



# THE IMPACT OF DIGITALIZATION ON AVIATION INDUSTRY

Submitted By

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Further, I certify that the work is based on the investigation made, data collected and analyzed by her and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of MBA.

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## ABSTRACT

The Purpose of this dissertation is to deeply study the Impact of digitalization on Aviation Industry in today's scenario. Digitalization is anonymous to digital transformation. AVIATION is a service sector where each and every activities event is connected in a logical and coordinated manner. It is simple exchange in return of services. .You provide passengers the basic plus add on benefits and in return he will give you the economy required to run your business.

Today the world is undergoing technological and digital changes at a rapid pace. Digitalization and technological advancement provides a framework that is beneficial and supporting element to Aviation industry.

Other structure of the aviation Industry such as economy, profit, cost structure and intensity of competition is somewhere revolving around the digital transformation.

Jaipur International Airport is used as a subject for research study for understanding the impact of digitalization on aviation industry.

All the digitalized facilities at Jaipur Airport is kept under study and its benefit that is being derived by the associated agencies and stakeholders is studied,

Users of digitalized technology at Jaipur Airport are classified under different groups and what impact does digitalization have on their work management keeping in view of catering 2-5 million passengers per annum along with provision of on-time services, time constrained ground operations and keeping the air traffic flow movement going in forward and smooth way.

Research was carried out using convenience sampling using survey questionnaire on 90 people under different categories .All areas of digitalization used by different agencies were studied keeping in kind the effective role of passengers experience and customer satisfaction using digital transformation.

The findings indicate that digital transformation has not only add on customer satisfaction but also help airlines in achieving their goal targets and improving goal efficiencies.

Viewing the impacts of digital transformation the Airports management is taking effort in commissioning new technological and digitally advanced facilities to make Jaipur upgraded and SMART Airport.

However, factors that is becoming hurdles in fully exploiting the features and implementation of digital transformation in aviation industry are discussed.

Future scope and requirements of other digital advanced technologies are proposed for Jaipur International Airport. At last the only and bitter truth left i.r.o Aviation industry is that “If you are not ready to change with the advancement in every aspects in the fields of aviation, you will be left behind and Today’s world is all about competition.



DISEERTATION ON IMPACT OF DIGITALIZATION ON AVIATION INDUSTRY



## Chapter 1: INTRODUCTION

### 1.1 Overview :-

The word *aviation* was coined by the French former naval officer and writer and Gabriel La Landelle in 1863.

Beginning of 18th century is marked with the development of the hot air balloon. A large significant step came with the invention and construction of first powered airplane by the Wright brothers in early 1900s. Since that time, aviation has been technologically advanced and revolutionized by the introduction of Jet which permitted a major form of transport all through the world.(WIKIPEDIA)

On December 17, 1903, The Wright brothers made the first successful powered, controlled and sustained airplane flight which marked the achievement and the authentic beginning of Aviation .

Aircraft began to transport passengers and cargo as aircraft structural designs grew larger and more reliable. (WIKIPEDIA)

During 1920s-1930s extraordinary advancement was made in the field of aviation:-

- 1-First transatlantic flight of Alcock and Brown in 1919.
- 2-Solo transatlantic flight y Charles Lindbergh's in 1927
- 3-Charles Kingsford Smith's transpacific flight in 1928.

Douglas DC-3 was one of the most successful designs of this period which became first and principal carrier to be profitable transporting passengers only initiating the modern era of passenger airline services.

The war brought many technological advancement and innovations to aviation, including the first jet aircraft and the first liquid-fueled rockets.

### 1.2 Background:-

Digitalization is the incorporation of computerized and digital advances in day to day life by the digitalization process. The exacting importance of digitalization gives an evident thought of advancement and innovation and technology dependent world.

Our general surroundings have changed drastically, especially since the start of the 21st century, predominantly because of the expansive accessibility of the Internet. Developments combined with the ascent of Social media platforms have added a great deal of speed to this advancement.

The advanced transformation enables the customer to determine ever increasing expectations. Simultaneously, most recent tech advancements like artificial intelligence, block chain, voice/face sensing technology etc. have opened doors like never before.

At present no field is left untouched by the continuously changing digital revolution. Aviation being a global platform rapidly evolving nature of industry is one of the field that is doing wonders and will continuously be benefited with the adaption and research for newest digital technology for the all-round benefit both commercially and economically.

A take-up in advanced innovation will be helpful to air terminals, airlines, airport operators and passengers. Computerized technology improves effectiveness, which decreases costs and thus improves traveller experience. (DIGITAL TRANSFORMATION IN AVIATION SECTOR, 2017)

### 1.3 **Purpose of the Study** :-

The purpose of the study is given below as :-

#### **OBJECTIVE:** - (Pooja, 2019)

1-sets out some of the main areas of opportunity for modernization and innovation in aviation - automation, digitalization, navigation and surveillance, electrification and data sharing.

2- Thoroughly examine the major digital trends currently shaping the commercial aviation industry in India and proposes measures for better passenger experience with current and new emerging digital technologies.

3- identifies some of the barriers and challenges to innovation and how these can be addressed by working in partnership with the aviation sector in India.

## **Chapter 2:- LITERATURE REVIEW**

The literature review is motivated and inferences are adopted from the websites of Ministry of Civil Aviation and AAI (Airports Authority of India). Also the data is collected from the study, research and open discussions conducted at Jaipur International Airport

### **Ministry of Civil Aviation:-**

The Union Ministry of Civil Aviation (MoCA)-Government of India is the central nodal ministry responsible for the formulation of national policies & programs for development and regulation of Civil Aviation in India and for devising and implementing schemes and policies for the orderly growth, safe and expansion of civil air transport.(AVIATION)

### **Organization set up of Ministry of civil aviation:-**

The Ministry has under its purview the following organizations:(AVIATION)(SCRIBD-AVIATION INDUSTRY IN INDIA)

#### **1-Directorates:-**

- ❖ Directorate of Civil Aviation(DGCA)

#### **2-Attached offices:-**

- ❖ Bureau of Civil Aviation Security (BCAS)
- ❖ Commission Of Railway Safety
- ❖ Aircraft Accident Investigation Bureau(AAIB)

#### **3-Autonomous bodies:-**

- ❖ Indira Gandhi Rashtriya Udan Academy(IGRUA)

#### **4-PSUs and Joint Venture:-**

- ❖ Airports Authority of India(AAI)
- ❖ Air India
- ❖ Pawan Hans Helicopter limited.

**Digital Initiative under Ministry of Civil Aviation:-**

(Ministry of Civil Aviation, MAY -AUGUST2019)

**(A) eGCA :-**

The function & process of **Directorate General of Civil Aviation (DGCA)** is being moved to an online platform to provide faster delivery of services & regulation oversight. The e-GCA was initiated on 14th May 2019. The first module on pilot licensing got launched in November 2019.

**(B) DigiSky :-**

Pursuant to the **issuance of CAR by DGCA** on 27.08.2018, DigiSky online portal has been launched to meet the requirement laid down by the CAR for flying Civil Drones. The available version of DigiSky is Beta version which and captures the entire aviation activities relating to drones viz. registration of drones and pilots, approval of flight path, post flight analysis etc. based on the No Permission No Take off (NPNT) distinctive features .(Ministry of Civil Aviation, MAY -AUGUST2019)

**(C) e-sahaj :-**

100% of security clearances pertaining to the Ministry have been made online on e-sahaj online portal launched by the Ministry of Civil Aviation. The portal is operational for granting clearances in respect of 24 categories by **Bureau of Civil Aviation Security**.

**(D) DigiYatra :-**

**Trial for rollout of DigiYatra initiative-started at Hyderabad and Bangalore airports.** This new initiative will effectively provide seamless and hassle free passenger travel using biometric technologies .It will help in improving passenger experience, minimal queue waiting time as the passengers can walk through e-gates by using advanced security and facial recognition solutions. Not only it will remove redundancies at check access points but will also enhance effective resource utilization.(Ministry of Civil Aviation, MAY -AUGUST2019)

Airport is used to denote areas where air-transport passengers and cargo are carried, especially where passenger movement occurs on a considerable mass scale and always where full-time  
UPES,DEHRADUN

customs facilities are available at international departure and arrival. Airport itself can be called a mini city surrounded by many agencies working cordially for better passenger experiences.

**In India Airports are managed by Airports Authority of India(AAI). Airports Authority of India manages:-**

- 137 airports having 23 International Airports (including 3 International Civil Enclaves)
- 10 Customs Airports (including 4 Customs Civil Enclaves)
- 81 Domestic Airports
- 23 Domestic Civil Enclaves at Defense airfields

“Airports Authority of India provides Air Traffic Management Services (ATMS) over entire Indian Air Space and adjoining oceanic areas with ground installations at all Airports and 25 other locations to ensure safety of Aircraft operations.”(AIRPORTS AUTHORITY OF OF INDIA)

Management of so many airports with ensuring the safety of Aircraft operations and hassle free movement can't be possible without technology.

Today we are dependent upon technology not only to carry out our day to day business but also keeping head to head race with the competitive world to ensure our existence with economic profit as byproduct of our efforts and to survive.

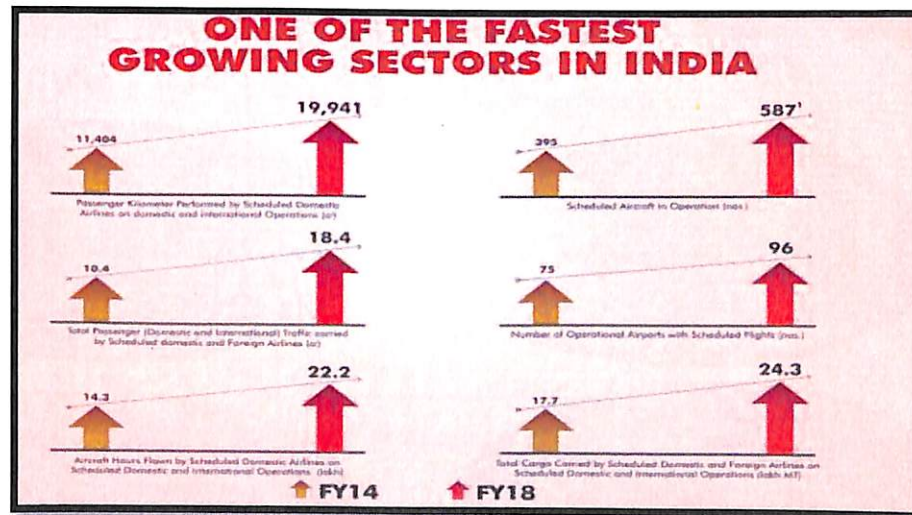


Figure 1-Four years of achievement-By DGCA

India is the third-largest civil aviation market in the world with a great potential of becoming 2<sup>nd</sup> largest aviation market by 2020. In 2016 Indian aviation had recorded an air traffic of 131 million passengers out of which 100 million were domestic air travellers.(AVIATION)

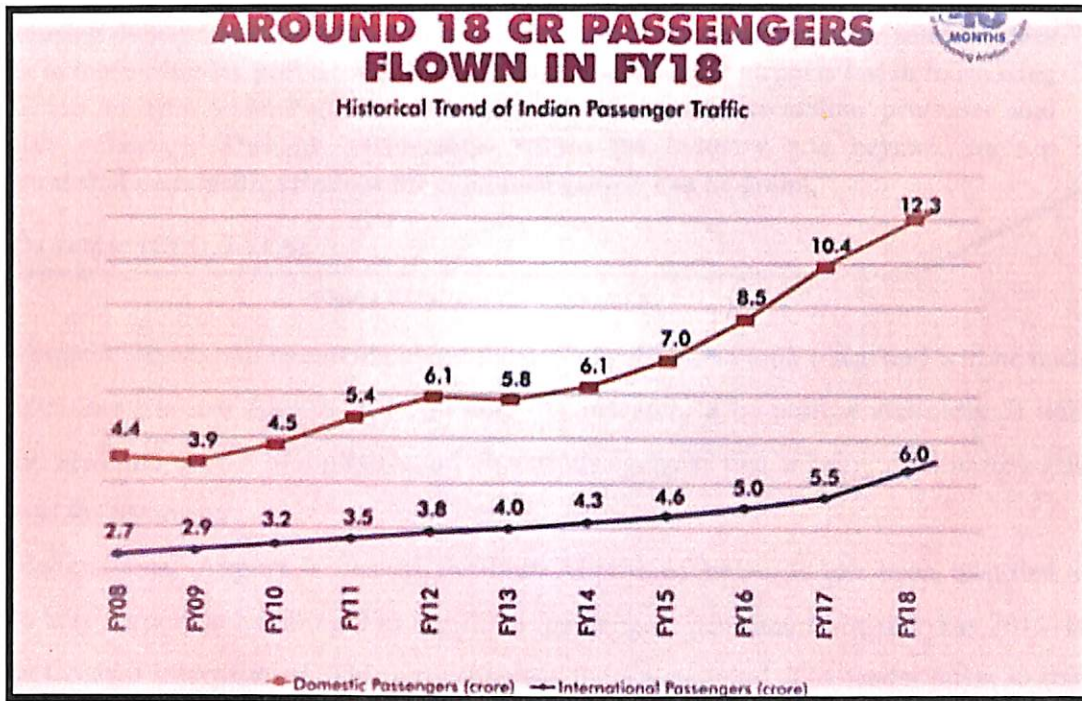


Figure 2-passenger traffic in FY-18 -Source-DGCA report

India is the fastest growing market and is expected to cater to 527 million passenger by 2037. India has been projected to be the second fastest growing country in the world for passenger traffic by Airports Council International (ACI) in its traffic forecasts between 2017-2040.(INTERNATIONAL, 2017)

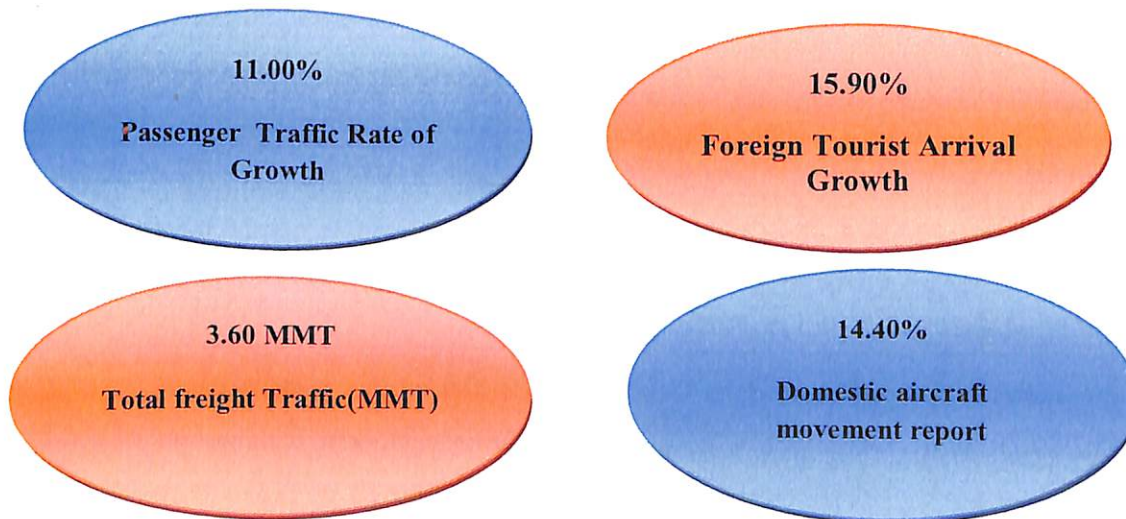


Figure 3-Percentage (%) growth in aviation

"Increasing demand will bring a significant infrastructure challenge. The solution does not lie in more complex processes or building bigger and bigger airports but in harnessing the power of new technology to move activity off-airport, streamline processes and improve efficiency. Through partnerships within the industry and beyond, we are confident that sustainable solutions for continued growth can be found,"

Mr. De Juniac (CEO, IATA)

Figure 4-Statement of CEO(IATA)

In this dissertation we will be talking about the digitalization that took place and will be taking place at Jaipur International Airport that will help our research to be narrow and clear .It will clearly show the need and impact of digitalization on various agencies that is being used to make the hassle free travel for passenger.

Jaipur International Airport is one of the best Airport of India. It has been awarded with the World's best Airport in handling 2 to 5 million passengers per annum for the year 2015-16 by the Airports Council International. This airport serves the state capital. The feeder cities to this airport are Shekhawati region ,Bikaner, Kota,Jhalawar ,Ajmer and Agra Region.

It is well connected with aviation hub cities of Delhi and Mumbai as well serves to 21 destination domestic cities. It is also connected to international destinations like Muscat, Sharjah, Bangkok,Dubai and Kuala Lumpur.(Jaipur International Airport data received from different source, 2019)

Total schedule domestic movement-740/week

Total schedule International movement-76/week

The passenger footfall is approx.--15000-20000 /day

Jaipur International Airport is the main diversionary airfield of Delhi Airport in case of Bad weather or congestion at Delhi Airport.It is also main alternate aerodrome of VVIP flights.

Year 2018-19 domestic passenger growth-15.4%

Year 2018-19 international passenger growth-15.02%

Data source-ATC,Jaipur

(Jaipur International Airport data received from different source, 2019)



**Stakeholders and associated department/Government agencies of AAI at Jaipur International Airport:-**

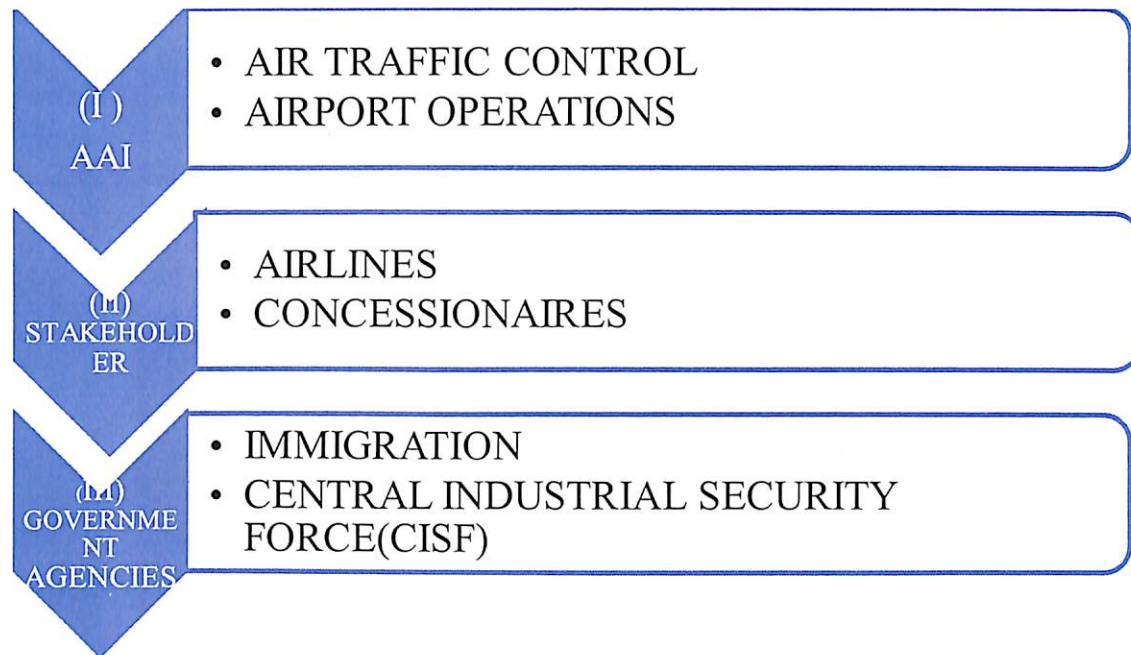


Figure 5- Classification of associated agencies at Airport

**(A)AIRPORTS AUTHORITY OF INDIA(AAI):-**

The digitalized transformation in following department has made the air travel hassle free,safe,secure and efficient:-

**(A)AIR TRAFFIC CONTROL:-**(Jaipur International Airport data received from different source, 2019)

Given the sharp increase in air traffic, air navigation service providers are faced with several challenges to ensure that they continue to control flights safely, orderly and punctually.

“On the one hand, more flexibility is needed regarding the scheduling of air traffic controllers. However, this alone cannot be the answer to the challenges of the future”(KLAUS, 2019).

For this reason, more efficient technologies, digitalization and new structures will have to be at the forefront.

Remote tower control (RTC) The introduction of remote tower technologies is an important step on the way to more digitalization.

**ATC services are divided into three service areas:-**

**a) Tower Control:-Range upto 25 NM radius of Airport**

The services under this are provided for arriving,departing Visual Flight Rules(VFR) and (Instrument flight rules) IFR aircraft and on occasion enroute aircraft within 25NM radius of Airport.

**Advanced facilities under this service are :-**

**(A)ASMGCS: (Advanced surface movement Guidance and Control System)**

It is being used for to control the movement of traffic in maneuvering areas.

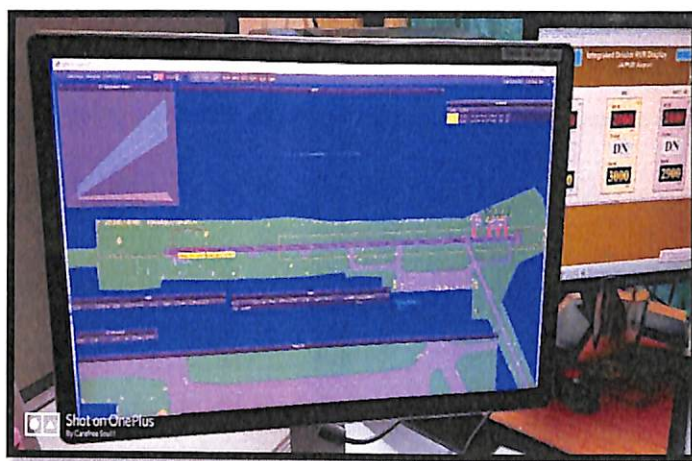


Figure 6-ASMGCS display

**(B) Surface Movement Radar:-**

It is a kind of surveillance display which includes map of the area,position of various aircraft and data tags that includes aircraft identification,speed,altitude etc. It is also used in adverse weather conditions.

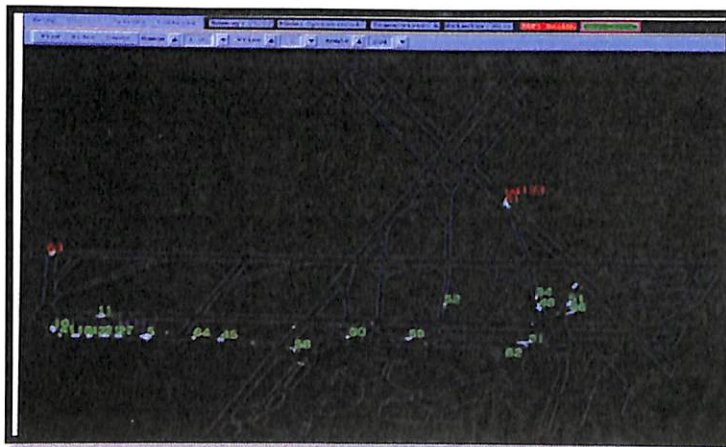


Figure 7-SMR display

**(C) DATIS-Digital Automatic Terminal Information System:-**

It is a continuous broadcast of recorded aeronautical information in busier terminal. The use of this facility is that it helps to release the congestion of channel as the aeronautical information required by Pilot can be heard when it is being broadcasted. Air traffic controllers can be relieved of congested channel and he can provide important information to approaching aircraft ,departing or arriving aircraft.

**(D)Remote Transmitters and Receivers:-**

Wireless communication using space waves,sky waves etc for effective and uninterrupted communication system is present in ATC tower .The ATCO's are eyes and ears of a pilot.Therefore all sort of latest advanced communication system are being used for seamless communication.

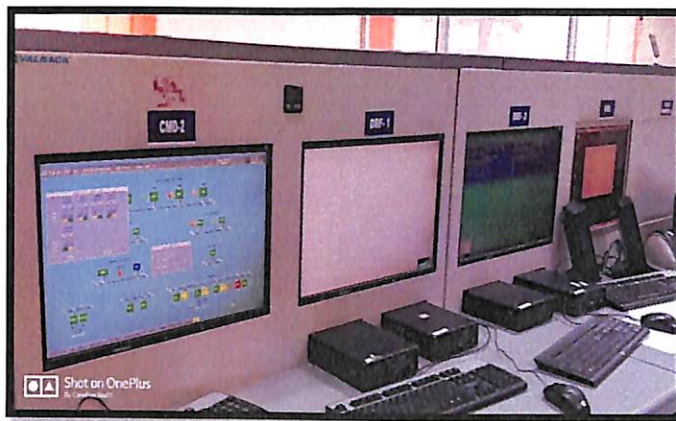


Figure 8- Transmitters and Receiver

**(F)Airfield lighting Control System:-**

The approach lighting system used at the runway miniature version is present in Air traffic control tower.Its full control is with ATCO's. At Night or during Low visibility for parking of aircraft ,that particular path is lit up/energized from tower using a switch button, so that pilot can easily park the aircraft in Parking bays without any difficulty.

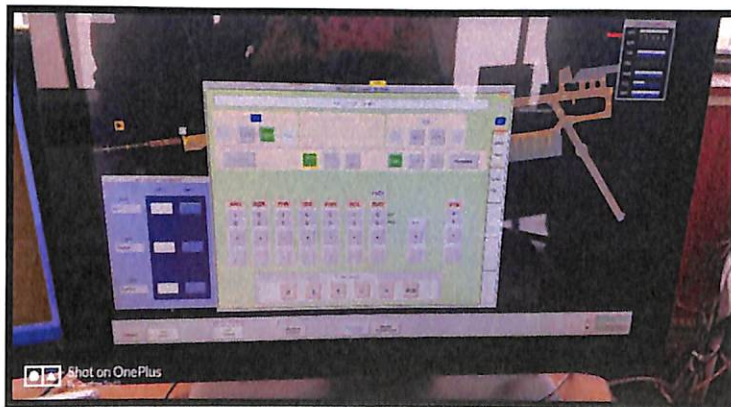


Figure 9Approach lighting control

**(B)Approach Control:-Range upto 30 to 50NM radius of Airport**

The services under this are provided for arriving,departing Visual flight Rules(VFR) and Instrument Flight Rules( IFR) aircraft and on occasion enroute aircraft.

This facility also provides monitoring of the approaches.

**Advanced facilities under this service are :-**

**1-Precision Track Monitor :-**

It is high –update and advanced Radar,high resolution ATC displays. It uses secondary surveillance Radar(SSR) providing better target presentations in terms of accuracy, resolution and track prediction.

Visible and Audible Alerts are generate to warn controllers to take corrective action.



Figure 10- Precision Track Monitor

**(C)Area Control:-Range is beyond 50NM radius of Airport**

The services under this are provided for controlling aircraft in a particular Flight Information(FIR) System at high altitudes between airport approaches and departures.

**Advanced facilities under this service are :-**

**Area Control Radar: (Automatic Dependence Surveillance-Broadcast):-**

It is also being done by high precision Radar screen displaying the movement of Aircraft. Using the information the tracked aircraft are given altitudes ,cruising speed and flight level information.

A safe separation is kept between aircraft on same flight level or different flight level horizontally and vertically respectively.

It transmits information to both pilot and traffic controllers for situational awareness.

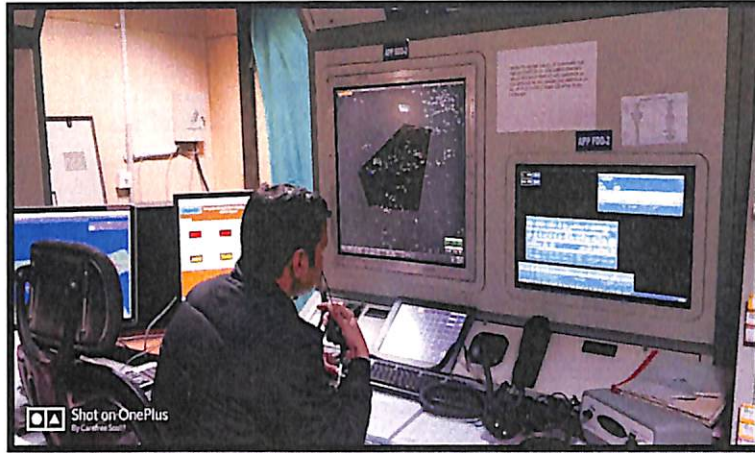


Figure 11-ADS-B Radar Display

The other facilities used at the airport which are of extreme usefulness to Air traffic controllers at Jaipur International Airport:-

1-The airport is equipped with **CAT-III Instrument Landing System(ILS)** and lighting system which helps to facilitate landing of aircrafts in foggy/poor condition up to 50m RVR. It is a classic example of modernization and digitalization.

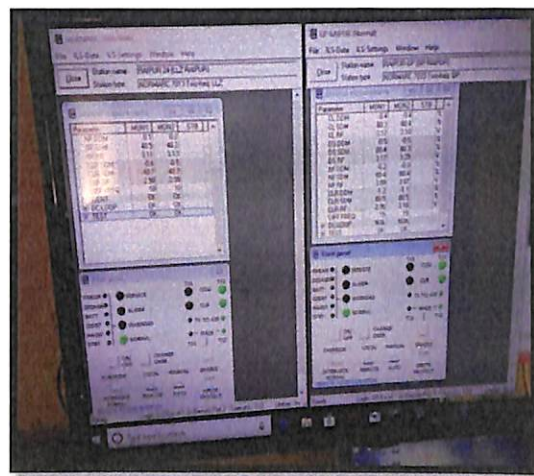
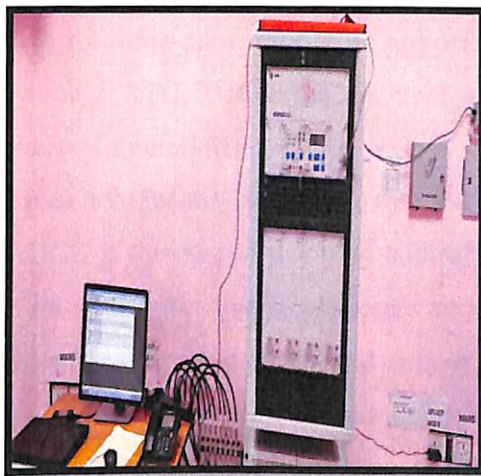
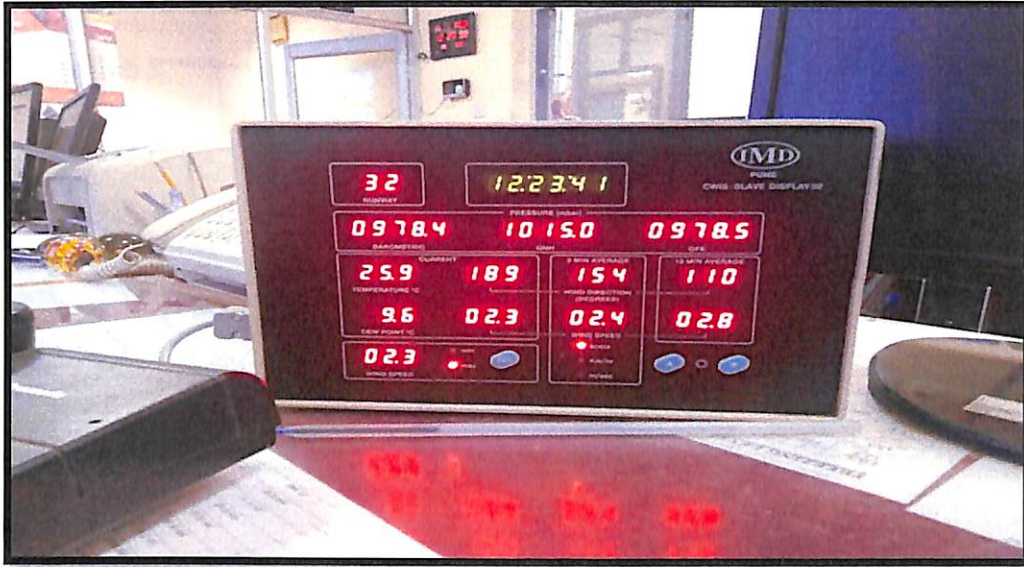


Figure 12 ILS equipment and display monitor

**2-Meteorology(MET)real time information**-Technological and digital advancement has made the job of ATCO's easy in terms obtaining real time weather updates. A critical data required by pilots from time to time for safe landing.



**Figure 13-MET Display**

**(B) AIRPORT OPERATIONS:-**

It comprises of **AOCC i.e Airport Operations Control Centre**-A standalone Control centre for effective resource allocation at an airport. Effective resource allocation is critical both in terms of Airlines and ATC. Better the resource allocation better the time management and better is the efficiency of operations.

Resources here means-Boarding gates, Parking bays, Carousels, Check-in counter

The AOCC is the central database control ,coordination and command centre for the whole airport which integrates the diverse processes and activities relating to the three major operational areas — passenger, baggage and cargo, and aircraft. It is the nervous system of the airport in the sense that it gathers, processes, generates and disseminates all kind of information; in the epicentre of the activities of the centre, the airport collaborative decision making and action initiation , relevant to planning and real-time data resource management and smooth airport operations.

It serves the role of supporting hand to Air traffic controllers for smooth airport operations and safe landing and departure.

The data is fed electronically using a software and a video wall displaying the real time flight data gets updated from time to time. The same video screen is given to ATC which helped them to know well in advance the parking bays without even looking it physically from the tower. The same

information is conveyed to pilots. A time managed airport operations is the critical factor for the success of an Airport.

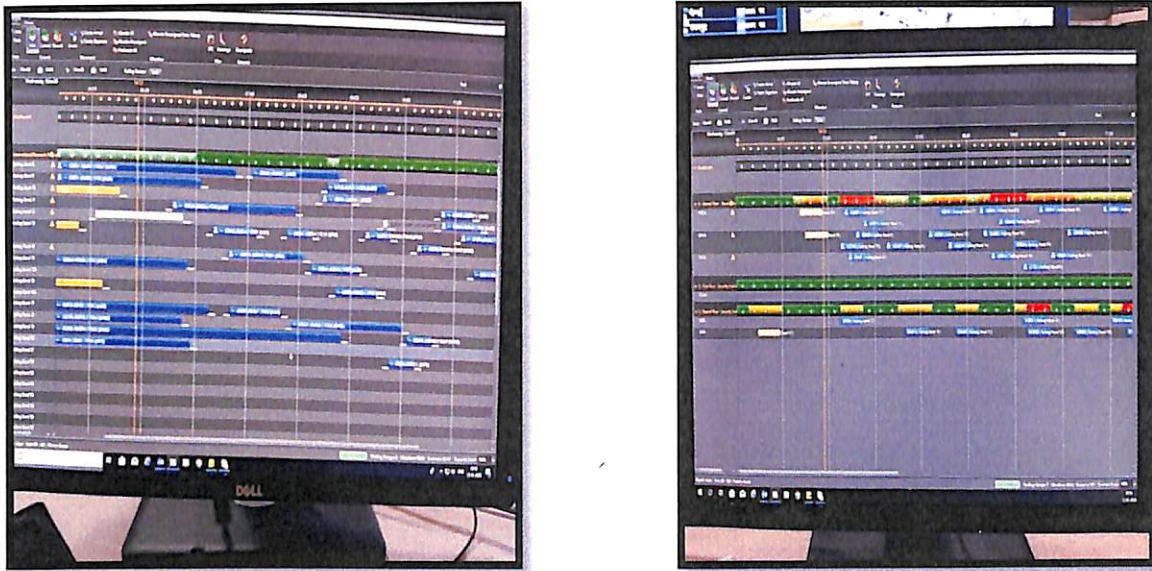


Figure 14 Resource allocations by AOCC

**FLIGHT INFORMATION DISPLAY SYSTEM (FIDS):-advertisements and earn revenue**

Connected via server and controlled by software, the system is loaded with real time updated flight information.

It is helpful for passengers as it provides real time data of arriving and departing aircraft timing and related resource allocation data.

Without the intervention of human presence real time data is available to passengers in no time.

At Jaipur International Airport there are 55 FIDS available throughout the airport acting as source of real time flight updates. It is also an important facilitation service which is mandatory to provide to passengers



Figure 15-FIDS display

## **(II)-STAKEHOLDERS AT JAIPUR AIRPORT:-**

### **(A) AIRLINES:-**

The commercial airline industry is undergoing its greatest shift since Open Sky policy in India(1990). Digital transformation and other major economic evolutions, for instance the quickly growing competition from new low-cost airlines, are pushing the major airlines to increase their efficiency and to hold their grasp on the aviation market in India. Since the adaptation of various digital trends can potentially increase efficiency, digitalization is particularly relevant for the commercial airline industry.



Figure 16-Airlines towards digitalization

### **Airlines working at Jaipur International Airport:-**

1-Indigo	5-Oman Air	9-Air Asia X
2-Spicejet	6-Air Arabia	10-Alliance Air
3-Go Air	7-Thai Smile	11-Air India
4-Air Asia India	8-Thai Air Asia	12-Air India Express

### **One by one we will see the digital forms used by Airlines at Jaipur International Airport:-**

#### **1-Mobile App:-**

There is a growing demand for air travel, driven by an expanding middle class in emerging markets, the expectations of millennial, and cheaper airfares. Key to capturing this opportunity will be adapting utilizing digital technology to meet consumer expectations.

The rise of 'the digital consumer' is prominent in the aviation sector, where a significantly greater proportion of customers have an online presence compared with other industries, companies are focusing on engaging with customers through effective online purchasing journeys, social listening, feedback apps and links with other players in the aviation, travel and tourism



industry. Airlines, for example, are using customer apps not only to enable online check-in and provide virtual boarding passes, but also as immediate customer feedback channels, and as tools enabling direct communication from the business - including real-time updates on flight delays and to prompt passengers to proceed to the boarding gate.



GO AIR MOBILE APP



AIR ASIA MOBILE APP



SPICEJET MOBILE APP



AIR INDIA MOBILE APP



INDIGO MOBILE APP

Figure 17-Airlines Mobile Apps

Real time updates and automated messages transmission helps the airlines to be in touch with passengers for better consumer experiences. All kind of solution is just at ONE FINGER TOUCH.

## **2-Self Check-in Kiosk machine/Common user self service(CUSS):-**

These are very useful for passengers who is travelling with Hand baggage only. The passenger don't have to wait in queue of Check-in counter as he can just type his/her PNR into the automated and digitalized system and in seconds he is issued with a boarding pass by the machine. This also helps to decrease the dwell time a passenger spends in getting a access to boarding pass. This helps to save the time of passenger as well as airlines.



Figure 18- Self Check-in Kiosk

This system also work on network services provided by SITA(Network provider).The sytem use the real time data and fetch the information from the database and provide the Boarding pass and helps to do Check-in process smoothly.

At present there are 25 Self Check-in Kiosk at Jaipur International Airport.It has reduce the passenger queue formation and also saves time.

Common user Terminal Equipment(CUTE)At present there are 26 Check in counter available at Airport for fetching the passenger details using service of advanced network provider SITA(**Société Internationale de Télécommunications Aéronautiques**) and issuance of boarding passes.

## 2-Baggage handling and reconciliation system:-

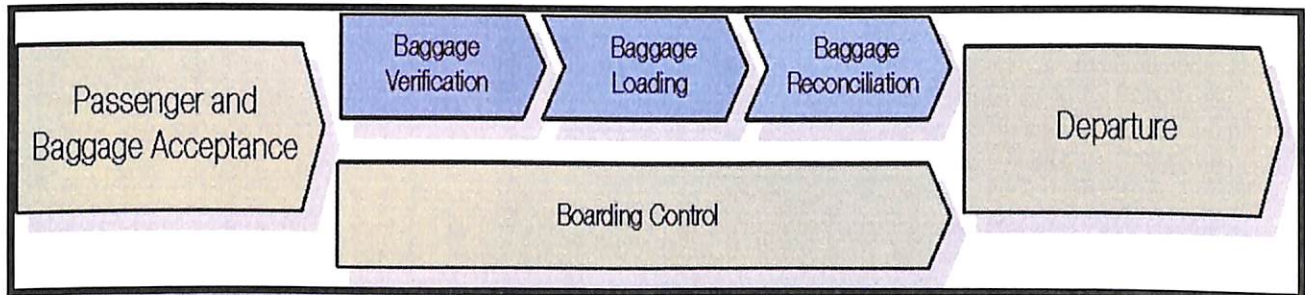


Figure 19- Flowchart of BHS and BRS

### (A)Baggage handling system (BHS)

It is a type of conveyor system installed in airports that transports checked luggage from ticket counters to areas where the bags can be loaded onto airplanes. A BHS also transports checked baggage coming from airplanes to baggage claims or to an area where the bag can be loaded onto another airplane.

At Jaipur International Airport, **Inline baggage system(ILBS)** has recently commissioned after final testing in December first week.

This facility helped in reduction of queues which otherwise was seen at the checked baggage scanning machine in the Departure Area. The baggage are scanned so as to detect any unauthorized or banned item which can act as dangerous goods and cause a safety concern to aircraft. As in the past various accidents had occurred due to carriage of dangerous goods which caused loss to life and property.

Due to activation of this facility the queues in the departure area is less now and the passenger dwell time in reaching to boarding gate is reduced now. What a passenger need to do is just take the boarding card from the counter and drop the baggage at the conveyor belt at the ticket counter and just proceed to Boarding gate instead of waiting for baggage to et scanned.

The In-line Baggage System is digitally monitored by a control room where the working of machine is controlled automatically by preloaded software programming. The faults and current working condition of ILBS can be monitored by Computer .

**Before ILBS-Long queues,cause of late arrival at check-in counter**



Figure 20- View Before ILBS commission

After ILBS is commissioned at Jaipur Airport-Less queue and less time spent at Check-in Counter



Figure 21-View after ILBS commission

**(B) Baggage Reconciliation System:-**

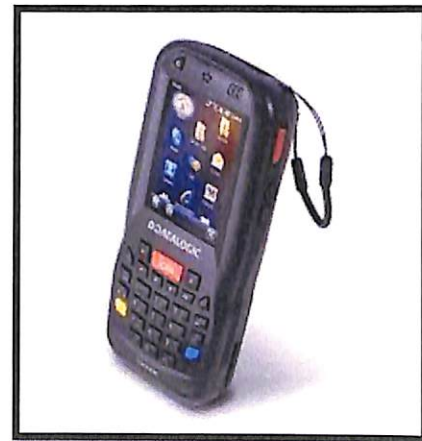
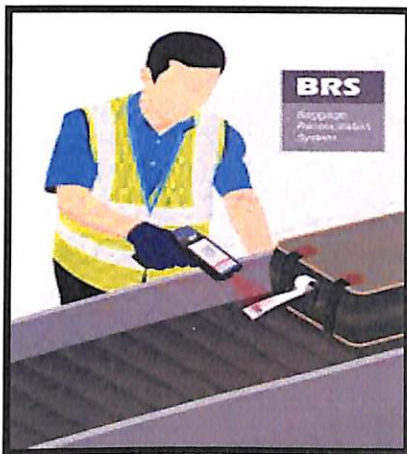


Figure 22- BRS device

This system use computer-generated RFID tags and readers to track baggage location within the airport, at the gate, and on the plane, and match all loaded bags with passengers. A-BRS uses wireless laser barcode scanners to read printed baggage tags.

The service network provider is SITA(Société Internationale de Télécommunications Aéronautiques).It helps to match the data in real time.

It helps to verify efficiently whether the luggage can be positively matched to a verified boarded passenger before it is loaded onto a departing aircraft. The interface displays baggage status in real time and allows users to audit information.

A BRS will keep track of every movement of every luggage and container in the system. The system is highly efficient because it takes full advantage of host lines already in place for passenger departure control and uses Bag Link gateways to send and receive baggage messages in standard IATA format.

### **3-Boarding Pass Scanner:-**

A **boarding pass** or **boarding card** is a document provided by an airline during check-in, giving a passenger permission to enter the restricted area/Security Hold Area (SHA) of an airport and to board the airplane for a particular flight. At a minimum, it identifies the passenger, the flight number, and the date and scheduled time for departure.

Boarding Pass scanner read the bar code on the Boarding pass(provided by IATA) at the boarding gate and verify the passenger details and helps to find airlines whether correct person is boarding the plane or not.



**Figure 23-Boarding pass scanner**

It also helps to find whether the number of checked in passengers has actually boarded the plane. If not the announcements are made or automated messages are sent to the passengers. This all is done within no time with the help of advanced technology and digitalization.

It saves the time of airlines as instead of finding details of passengers and matching it ,all the database in connected by central server which verify the information of check-in passenger at the boarding gate.

Regular aircraft maintenance is an essential contributor to the safety of passengers. In addition to the optimization of MRO (Maintenance, Repair and Overhaul) processes, aircraft manufacturers will benefit from ongoing digitalization developments. Predictive Maintenance could reduce the risks of accidents.

In addition to cost reductions and flight efficiency, there are improvements within flight safety in the with advancement and digitalization.. For example, the enhancement of anti-collision systems will mean that they can be used not only during actual flight operations, but also to facilitate navigation at the airport facilities. Especially during foggy weather conditions, this could be very beneficial.

Recent innovations enable aircrafts to calculate and identify the most efficient flight routes. This leads to enormous cost savings for airlines by reducing fuel consumption while simultaneously protecting the environment.

### **(B) CONCESSIONAIRES:-**

With the growing advancement, technology and digitalization, people are doing cashless travel.All they need is a Mobile with an internet connection or a credit/debit card.

Numerous type of Mobile App providng effective security features has been developed for online payment. Any item can be purchased at an airport with a click of a button.

Concessionaires are also practicing paperless bill .The bills are being sent to customer e-mail id. Using this the environment is being protected and bills can saved for future reference.

The digitalized era is proving boon for businesses at Airport.



Figure 24-Mobile digital payment Apps

## (III)-GOVERNMENT AGENCIES AT JAIPUR AIRPORT:-

### (A)-IMMIGRATION:-

The role of immigration department is Effective Border control. It is the responsibility of Immigration department to verify the authenticity of the document of the foreign/domestic travelers visiting India. Their role further extends to block the way of illegal immigrants as they can be a source of dangerous activities in India. India being a ultra sensitive nation needs to be careful from outsiders and only way is Border Control.



Figure 25-Digitalized immigration facility

The need of digitalization was felt in Immigration department in year 2008 when the Mumbai attack took place popularly known as 26/11 Mumbai attack. The main helping hand David Coleman Headley was spying target points for Lashkar e-Taiba.

During that time the immigration department doesn't have central server so as to keep the record and track the foreign national entering India. It was simple paper, pen and an application form. After the attack happened the need of effective tracking was felt. A need of Central server was felt where all data and tracking information of foreign travelers can be retrieved sitting at any location.

To strengthen the Immigration system at Jaipur International Airport , an advanced program viz. "Mission Mode Project on Immigration, Visa Foreigners' Registration and Tracking (IVFRT) has been undertaken by MHA/BoI, with the assistance of National Informatics Center(NIC). Under the project, all the Indian Missions, Immigration Checkposts (ICPs), FRRO/FRO offices are being computerized and networked to develop a secure and "(BUREAU OF IMMIGRATION) integrated delivery framework to facilitate legitimate travelers.

At Jaipur International airport ,Immigration system is effectively controlled by a **central server** keeping database of all Visa applied travellers, maintained by NIC department at New Delhi.All data can be tracked using central server and information about foreign traveller's location can be traced from time to time.**e-Visa facility** is also available at Jaipur International Airport. Persons holding e-Visa will be allowed to enter into India only through the designated international airports (28) and out of all of them,one is Jaipur International Airport.

Also **e-gates** have been installed where the passport is scanned by the Immigration officer .After scanning the fingerprints(Biometric) and information of Passport with the database of Immigration, if found correct and legitimate then e-gates are opened and entry to Indian Soil is granted within no time .Otherwise the passenger is deported and if found suspicious with the information that is contradicting with the database is taken to inquiry office established at Airport.

This way digitalization is not only helping in providing the passengers a **hassle free movement** avoiding long queues but also helping in keeping the **security** of the Nation uptight and **efficient Border Control**.

#### **(B)-CENTRAL INDUSTRIAL SECURITY FORCE(CISF):-**

The Airport security market is witnessing a revolution, driven by adoption of new screening technologies and intense digitization of security processes, mainly in passenger and baggage screening.

The passenger spends money in Air transport so as to save time and hassle free movement.Airport being the ultra sensitive mode of transportation is deployed with CISF to provide security cover at sensitive access points.

The critical factor for success of air transportation is Time management. It not only applied to airlines, facility provider Airport operator but also on Security System managed by CISF.

It is not possible to open each and every passenger baggage or any baggage for random inspection as the passengers traffic is increasing day by day in huge number.

Therefore here comes the role of digitalization and advancement.



**At Jaipur International Airport, the two digitalized mechanism used by CISF are:-**

**1-X-ray baggage system :-**

Checks baggage for any unauthorized/banned/illegal item to carry in hand baggage is checked using X-ray machine which interpret the images of items in baggage to compare with the data base stored in software.

With the latest advancement, computerized systems are being used to scan items and verify whether the baggage can be cleared or to hold for further inspection.



Figure 26-X-ray machine scanning process

**2-Explosive Trace Detector:-**

It is used for random inspection of check-in baggage for explosives/Narcotics in Departure Area. CISF personnel randomly select any passenger baggage for this scanning. The sample test piece is rolled over the baggage and placed in the computerized machine which compare the sample with the preloaded database. The software checks the sample and compare the value with standard value.

If any sample is showing positive result then the baggage is checked and the owner of the baggage is taken for inspection.



Figure 27-ETD machine

## **Chapter 3:-RESEARCH DESIGN, METHODOLOGY AND PLAN**

### **3.1 Data Sources :-**

The approach of this study is primary and secondary data based analysis. The primary data has been collected via Survey questionnaire in hard copy format .Secondary data is collected from different sources from official websites, Wikipedia and scholarly journals.

Other reports from AAI airport, ATC Jaipur data, and ICAO publications and many other institutional are also collected for supporting the literature references. Literature is also collected from Indian Aviation Academy, New Delhi veteran experts presentation and study materials.

Altogether relevant books, journals and periodicals, research papers, published thesis, articles, financial dailies, websites, are also consulted by the guide for better referencing.

### **3.2 Research Design :-**

A convenience sample is defined as non-probability sampling method where the sample is taken from a group of people easy to contact or to reach. It is also known as grab sampling or availability sampling. There are none other different criteria to the sampling method except that people be available and are willing to participate.

The sample was selected at Jaipur International Airport. The sample was divided on the basis of impact of digitalization in professional fields at the airport. It comprises of Airlines, Airport Operator and its associated department.

The sample was also chosen from travelling passengers of different age and is travelling due to different reason. The impact of digitalization on their air travel was studied.

### **3.3 Survey Questions :-**

The survey question was designed for convenience sampling(sample size-80-100)for:-

- a)Passengers
- b)Airlines
- c)Airport operator
- d)Associated department of Airport Operator like ATC.

**Interview Procedures:-**

A sample format for conducting survey was taken out in a hard copy print out in the form of pamphlet.

The same is distributed to random samples at different point of time.

Main emphasis was given on management of Airport operation at Peak time. It is well known fact that airport efficiency is calculated on the basis of smooth management of Airport Operation at Peak hours.

**Peak hour at Jaipur International Airport is :**

Morning-0600-0800 IST

Evening-2030-2230 IST

The sample format is simple and easy to fill. A standard **questionnaire** is used so as to provide quantifiable answers for a research topic. These answers are relatively easy to analyze.

Mostly questions are open ended questionnaire which are easy to answer and less time consuming.

Survey questioned are designed in easy , logical and sequential format so that analysis of result can be made without any difficulty.

**Sample questionnaire is attached in the Appendix. Kindly refer the Appendix-page- 37-44**

The impact of digitalization based on the experience of facilities used at airport by different user is analyzed and the need for scope of improvement is assessed.

## **Chapter 4: FINDINGS AND ANALYSIS**

The infusion of digital technologies in aviation management and airport operations has had a positive impact for all stakeholders and associated agencies at airport..

The internet has taken by storm all fields of technological advancement. We are living in the era of digital transformation where one technology is ready to be replaced with more advanced and superior digitalized technology.

Whenever it comes to technology all we want is NEW AND LATEST ONE.

**Considering the findings at Jaipur Airport and after researching and analyzing the result of survey Questionnaire the quality assessment of all findings is given below:-**

1-With the advancement and sophistication in digital technology after the advent of Internet the interaction with the general public is not only accessible 24\*7 but has become two –way communication leading to better customer satisfaction.

All airlines at Jaipur International Airport have developed Mobile App of their respective airlines. The data relevant to the same has already been shown in the report.

They are now well connected with the customers providing them real time data and satisfying their queries and redressing their grievances online itself at any place at any time.

With non-aeronautical revenues becoming a driving force and passengers an increasingly important customer segment, airport digital marketing comprising websites, e-commerce ,mobile application, social media sites is growing more sophisticated.

With advertisement at Social media sites and promotional offers the airlines are creating lucrative offers for passengers which are hard to resist thereby satisfying passenger requirement along with earning profit.

**Digitalization has positive and effective impact on in-terminal operations :-**

a)With the installation of various facilities at Jaipur Airport such as CCTV(Closed circuit television),FIDS(Flight Information display System)X-ray machines ,ILBS (Inline baggage system) the life of passengers, airport professionals, security staff etc has become easy and smooth.

b)The most important trend is the “self-service” airport concept, which is concerned with the digitization of every touch point on the curb to gate passenger journey.

It is the new concept that “Self-service Airport” is part of the wider “Smart Airport” concept, which looks at the impact of digital technologies on all internal and effective passenger-related processes in the capacity constrained airport environment.

At Jaipur Airport there is a facility of **self check-in Kiosk** which are positively impacting the overall experience of passengers, airlines and terminal management.

c)**Baggage handling and reconciliation system** is effectively working at Jaipur International Airport and Airlines are finding it use in efficient way meting the deadline of Aircraft turnaround time along with verifying the authenticity of luggage of correct boarded passenger and loading the luggage in correct aircraft with the help of RFID sensing digital technology.

d)**Feedback devices commonly known as HAPPY KIOSK**15 nos. are installed at different points which are easily accessible to passenger at Jaipur airport which are connected using Internet and central database.

They are useful for providing real time feedback to the airport management and action can be initiated well in time as the feedback below satisfactory level is received via automated messages to the concerned official looking after the passenger facilitation.

A monthly report is generated and compared with last month feedback performance and action taken report and compared data is then used further to improve facilitation.

e)**Lost and found portal** has been developed by IT team of Airport Authority of IndiaCHQ,New Delhi which helped the passenger in searching online their lost items at Jaipur Airport. This has reduced human interference and all the process and instructions to be followed are well in advance written there.

Now Airport terminal manager, Jaipur Airport instead of focusing attention on phone calls by passengers querying about lost items can divert his attention to implement better passenger facilitation and helps in improving the Airport standards.

f)Ministry of Civil Aviation has developed **AIR SEWA Mobile App** which is directly responsible for redressing passenger Grievances and providing Airline, Airport data in real time. At Jaipur Airport one can find **Air Seya Kiosk** also for retrieval of flight data or airport information or reporting grievances. The best part is common passenger can scale his grievances directly to the ministry and in research at Jaipur International Airport it is seen that effective action is being taken once the complain is being transferred to Jaipur Airport in a given time frame..

Various passengers e-mail showed appreciation and encouraging words once their grievances are rectified within specified time frame.

The connectivity of common man with the ministry is made possible with the help of digitalization. Such experiences are increasing customer satisfaction as aviation field is service field where business profit is dependent on customer experiences at airport and his overall satisfaction. More the customer is satisfied more is the chances of his reusing the facility of the airport.

3-A wave of automated technologies is helping make air traffic control operations safer and more efficient.

An ATC tower window serves as main source of information to controllers while they give clearances to landing and taking off aircraft or taxiing to-from the stand. Although obstacles such as poor visibility, poor weather conditions, and runways orientations that stretch into the whole operational areas can make their job even more stressed.

Controllers at Jaipur International Airport therefore are using radar displays to enhance their awareness. Automated visual and aural warnings as those provided by a conflict alert system, let the controller know automatically if an aircraft or vehicle is attempting to enter a runway when the same is already occupied.

This is helping them to take preventive action well in advance and provide safe environment for Airport operations in conformance with ICAO standards.

A detailed report of all the facilities has already been provided in the dissertation report.

At Jaipur International Airport ,in air traffic control (ATC), a series of automated solutions are deployed to provide controllers with more accurate information which is helping increase visibility at airports, and enhance communications with pilots. Communication, navigation and surveillance tools help ATC controllers to fulfill their primary responsibility of preventing collisions between aircraft.

Also providing real time data and satisfying passenger queries at the touch of a button thereby increasing customer satisfaction is also helping Airport in getting highest ASQ rating. The ASQ(Airport service quality) rating of Jaipur Airport has significantly improved from last year with the advent of few digitalized facilities at airport(4.43 to 4.73)

## **Chapter 5: INTERPRETATION OF RESULTS**

**The concept of digital transformation is defined by three separate but interdependent drivers:**

Digitization, Connectivity and Data.

Digitalization based technologies are creating abundances opportunities for the smooth optimization of air travel. Being a service based industry ,not only from customer perspective point of view but digitalization or digital transformation is becoming an critical need for players in aviation industry. Increasing profitability by optimizing flight performance is just as important as improving the customer experience along with safety.

**The benefits to airport management can be summarized as follows:**

### **Process Optimization:-**

- ◆ Enabling an airport’s Business Process Improvement (BPI) team to identify problem areas, measure performance and take necessary actions
- ◆ Allowing both short and long term planning
- ◆ Enhancing employee productivity
- ◆ Delivering cooperation amongst stakeholders
- ◆ Cost cutting

### **Business Model innovation**

- ◆ Enhancing the creative campaign process by allowing the development of unexplored non-aeronautical revenue streams as the non-aeronautical has become the commercially significant for airport development and operation .
- ◆ Enabling airlines in providing airline passengers in order to offer new services to the right people at the right time and at the right price.

### **Customer Experience improvement**

- ◆ Improvement through process optimization and business model innovation, but can be targeted specifically only through digital transformation
- ◆ Allows airports to develop unique services and facilities to facilitate the passenger journey through each and every airport service access point

Future preparation of aviation industry is crucial. If we fail to keep up with the standard of competition and trend, we will be left behind. New generation innovative ideas, trends, technology and digital advancements are waiting just around the corner.

In comparison to other industries in respect of digitalization adoption airports are considered lagging behind. This is mainly due to their traditional business to business model, cost cutting, incorporation of IT infrastructure into main streamline operations and heavy reliance on aeronautical revenues instead of exploiting non-aeronautical revenue.

**It is well known fact that step-changing digital transformation in aviation is still at a very early stage. Progress in terms of significant level of transformation has been relatively lethargic and slow due to:-**

- ◆ The unwillingness of management to modify traditional business models and processes adding fuel to the misconceptions and uncertainty of digital transformations;
- ◆ Varied process and varied stage timing for which management is not prepared to wait.
- ◆ Fails to understand Gap analysis between required and existing digital facilities requirements leading to late implementation and fear of lack behind.
- ◆ Resistance to the culture change and implementation of new initiatives even in non-sensitive areas.
- ◆ Traditional continuation of annual planning cycles.
- ◆ Cost structure and financial management.
- ◆ Difficulties in transplanting digital concepts into people's day to day lives

“Airports are contending with increasing passenger numbers and digital technology should help in terms of airports' ability to handle enhanced capacity and in terms of operational flexibility. These factors should help to improve passenger experience as the process becomes much more seamless, which will in turn help to drive revenue generation for airports. This will involve airports investing in digital technology in the short term, but the longer-term benefits as the report outlines, are manifest”.(John, 2018)



Besides advantages like business operations optimization, there are of associated risk with the concept of implementation of digitalization.

In case of Air traffic controller digital system:-

Automation and centralized data server connectivity although is providing benefits to aviation industry but airport can also face biggest risk i.e Automation failure..Although redundant data servers and data bases with redundant connectivity are provided but in worst to worst scenario our Air traffic controllers should be trained and ready to operate with minimal facilities available digitalization and safety nets should be there without fail for in future worst scenario.

Total dependency on digitalization is not the solution for effective operational requirement. One should be ready for any consequences. When it comes to aviation Safety can't be compromised even it comes at the cost of decommissioning of any digital facility.

A great emphasis is being given on non-aeronautical revenue but a airports could for instance, experience difficult times because of their non-aviation earning framework .Major part of revenue comes from commercial and non-commercial vehicle parking facilities.

Good railway connections and a wide range of car-sharing offerings could reduce the number of parked cars at the airport and lead to huge revenue losses.

Sometimes real and physical human interaction is felt e.g during customer care communications. Today's EVA(Enterprise virtual assistant) are being operated 24\*7 basis which only answer the preloaded query replay related to airlines.

For effective communication and grievance redressal human factor intervention is needed. Humans cant be totally dependent on machines.

“The aviation industry is turning to digital transformation and customer experience to stay ahead of the competition and attract new passengers. The dominant role of new digital technologies as levers to offer passengers a comfortable and satisfying journey is key to this transformation. However, the current (mis)understanding of digital transformation frequently results in a linear transition of complex and often inefficient processes into the digital arena”.(Georg, 2017)

## **Chapter 6: CONCLUSIONS AND SCOPE FOR FUTURE WORK**

In summary, one can conclude that the **digitalization or digital transformation** is gaining importance for the effective operation of flights. It not only enhances the operational efficiency of airlines, but also have environmental advantages along with the keeping the critical element of flight "SAFETY" intact and uncompromised. The advancement of digital advancements has already left footprints in the aviation sector. (Joel, 2017)

Airports are impacted by the digitalization with the help of Internet of Things (IoT) in three different areas:

- Systems
- assets

### **System connectivity:-**

Through the evolution and implementation of Airport Collaborative Decision Making (ACDM) concept.

### **People connectivity:-**

Through Real time data updation and facility provision to improve process flow and operational efficiency. Two way communication acts as communication binder between user and service provider.

### **Assets Connectivity:-**

Various assets are connected by central server, internet of things and digitalization.

Considering the today's scenarios with the advent of smart technologies time has come to make the Airport even smarter one.

Structural planning, financial management and digitalized technological help can bring us closer to the formation of Smarter Digital Airport where in no time all kinds of facilities, benefits, flexibilities etc can appear in front of us.

### **The same can be achieved by following ways:**

- 1-Setting your requirements and criteria and selecting suitable IoT solutions.
- 2-Determining the organization technical capability and requirement of outsourcing if needed to implement chosen IoT solution.
- 3-Assess current organization readiness to implement solution in terms of cost, infrastructure, long term benefits etc.
- 4-Build a roadmap to narrow the gap between expected and implemented solutions.

Considering the future scope of Jaipur International Airport , after discussions and research the following areas required attention in five major area:-

#### **Airport operations optimization:-**

- ◆ by implementing self-service baggage drop zones;
- ◆ e-gates for boarding –minimal ground staff intervention .(P.E, 2019)
- ◆ Implementation of Digi yatra which works on facial recognition and minimal human intervention air travel journey i.e hassle free access from curb to boarding gates.(P.E, 2019)
- ◆ Fast tag parking management
- ◆ Big data and analytics to optimize passenger flows, allowing them to process larger numbers and also provides information for effective decision-making.

#### **Air traffic management optimization**

- ◆ In CNS( communication, navigation and surveillance) along with automation systems like the introduction of digital flight charts use of e-flight strip
- ◆ Fully exploitation of AIMS(aeronautical Information management System)portal is required.
- ◆ Virtual modeling and simulation allowing better resource allocation to cope to peak hours. It will also allow them to foresee the impact of flight delays and make optimal use of the runway.

#### **Maintenance, repair and overhaul optimization**

- ◆ Can be achieved through predictive maintenance using more advanced digital technologies minimizing the fault rate and reducing maintenance time thereby minimizing idle time of aircraft;
- ◆ Effective central maintenance management system for Airport maintenance. (SINGH VANDANA, 2019)

#### **Enterprise applications optimization**

- ◆ with the implementation of equipment and asset tracking for effective operational efficiency.

#### **Airline operations optimization**

- ◆ Adoption and introduction of fuel efficiency management system and efficient engine aircraft.

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## APPENDIX

### APPENDIX 1.1- Sample Questionnaire for:-

- Passengers
- Airlines
- Airport operator
- Air Traffic Controller

### APPENDIX 1.2- General

- ◆ Graphical chart of traffic movement at Jaipur Airport



## Impact of Digitalization on Aviation Industry

Dear Passenger,

As a part of researching on the impact of digitalization on aviation industry. Passenger convenience and satisfaction plays an important role in aviation industry.

Therefore, I, kindly ask you to take some time to fill out this brief questionnaire.

The survey is conducted to study the impact of digitalization on air travellers.

Once completed please return the questionnaire to the interviewer before your departure. Your views regarding your experience will be kept confidential and it is very important to us.

<b>AIRLINE</b>	<b>DESTINATION:-</b>	
<b>AIRPORT-</b>	<b>FLIGHT NO.-</b>	<b>BOARDING GATE-</b>
<b>DATE OF JOURNEY(DD/MM/YY)-</b>	<b>TIME OF DEPARTURE(IST)-HRS: MIN</b>	
How did you booked your ticket? <input type="checkbox"/> ONLINE <input type="checkbox"/> TICKET WINDOW WHICH ONE YOU FIND CONVENIENT?-		
Did you get the time to time automated messages in form of instructions for air travelers from airlines to make your journey hassle free ? <input type="checkbox"/> YES <input type="checkbox"/> NO		
What mode of transportation you used till Airport? <input type="checkbox"/> TAXI <input type="checkbox"/> BUS <input type="checkbox"/> RENTAL CAR <input type="checkbox"/> METRO/TRAIN		
Did you use Mobile App for Booking of Ground transportation? <input type="checkbox"/> YES <input type="checkbox"/> NO		
Which facility did you use at Airport for Check-in? <input type="checkbox"/> SELF-KIOSK <input type="checkbox"/> CHECK-IN DESK <input type="checkbox"/> WEB CHECK-IN		
Which facility do you think saves time while for Check-in? <input type="checkbox"/> SELF-KIOSK <input type="checkbox"/> CHECK-IN DESK <input type="checkbox"/> WEB CHECK-IN		

Are you Frequent flyer from Jaipur Airport?  YES  NO

If Yes, then Did you realize that with the commission of ILBS(In line baggage system)has reduced check-in time at Check-in Counter?  YES  NO

Did you get the updated flight Information from FIDS(Flight information display system) at Airport?

YES  NO

Do you think CCTV is useful at Airport?

YES  NO

Do you think with the advanced technology and digitalization, even immigration process using biometric and e-Gates has become much easier and takes less time?

YES  NO

Did you purchase or eat anything at Airport?

YES  NO

Which mode of payment you find it much easier?  DIGITAL USING MOBILE

Did you think Digital advancement has made impact in aviation services ?

YES  NO

What other mode of advanced and digitalized service you want at this Airport?

.....  
.....

**Thank You for Your Precious time!!**

**Name:-**

**Age:-**

**City:-**

**Country**





Which digitalized facilities are available at the airport that are useful for airline operations?  
.....

Do you think you feel connected to passengers with the help of digitalization and help in settling their grievances and Queries?  
 YES       NO

Do you think CCTV is useful at Airport?  
 YES       NO

Does the newly installed digitalized ILBS has reduced the queue and waiting time of passengers at check-in counters?  
 YES       NO

Using the digitalized facility at airport like BRS, Self check-in Kiosk, ,Boarding scanner you are able to maintain Turn Around Time of Aircraft for both domestic and International Flights?  
 YES       NO

What other mode of advanced and digitalized service you want at this Airport?  
.....  
.....

**Thank you for your precious time**

Name:- .....

Age:-.....

Years of Experience in Airline:-.....



IMPACT OF DIGITALIZATION ON AVIATION INDUSTRY

Dear Airport Operator,

As a part of researching on the impact of digitalization on aviation industry. Passenger convenience and satisfaction plays an important role in aviation industry. Role of technology and advancement is recognizable in airport management.

Therefore, I, kindly ask you to take some time to fill out this brief questionnaire.

The survey is conducted to study the impact of digitalization on airlines.

Once completed please return the questionnaire to the interviewer before your departure. Your views regarding your experience will be kept confidential and it is very important to us.

Thank you.

OPERATIONG AIRPORT

NUMBER OF FLIGHTS OPERATING DAILY-.....

DATE(DD/MM/YY)-  
.....

FLIGHT MOVEMENT 24\*7?  
 YES  NO

TOTAL DESTINATION SERVED? .....

NUMBER OF AIRLINES WORKING?.....

DAILY PASSENGER

Is your Airport International Or Domestic?  
 INTERNATIONAL  DOMESTIC  BOTH  ONLY

Do you think Digitalization facilities at airport helped you to win World's best Airport in category of 2 to 5 million passengers per annum for year 2015-16 ?  
 YES  NO  MAY BE



## Impact of Digitalization on Aviation Industry



Dear Air Traffic Controller,  
 As a part of researching on the impact of digitalization on aviation industry. Time management and safety of Aircraft operations is vision of Air Traffic Controller. Role of technology and advancement is recognizable and plays an important role in flight safety.  
 Therefore, I, kindly ask you to take some time to fill out this brief questionnaire.  
 The survey is conducted to study the impact of digitalization on airlines.  
 Once completed please return the questionnaire to the interviewer before your departure. Your views regarding your experience will be kept confidential and it is very important to us.

NAME:-

DESIGNATION-

NUMBER OF FLIGHTS OPERATING DAILY-

DATE(DD/MM/YY)-

AIRPORT SERVING-

FLIGHT MOVEMENT 24\*7?  
 YES       NO

HOW LONG YOU HAVE BEEN WORKING AS AIR TRAFFIC CONTROLLER?.....

What Controlling position you are working on at present?  
 TOWER CONTROL       APPROACH CONTROL       AREA  
 CONTROL     

Do you think digital advancement has improved the safety of Aviation?  
 YES       NO

Can you guide the aircraft without digitalized equipments??  
 YES       NO

Digitalized Radar information display helps you to maintain safe distance between Aircrafts?  
 YES       NO

How often digitalization data and equipment is helping you with your work ?

Very Much                       Fair                       Hard to say

Do you think digitalization is helping you while you are on Channel in sharing congestion that could have come if digitalization is not there(like ATS work)?

YES     NO

Do you think technology and advancement dependency is beneficial or not?(if not why?)

YES                       NO

If No

Do you think AAI is going ahead with digital transformation for better Aviation Safety?

YES     NO

Are you trained and prepared for safe aircraft operation if the digitalized facility hampers for some time?

YES     NO

What other mode of advanced and digitalized service for better safety and smooth operation of Aircraft?

.....

**Thank you for your precious time**

**Name:-**.....

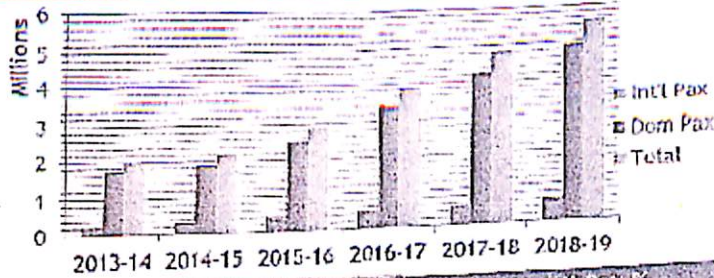
**Age:-**.....

**Designation:-**.....

1.2 PASSENGER TRAFFIC AND AIRCRAFT MOVEMENT AT JAIPUR AIRPORT

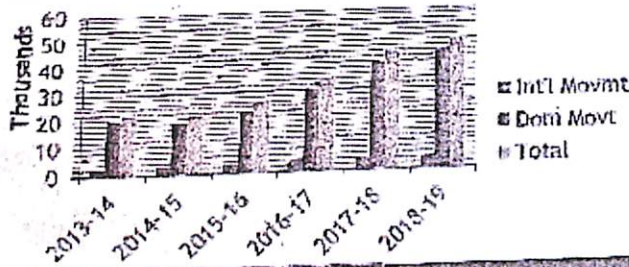
2. Passenger traffic: -

**Passenger Growth Chart**



YEAR	Dom Pax	Int'l Pax	Total	Growth Rate %		
				Domestic	International	Total
2013-14	1729200	268708	1997908	6.97%	14.22%	7.86%
2014-15	1871345	344960	2206305	8.17%	23.09%	11.04%
2015-16	2540451	309899	2850350	35.76%	8.96%	31.52%
2016-17	3551528	450184	3801711	31.93%	24.81%	31.04%
2017-18	4258647	525875	4784522	27.09%	16.20%	25.80%
2018-19	4915539	606013	5521552	15.45%	15.02%	15.37%

**ACFT MOVEMENT GROWTH CHART**



YEAR	Dom Acft	Int'l Acft	Total	Growth Rate %		
				Domestic	International	Total
2013-14	19900	2040	21940	15.74%	19.59%	16.05%
2014-15	18648	2735	21383	-6.29%	34.07%	-2.60%
2015-16	22772	2927	25699	22.11%	7.02%	20.17%
2016-17	30283	3722	34005	32.98%	27.16%	32.32%
2017-18	39819	4208	47861	31.49%	13.06%	40.74%
2018-19	43914	4155	49468	10.3%	-1.2%	3.4%

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**END!!**

