoT applications with sensors integrated guarantee optimal water management and minimize needless water waste.
- *Greenhouse farming:* This offers favorable circumstances for growth and protection from numerous pests and changeable weather. IoT is used in smart greenhouses to monitor and manage the climate, removing the need for human interaction. Use a variety of sensors to detect environmental conditions dependent on the plant. This offers farmers the greatest answer at a minimal cost. It detects pressure, temperature, light levels, or climatic changes in addition to those. It takes the necessary action following sensor data.
- *Agricultural Drones:* Drones are a popular piece of agricultural equipment. Drones may be either ground-based or airborne. These may be used for field or soil analysis, spraying, crop monitoring, and crop health assessment.

4. CONCLUSION

Technology is a light that dispels shadows and helps people to survive on the planet. The use of emerging technologies in agriculture helps in increasing productivity and ensuring quality work in less time. This strategy is built with cost-effective and best-in-class software that is user-friendly and ensures profit on the job. Technology is a light that dispels the shadow and advances human life on earth. One of the major issues facing agribusiness was the need to develop aids for landlords. The challenge of controlling the production of a specific crop is similar to that of managing the production of multiple crops. This will help a new landowner to understand and control the farming process and ensure a means to calculate profit from expenditure and revenue in terms of needs.

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