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NEXT G- LOGISTICS:UNMANNED AERIAL VEHICLES OR DRONES

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ABSTRACT:

The use of innovative technology in logistics firms has a significant influence on the mobility of goods and people and also on the performance of the logistics firm. Due to this growth of technology and globalization it has become mandatory for the firms to adopt with new generation technologies which help in gaining a competitive advantage and increased profitability. Earlier the Unmanned Aerial vehicles or drones were used only in developed countries and in India drones were most commonly associated with military operations. With the development and advancement in technology, better integration, cheaper and small sensor and ease-of use options, tools are used for various applications. Use of drones has become a primary resource to acquire remotely- sensed GIS data. The main objective of the research paper is to understand the various characteristics and applications of this emerging technology of UAV s or drones. The aim is to explore the applications and usage of drones not only in Developed countries but also in India. To understand the various challenges in using unmanned Aerial vehicle.

Keywords: Unmanned Aerial Vehicles or Drones, Innovation, Information technology, Applications

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INTRODUCTION

As the world of technology opens up and mankind started expecting benefits in terms of reduced cost, speed and accurate delivery solutions which are a major cause of logistics innovation for competitive advantage. In today‘s world the realization and need of deliverables are the main focus areas.

With the fast growing economy, the demand for logistics services has been growing significantly not only in India but globally. The implementation of new innovative technologies has shown a positive impact on the growth in logistics sector. Technology has given wings to logistics firms. If the new technology is implemented correctly, it helps in improving the agility of the firm, increases in operational and financial performance, reduces the cycle time, helps in achieving higher efficiency and helps in timely delivery of products to the customers.

(Koellinger, 2006)explains that with the adoption of new technologies over the past few years ,the logistics sector have made significant progress,particularly linked with internet and e-business. The need of innovative efficient and effective process in the logistics firm web is introduced and used mostly for commercial purpose through internet trading and Information technology.

Logistics firms have adopted the information technology in their business to enhance the operational efficiency (Cox & Ghonein , 2006). Information Technology has benefited the logistics sector in terms of increased efficiency ,effective business process, facilitating sharing of information quickly and bringing down barriers of geographical boundaries ,facilitates quicker, cheaper and more efficient communication ,data storage facilities, cost reduction hence , improving the firms performance by gaining a competitive advantage and increase in profitability and market share.

Technological Advances like data acquisition technology, Information Communication Technology, Warehousing and Transport technologies has a significant influence on the performance of the logistics firm. (Sullivan, 2005)explains the various applications of IT in different aspects of logistics. The use of IT in transportation sectors has various systems like

GSM/GPRS network, fleet management system, GPS satellite, real time fuel management system and more applications of IT in warehouse management,Cargo tracking system through GSM/GPRS like ECTS (Electronic Cargo tracking system), EDI,RFID which has helped in increasing the safety, security, reduction in paper work and moreover reduction in cost.

The use of technology has significantly increased the performance of the firms through the internet tools. (Lee & Wang, 2011)explains that the use of information technology has profound impact on logistics firms and also address the possibilities of reducing bull-whip effect in logistics management through various internet tools.

It is a need for the logistics firm to keep up with the continuous technological development taking place around the world as it directly affects the performance of the firm in terms of cost, security, clearance and service delivery. Logistics firm have a big challenge to grow and meet up with their responsibilities as the volume of transaction increases each day. So, in order to survive in this competitive world and to provide better and timely services to the customers, logistics firm has come up with new technological vehicles called drones or UAV's for the quick deliveries. It helps in making the process more speedy, clear and efficient.

An Unnamed Aerial Vehicles (UAV's) or drones are remotely piloted aircraft or systems. In the beginning of 21st century almost all developed countries has shown interest in UAV's. The usage of UAV's in developed countries is successful as UAVs represents a historic opportunity to exploit transformational capabilities of leading technology to support life services. The operational utility and technical visibility of UAV's has shown a remarkable performance.

(Tiwari & Dixit, 2015)explains that UAV s are more reliable ,economic, autonomous and easier to use technology with a great potential to conduct essential ground operations in a more efficient way .

USES OF DRONES IN DIFFERENT SECTORS

UAV s or drones earlier were associated with military or police operations for a long time mainly for shooting targets and for surveillance but with the advancement in information technology there is development of UAV s and is used in a variety of domestic and personnel applications

.The UAV s not only open up the gateway of new markets but will greatly broaden current markets .Earlier Geographical information System (GIS) system was used for capturing, storing, analysis and displaying the data .With the advancement in informational and computational technologies and advancement in processes with number of modern technologies GIS emerged as a broader term which is not only related with data collection but also as one of the high quality ,near real –time imaging and fast delivery has been raised as UAV s or drones. UAV s has become a primary source to acquire remotely sensed GIS data. The flight of UAVs may operate with various degree of autonomy, either under a remote control by a human operator ,or fully or intermittently autonomously, by on board computers .They range for short range systems to long endurance, high altitude systems that requires an airstrip (Brooke, 2012). The short range systems can be simple and hand operated.

In India, UAV s is intended for military usage and for civilians. Indian armywas first to acquire UAV s in 1990's and then the navy and air force following the same (Chakravorty, 2015). Indian Army is operating drones for over a decade .Due to suffering from the severe constraints and technical limitations as well as chronic delays India had to import the models from Israel .The current inventors of UAV s is relatively modest in the country. By the year 2017, it is expected by Ministry of Defence to execute five additional contracts for purchasing a total of 600 mini drones to be operated by units of air force, navy, army and police worth $12.5 billion. All the production related work is to be carried out in India, while the system (The Indian Military review (IMR) Media group, Nov25-26, 2013).According to 6 W research, India UAV market is anticipated to reach $421million by 2021.

In India UAVs have proved to be a technology enhancer and enabler for performing reconnaissance, air and maritime surveillance of boarders and intelligence collection .UAVs are force multipliers and their use is optimal when there is synergy among three services of armed . The UAV s were used during elections for the state legislation in the Bastar region –a district of the state of Chhattisgarh in Central India was considered a strong hold of the left wing Maoists (ESRI, 2013). Around six drones names as "Netra" owned by Central Reserve Police force were used for a 40,000 Km area and provided effective round the clock surveillanceand real time intelligence.

According to(Tiwari & Dixit, 2015)for the economic growth of developing countries there are four major factors Agriculture, Energy, Living standard and ability to mitigate natural calamities. UAV‘s can help in many ways to increase and to sustain the development of the country. UAVs has different types of application in developing countries as in agriculture, critical assistance during disaster management and relief operation, monitoring large rugged areas, tracking down criminals, disaster areas, observing forest fires, capturing and collecting all the 2D and 3D features with the use of photogrammetry, image processing and ground control points that are the last mile problem in modelling and visualizing the whole world.

Different types of sensors are used and each of these sensors has different types of applications. Various kind of sensors which are used are visual sensors, Multispectral, hyper spectral, Li Dar, GPS and Thermal. Drones are used to acquire remote sensed GIS data.UAVs are used in various GIS operations like:

Digital Aerial Imagery (DAI): With the technological development, drones are used to capture high resolution, georeferenced still photography of the study area. Acquired images can be successfully processed to produce digital ortho-photo and digital map.

Real time Motion Picture (Video): UAV s is primarily used for capturing and downloading real time video. Aerial video,collected by visible video cameras deployed on small drones,helps to solve many hard challenges like natural disaster remediation(Moore, Rizos, & Wang, 2003).

Oblique Images: Oblique images in an aerial photography are captured at specific angle. Oblique images helps to extract 3 components mainly 3 D geometry, Appearance, properties/Attributes .UAV s provide cost effective and an alternative with an additional feature to capture building at all possible angles.

Thermal Images: are those images in which visibility of objects in dark by detecting infrared radiation and creating images based on energy fluxes and temperature variations .Thermal camera is a device that can be attached to drones to carry out thermo graphic surveys. They are

used to detect the defects in solar panels,wind turbines and buildings and other structures which are difficult to access.

GPS/INS Location: The most widely used navigation Technologies for the UAVs are GPS receivers and INS services. INS is a device which operates independently of any external signals or inputs, providing a complete setoff navigation patterns (includes position, altitude and velocity) with a high data rate. INS s provides short term position accuracy but satellite based GPS navigation techniques offers a consistent accuracy and GPS signals can be tracked during entire UAV mission(Wang, 2008).

3D Point Cloud: UAVs are also used for aerial photogrammetry (Everaerts, 2009). Digital images with automatic generation of high quality, dense point clouds from digital images is the advancement in digital photogrammetric technology (Rosnell & Honkavaara, Point Cloud generation from Aerial Image Data Acquired by QuadrocopterType Micro Unmanned Aerial Vehicle and Digital Still Camera, 2012)

Usage of UAVs is not restricted only for high definition geo referenced images,point cloud model to real time motion pictures ,oblique photographs but also has applications for agriculture practices ,Disaster management, drones for supplying food and medicines in remote areas and drones for energy.

UAV s in Agriculture:

In India agriculture is demographically the broadest economic sector and plays a significant role. Use of technology and the high costs associated with it is a major problem, so farmers are forced to use the conventional way of farming .Using various drones like drones enabled Crop Health imaging system which helps to have a composite video at a low cost. Use of this technology in agriculture helps to save time, increases yield as the precision application of pesticides, water and fertilizers only where it is needed for a specific crop increases the yield. It helps in Crop health imaging which is to see the colour contrast in the field that allows how much sunlight is being absorbed by crop canopy.

Integrated GIS mapping helps to draw field borders .GIS also produces map based on themes such as soils or hydrology.

Drones for Disaster Management: UAV s are safe and efficient means of acquiring information in a region that are difficult for rescue teams to access and get an idea about the situation such as flooded area, volcanic sites ,tsunami sites. Drones give status of damages and provide information about its impact. Drones in disaster management helps in food and material supply at the site that are not accessible.

After the disaster situation, UAVs are used to search the missing people and rescue the people who are stuck. Monitoring relief and rehabilitation operations and make them enough to serve the persons who are in problem.

Drones for Supplying medicines and food to inaccessible areas: Small drones are used to deliver payloads to remote communities to solve the basic problem related to food and medical. Use of drones together with GIS can solve a problem in remote areas like virus affected areas where drones can fulfil the requirements of medicines and in tribal and naxalite area where life is too hard to survive, drones can maintain the supply for basic need of life.

In 2012, Food and Agriculture organisation of United Nations (FAO) explains that, food security is still a major concern as 1 billion people are suffering from starvation and malnutrition around the world. In rural and remote areas, there is higher level of health risks and higher rate of diseases, chronic diseases and injuries. Drones can be used to speed up the delivery of food and medicines and other supplies to these areas and it provides a cheaper, quicker alternative to develop than a road network and other costly alternatives.

Drones for Energy sector:After natural calamities, drones with high resolution images and ultra violet sensors used to collect information about status of transmission lines, cracked insulators and connections .This information is essential for maintenance of operations and in order to restart power transmissions.

Drones are also used to monitor the height of tree around the transmission lines and collect information to ascertain need of trimming.

As nuclear energy which is rapidly adopted by growing countries all over the world .It is always critical to manage nuclear power plants and nuclear radiations. As drones are able to fly at low altitude, they can measure radiations in greater details than any other aircraft.

COMPANIES SEEKING THEIR FUTURE WITH UNMANNED AERIAL VEHICLE-DRONES

- Amazon in UK has conducted trials to deliver the goods using drones. They are finding up ways to expand their delivery range by using prime air drones. They have worked out a detailed plan including how the batteries of Drones can be recharged by creating docking stations over the street light poles and telephone towers. Amazon was recently awarded a patent for "multi-use UAV docking stations and methods".

- Wal-mart stores Inc. are testing drones to manage its warehouse inventory more efficiently. The drones capture 30 frames per second of products on aisles and alert the 'pilot' when products become depleted or not properly stocked.

- DHL, a German delivery firm is using drones to deliver small parcels to German island of juist& a sandbar island(12km from German coast). Deliveries will include medication and other goods that may be "urgently needed". It flies under 50 meters to avoid entering regulated air traffic corridors. The drone takes fully automated route tp a dedicated landing area on juist. To ensure that the good gets secured during transport, DHL parcel developed a special air-transport container that is extremely light weight as well as weather-and waterproof.

- Domino's has also conducted a successfully done test to deliver pizza using drones to the customer.
- China's biggest internet retailer-Alibaba did a 3-day test on drone-based deliveries within a one-hour flight of its distribution centres in Beijing, shanghai and Guangzhou. Alibaba used its

drones to deliver orders for a specific type of ginger tea, helping limit the maximum weight of package to 340g.

In Indian Context

- Francesco's pizzeria in south Mumbai (India) conducted a test delivery by sending a pizza to a customer located 1.5 kilometres away from their outlet. The pizza box was carried by a drone and landed on a high-rise rooftop. The pizza was delivered in a shorter duration and the test was successful.
- Mumbai government is also considering use of drones to monitor, identify and control vehicles breaking traffic rules. Initially they are planning to use drones at load line of the 'ghat' on expressway where setting up of cctv cameras is not possible. They will employ the use of drones by using it for clicking photos of the vehicles that are breaking traffic rules like mostly heavy loaded trucks jump lanes to overcome other big vehicles, which causes traffic jam and then the transport department will take action against errant drivers.
- A private transmission company Sterlite Powers has entered into partnership with drone sharper shape to use its services to monitor its assets in India. Sterlite Powers believe the use of drones will increase the uptime of the grid, reduce transmission tariffs, avoid grid blackouts, and also saves the environment by reducing deforestation along the line corridors. In addition to this, usage of drones will reduce the need of man power hence lowering the variable cost linked to such operations.
- For the first time in India in many years in Kashmir Valley Helicopters and drones were used for security purposes during Ed-al-Adha festival on 13 September '16. Drones were used to keep a bird's eye vigil from the skies and give early warning to security officers.

CHALLENGES IN USING UNMANNED AERIAL VEHICLE

1. AVIATION APPROVAL: Any Air-bone delivery system will require approval from Aviation Authorities, Security Checks, flight plans etc.

2. URBAN DELIVERIES: Whatever trials have been conducted with drones so far, are in the rural areas. There are different challenges of using them in Urban Area e.g. in Multi storey apartments, where will drones make delivery?

3. THEFT: The drones will be able to deliver the goods in open areas. How the packets will be protected from theft, is still a challenge.

4. INSURANCE COST: The insurance companies do not have any experience and estimate of risk involved in deliveries through Drones. Therefore the Insurance Premium will be high initially, which will an additional cost to the end customers.

5. WEATHER: At present Drones cannot operate in Heavy rains, Snow and heavy winds. Therefore it is another challenge to be handled.

Conclusion:

The study found that the usage of innovative technology in logistics firm in country has contributed to increased performance. Use of information Technology in transportation, warehousing, security, cargo tracking, verification and tracking information have benefited the logistics firms in terms of competitive advantage, customer satisfaction, speedy and timely delivery of goods reducing the logistics costs and increase in financial gains. With the advancement in technology, we have UAV s or drones are developed which are not used only for military purposes but also for domestic purposes like in agriculture, energy sectors, supplying of food and medicines in remote or inaccessible areas, drones in disaster management. UAVs in integration with GIS is used to support life services and for search and rescue operations.In the upcoming years, future drones will have more powerful integrated cameras and drones will get less expensive and rich features. Features like Snapdragon Flight, a digital signal processor for flight control, with Wi-Fi, Bluetooth, GPS and support for different sensors has been introduced. The new developmentsadd features to UAVs, and regardless of regulation, drones carry various sensing instruments for commercial work. UAV s or drones are more reliable, autonomous, economical and easier to use technology with great potential to perform in more efficient and effective way.

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