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DRONES ARE EXTENDED CONNECTIVITY IN BUSINESS ORGANIZATION

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ABSTRACT

The study explores on the concept of drones as extended connectivity in business organization. Contemporary times have made it very expedient for business organizations to double their efforts towards ensuring that they deliver products and services at optimum capacity. To this end Companies are shifting the value proposition from traditional hardware and equipment offerings, to insights based on data, analytics and advanced algorithms, which allows information to be communicated perfectly, over long distance, to huge numbers of users, at very low incremental cost. This paper considers and highlights the opportunities emerging from the use of drone technology as extended connectivity in business organizations and shows that rapid technological development of drones initially driven by military applications, has resulted in robust and reliable aerial platforms now addressing a growing number of civil and industrial use cases, across a diverse set of verticals including agriculture, oil & gas, logistics, and many others.

Keywords: Drones, Connectivity and Business Organization.

INTRODUCTION

Enterprise or business transformation was commonly used to describe a radically new way of running an organisation. As technology increasingly disrupted the status quo, people began using digital transformation to describe enterprise transformation in response to evolving digital technologies. Somehow in the process, 'enterprise' was dropped from the terminology. Other flavours of digital transformations such as AI and automation (drones, robotics. 5Gs) are sweeping through the world of work, focusing on radical changes within organisational functions like finance and marketing, checking quality on the production lines, customer care services etc. Technology has become increasingly integrated in different facets of our lives and is gathering pace by the day.

Companies are shifting the value proposition from traditional hardware and equipment offerings, to insights based on data, analytics and advanced algorithms. Digital technology allows information to be communicated perfectly, over long distance, to huge numbers of users, at very low incremental cost. The internet of things enables companies to apply digital technology to improve the scalability of their operations, communicate simultaneously with separate communities, and combine previously distinct processes to transform existing business models and produce new opportunities. The opportunity emerging around UAS (unmanned aerial system) technology highlights many principles. As with many new technology innovations, early use cases focused on UAS augmentation of human skills in traditionally labor-intensive applications: crop scouting or utility infrastructure inspection are typical examples where significant efficiency gains or safety improvements can be rapidly achieved through deployment of UAS-based video capture platforms. Over time, UAS technology combined with innovation in other emerging areas like AI, computer vision, and remote sensing will enable new levels of automation and new types of analytic solutions that will have transformative impact across these verticals. For example, rather than live visual inspection of potential rotor blade damage on a wind turbine by a trained human UAS operator, imagine an autonomous UAS fleet deployed across a wind farm to continuously capture video data, AI analytics at the edge to automate identification and classification of known damage patterns, and cloud based optimization solutions that predict potential turbine output losses in megawatts per year based on historical wind farm data and aggregate industry benchmarks. The utilization of technology to build an environment where people can be motivated to work collaboratively, utilize existing information, and ultimately want to share the knowledge they produce is a vital approach to extending connectivity in today's society. (Nugroho & Mochtar, 2006). Various digital information dissemination and extended connectivity tools have been introduced over the years, changing the concept of globalization and socializing in the twenty-first century. The dissemination and retrieval of information, as well as task delegation, are now possible without borders, permitting individuals to live in different countries and interact with each other at a distance. This has been facilitated by the utilization of technological gadgets like robotics, drones, and 5G. The support of technological facilities in the administration of business organization in advanced countries of the world shows great development in socialization and standardization. Technological facilities like robotics, drones, and 5G have all contributed to easing the communication process in today's

world and supported the extending connectivity of diverse users, a process that helps to facilitate business organizations.

The usefulness and significance of technological advancement in the use of robotics, rones, and 5G brought the term "extended connectivity" to the forefront. Improved connectivity within the networked workspace and between the networked system and its connected technologies characterizes extended connectivity, particularly in business organizations (Tobing, 2007). Talbot (2016) defines "extended connectivity" as "improved communication from place to place, a place to person, and person to computer," and it is required in various networks where there is no direct physical connection. Extended connectivity also has the advantage of reducing traditional workloads (because employees are not required to travel long distances) and saving money. As a result, the paper demonstrates the enormous benefits drones connectivity in business organizations.

OBJECTIVE

The objective of the study was to explore the role of drones in extending the connectivity of business organizations.

CONCEPTUAL REVIEW

Artificial intelligence (AI) is an umbrella term for a suite of technologies that performs tasks usually associated with human intelligence. The technology responsible for driving most current and recent advances within the field of AI is 'machine learning', which enables computer systems to perform specific tasks intelligently, by learning from data rather than pre-programmed rules. Machine learning is used across many areas of everyday life, such as image recognition systems (like those used to tag photos on social media), in voice recognition systems (like those used by virtual personal assistants), and in recommender systems, such as those used by online retailers. Sensational films might make us anxious that AI will develop its own consciousness, but this remains the stuff of science fiction. In coming years, we are likely to see AI advancements in processing human language, which could lead to improved chatbots and virtual assistants. It will also underpin other technologies, such as autonomous vehicles and the 'metaverse' – an emerging term for new collective cyber and virtual reality spaces.

Artificial intelligence (AI) as a subset of technology adoption in the workplace mimics human intelligence, allowing computer applications to learn from experience via iterative processing and algorithmic training (Colorado State University Global, 2021). AI systems get smarter with each successful round of data processing since each interaction allows the system to test and measure solutions and develop expertise in the task it's been set to accomplish. Since this can be completed rapidly, much faster than the rate a human being would be able to perform similar work, AI systems can become experts far faster than humans, making them incredibly effective options for any process requiring intelligent decision making. Such magnanimity cuts across its tools among others namely robotics, drones and 5G.

Drones

Unmanned aerial vehicles (UAVs), more commonly known as drones, are an exciting and compelling market segment for advanced communications services based on 4G and 5G. With a wide range of hardware products available to commercial and consumer markets, the applications for drones continue to grow rapidly. Drones are implicitly mobile, and connectivity already features strongly in the operation of these devices.

UAVs were most often associated with the military. They were initially used for anti-aircraft target practice, intelligence gathering and, more controversially, as weapons platforms. Drones are now also used in a range of civilian roles, including search and rescue, surveillance, traffic monitoring, weather monitoring, firefighting, personal use, drone-based photography, videography, agriculture and delivery services (Ben & Alan, 2021; Sroba, 2021). Drones are equipped with different state of the art technology such as infra-red cameras(military UAV), GPS and laser (military UAV). Drones can be controlled by remote control system or a ground cockpit.

Drones In Business Organization

The impact of drones on work is a hotly debated topic. Some predict potentially large scale job losses, others are more modest in their estimates. While much has been said about the potential impact of drones on jobs and the future of work, a common view is that many jobs are at risk of being taken over by machines, potentially leading to large-scale job losses. Research shows that while there are risks, there are at least

as many opportunities to increase the number and quality of jobs. No doubt these technologies will change the nature of work as we know it. This change needs a proper people strategy led by people professionals.

How drones will impact businesses

Predicted commercial applications and market value by industry

Infrastructure: *Investment monitoring, maintenance, asset inventory* *$45.2 bn*	**Agriculture:** *Analysis of soils and drainage, crop health assessment* *$32.4 bn*	**Transport:** *Delivery of goods, medical logistics* *$13.0 bn*	**Entertainment & Media Advertising**: *entertainment, aerial photography, shows and special effects* *$8.8 bn .*
Security: *Monitoring lines and sites, proactive response* *$10.5 bn*	**Insurance:** *Support in claims settlement process, fraud detection* *$6.8 bn*	**Telecommunication:** *Tower maintenance, signal broadcasting* *$6.3 bn*	**Mining:** *Planning, exploration, environmental impact assessment* *$4.3 bn*
Source: PwC (2016)	**The business of drones**		

Drones And Organization workforce

One key area is around skills. A few high-end technology firms will need many AI programmers, but most organisations will be using AI systems developed elsewhere. Staff will not necessarily need to be able to program an algorithm, but they will need to be intelligent customers of AI technologies. As AI is largely powered by data, we will need to see a strengthening of data skills across the workforce. The education system has not yet caught up with the data and digital skills required, so it is likely that employers will need to remediate this directly, cascading basic-level data-handling, statistics and digital training across the workforce. Those organisations that are not already using their internal and customer data effectively will also need to invest in strengthening their data systems. Data ethics and governance skills will also be important: AI systems can be 'black boxes', and if they are making important decisions, staff will need to create and handle accountability and appeal procedures.

Skills will also be an issue at board level of the organisations if board members do not understand the possibilities and risks of new technologies. Such skills are typically found on the boards of technology companies, but are often in short supply in organisations that don't think of themselves as technology organisations. Businesses will need to specifically recruit for these skills in future board members, and may need to look to a more diverse pool of candidates.

Drones Connectivity in Business Organization

Previously reserved only for military use, drones are now relatively common. In businesses such as sport, entertainment, music, even security, oil and gas, drones provide eagle-eye coverage to ensure external and internal threat of danger are easily sported, detected, and corrected. Drones are also utilized in agriculture for the monitoring of crops and animal herds, and in search and rescue for locating missing persons (Sroba, 2021). Drones are proving as effective tool for designers and engineers. The possibilities for their application within our industry seem infinite. There is no doubt that drones will continue to change the face of engineering and the wider business world in which we operate.

Uses and application of drones in different sectors

Precision / Smart Agriculture: Precision Agriculture, or Smart Agriculture leverages advances in UAS and IoT technologies to improve operational efficiency and maximize yields, whilst minimizing the use of chemical pesticides and fertilizers. There are immediate benefits for farm operators as input costs are reduced, and yields may be improved with greater insight and more targeted crop care. Agriculture presents several interesting UAS application use cases, including crop health monitoring, nutrient management, fertilizer application, and irrigation management . UASs are relied upon in agriculture to take field 3D maps to show soil patterns, spray crops with water / fertilizer, shoot seeds into the soil, and utilize thermal and other IoT sensors to provide crop health updates to farmers.

Oil & Gas: The Oil & Gas industry maintains one of the most complex and complete asset lifecycle management regimes, keenly aware of not only the impact of defects and failure on production but also their wider environmental responsibilities. UAS platforms are primarily used for managing complex operations, monitoring equipment in remote areas (e.g. oil rigs and platforms) and detecting potential oil spills / pipeline leaks and other high risk issues. UAS solutions provide up-to-date, measurable geospatial information that Oil & Gas companies can leverage to detect problems early-on and perform necessary data analysis to minimize risks.

Emergency response: UASs can provide unique vantage points delivering real-time data feeds from emergency scenes to provide improved or earlier situational awareness for first- responders, fire fighters and police. In one such application, Deutsche Telekom and the Dortmund Fire Service rescue operations have demonstrated how UAS platforms may be leveraged to provide enhanced situational awareness. Under this initiative, once an alarm has been raised to prompt a rescue effort, a UAS flies to the area and begins an automated surveillance to find the victim. The UAS can guide the terrestrial rescue units directly to the location. Using UAS surveillance helps rescue teams to find a missed or injured person as soon as possible, minimizing search time and increasing the probability of a successful rescue. Crucial time can be saved, and rescue teams can focus on attending to the medical needs of the victim.

Medical response: UAS platforms have also demonstrated great potential to assist with the transportation and distribution of drugs, medical aid and organ transplants. For example, in 2016, the Rwandan government teamed with Silicon Valley start-up Zipline to deliver medical supplies to five Rwandan hospitals; further plans will expand the program to almost half of the country's hospitals. In an application which demonstrates the reach and efficiency potential of UAS technology, a research paper published by Johns Hopkins Medical School suggests that using UAS to deliver vaccines in low and middle income

countries can improve vaccine availability from 94% to 96%, whilst generating approximately 20% savings in transportation

Public Safety: UAS technology is proving to offer impactful solutions to some of the most pressing situations facing the public. The flexibility, timeliness and automated nature of UASs provides high value use cases in disaster response, emergency medical access, search and rescue, and environmental monitoring. Moreover, these applications of UASs have significant support among the public.

Benefits of Drones in Business Organization

Whilst public perception and regulation continue to evolve, likewise the UAS technology on offer is maturing and advancing rapidly – permitting automated UAS to carry-out more complex tasks and address an increasing number of application use cases. Here we consider the key benefits of UAS platforms which are driving their adoption.

Operational Efficiencies: To date, the primary market driver for the majority of UAS application use cases has been a reduction in cost and an increase in efficiency. Emerging UAS technology enables the costs associated with traditional aerial operations to be dramatically reduced. In the majority of cases, the cost reduction is straightforward to quantify, qualify and hence a robust business case may be quickly established. By way of example, Oil & Gas majors have demonstrated that UAS platforms can significantly reduce the costs associated with their asset lifecycle management and maintenance regime. Traditionally activities such as pipeline inspection involved high-cost helicopter or fixed- wing over flights, undertaken by highly skilled aviators who visually inspect pipeline corridors looking for evidence of intrusion or liquid chemical containment issues. However, inspections may now be undertaken by low-cost UASs, significantly reducing the costs involved. Similar savings may be realized across Oil & Gas asset management activities, such as flare inspection. Agriculture is another industry where huge opportunities present. Studies into the positive impacts of Precision Agriculture and UAS platforms have estimated that farmers may increase their crop yield by up to 5%, whilst also reducing their input costs by 5%. UAS technology may enable farmers to gain a better understanding of their crops through closer, more timely and more frequent inspections. Consequently, irrigation, pesticides and chemical fertilizers may be applied in a more targeted manner to address those crops that require and will benefit from the intervention. Low-cost UAS platforms help reduce the cost of inspection and chemical application, whilst also enabling farmers to continually monitor and tend to crops in a cost effective manner. Whilst the focus presently is on the succession of manned airborne activities by unmanned vehicles, there is further potential to improve efficiencies through automation. For example, applying analytics to the video captured during a pipeline inspection overflight can automate the visual surveying. If achieved in real-time, the UAS may detect and subsequently opt to inspect defective aspects of the pipeline more closely - eliminating the costs associated with a follow-up inspection and leading to full automation of inspection activities.

Risk Reduction: One of the major concerns associated with manned aerial applications is the associated risks. Pilot training, flight duration, weather conditions and hazard restrictions are key considerations that must be taken into account when deploying a manned aircraft. UAS technology enables us to place unmanned aircraft into situations where it is infeasible to place a human aviator due to the associated risks. We can also leverage UASs to glean greater insight in advance of human activities to help mitigate risks and reduce the time that humans spend in hazardous situations. By way of example, utility and civil construction companies are embracing UAS technology to help mitigate the risks involved in infrastructure inspection. The vast majority of inspections rely on placing ‘human eyes’ on infrastructure to assess the condition of essential components and to determine if maintenance is required. Leveraging low-cost UASs, maintenance teams can inspect infrastructure whilst keeping their feet firmly on the ground, hence eliminating risky and time consuming climbs. For example, let’s consider how energy firms inspect key pylon infrastructure. Presently operators may choose to employ a helicopter inspection, or more often require a maintenance team to undertake a climb to visually inspect pylon infrastructure. UAS enable maintenance teams to perform an initial inspection from the ground, eliminating risky climbs and reducing cost. A UAS inspection is typically quicker and requires less people than a climb, hence teams may inspect pylons at a greater frequency or with fewer dedicated personnel. If a defect is identified, the extent and impact may be assessed from the ground. A human climb may be required to resolve the issue, but before leaving the ground the maintenance team can ensure they have the replacement components, the appropriate tools and team to undertake and complete the repair. Similar risk reduction and mitigation strategies may be employed across multiple verticals, removing humans from harsh

environments or treacherous conditions and eliminating unnecessary activities.

Location, Accuracy and Precision: UAS technology may be employed to provide greater detail than current aerial surveillance solutions, hence enabling higher precision analysis and promoting accurate decision making. Let's consider the example of an insurance assessment for a civil property as a result of storm damage, or a recent inspection of the Capitol building roofline in the USA. Traditionally this kind of activity would require human inspection involving ladders and scaffolding, a lengthy, risky and costly procedure. However, a UAS may be easily deployed and operated within centimeters of the roofline to provide a detailed assessment of the condition. A pilot may be onsite operating the UAS whilst the survey assessor sits at their desk hundreds of miles away, directing the pilot and inspecting the images to survey the roof without any need for them to leave their office. The Agricultural industry also benefits significantly from the granular and accurate assessment provided by UAS platforms. Traditional crop inspection techniques rely on manned aircraft or satellite overflights, both of which are constrained in terms of flight frequency and the detail they can provide. Low-cost UASs provide a more detailed assessment than either of these techniques, enabling farmers to continually tend to their crops, potentially at the individual plant level rather than a granularity of square meters. Armed with a detailed assessment, farmers subsequently intervene in a timely and accurate manner, thereby reducing input costs and increasing yield by tending for crops at a far more granular level.

Challenges of drone applications in Business Organizations

Technological challenges: This is one of the major challenges to the industrial application of drones. One of the most frequent relates to constraints in current battery technologies. Other technological challenges involves indoor navigation, reliable data transfer and communication, danger of explosion, safety mechanism and noise

Operational challenges: Most drones applications are manual pilot operations that are flown within the line of sight. This operation require skilled and alert pilots who do not only must fly drones safely, but also have a deep understanding of the tasks and mission involved. Human issues such as workers knowledge and technical experience, training and involvement in planning are key determinants for the success of technology adoption. Developing a convincing business case that provides acceptable returns on investment is another organizational challenge in adopting the use of drones.

Legislative Rules and Regulations: Although the number of drone application is increasing, regulations concerning their usage are lagging. The license (or lack of it) defines how, where and what application the business organization can use drones. There are large variations between countries in terms of drone legislation.

THEORETICAL FRAMEWORK

The Theory of Technology Acceptance Model (TAM)The possible adoption of drones, for extended connectivity in business organization is explained through the use of the Technology Acceptance Model (TAM) by Davis (1989). The model suggests that when users are presented with new technology, several factors influence their decision about how and when they will use it. These factors are perceived usefulness, defined as the degree to which a person believes that using a particular system would enhance his or her job performance, and perceived ease of use, defined as the degree to which a person believes that using a particular system would be free from effort (Davis, 1989 cited in Sanzogni et al., 2010). These three factors are considered to be the primary determinants for adopting and using new technology and are influenced by other variables such as security concerns, cost, convenience, and satisfaction (Sanzogni et al., 2010). The Technology Acceptance Model (TAM) is a prominent theory that seeks to investigate the attributes that influence technology adoption. Ducey (2013) also described it as a parsimonious theory of technology adoption in an establishment, which intends that individual responses toward technology can trigger intentions or curiosity to use the technology, which in due course can influence actual usage. Concerning the present study on drones for extended connectivity in business organization, TAM can be used to better understand technology acceptance. Based on the TAM, for business organizations to adopt drones, for extended connectivity, they need to find out (1) the perceived benefits of the technology from their perspective; (2) how comfortable users are with the technology; and (3) the cost related to the usage of the technology, before they adopt it. Therefore, TAM was chosen as the appropriate model for this study, and based on this, the conditions for adopting drones extended connectivity in business organization can be explained.

CONCLUSION

Adapting to ubiquitous digital connectivity is now essential to competitiveness in most sectors of our economy. Having examined transformation across dozens of industries and companies – both traditional and born-digital, research has shown that digital transformation is no traditional disruption scenario: the paradigm is not displacement and replacement but connectivity and recombination. Transactions are being digitized, data is being generated and analyzed in new ways, and previously discrete objects, people, and activities are being connected. As the industry is fast developing in countries where the regulations are enabling, and on hold or winding down where these are too strict, expensive to comply with or disabling, regulators should be fully aware that the impact of their decisions reaches far beyond security and privacy and could determine whether businesses becomes a data-driven and profitable enterprise or not.

RECOMMENDATIONS

The current industrial applications of drones are mainly in the outdoors, hence their profitable applications in industries such as agriculture, construction and infrastructure logistics etc. Currently there is a gap between technological development of drones and the profitable application they can offer to organizations whose businesses are basically indoors. ex. manufacturing industries. Hence there should be focus on drone development for indoor based sectors of a business organization.

Secondly drones services represent a new frontier in technology development. Youths are attracted by technology, its development and use. UAS for business could be a magnet for educated youth in developing countries to develop service enterprises based or at least operating in rural areas, thus generating jobs opportunities and improving production and returns on investment.

REFERENCES

Adam,U. (2022). How artificial intelligence will transform businesses. https://www.businessnewsdaily.com/9402-artificial-intelligence-business- trends.html

Ben, L. & Alan, R. E. (2021). Drone (UAV) https://www.techtarget.com/iotagenda/definition/drone

Colorado State University Global (2021). Why is AI important? https://csuglobal.edu/blog/why-ai-important

Davenport, T.H. and Ronanki, R. (2018) Artificial intelligence for the real world. *Harvard Business Review*. Vol 96, No 1, pp108-116.

Demir, K. A. (2017). Roboethics: Current research questions. In 4th International Management Information Systems Conference, Istanbul, Turkey, 17-20.

Demir, K. A. & Cicibas, H, (2017). Industry 5.0 and a critique of industry 4.0. In 4th International Management Information Systems Conference, Istanbul, Turkey, 17-20 October 2017.

Demir, K. A., Cicibas, H., & Arica, N. (2015). Unmanned aerial vehicle domain: Areas of research. Defence Science Journal, 65(4), 101-108.

Drone Powered Solutions. 2016. Clarity from above. PwC global report on the commercial applications of drone technology. Warsaw, PwC.

Drones University. 2017. SACAA crackdown on illegal drone usage [online]. [Cited 21 July 2017]. http:// www.drones.university/sacaa-crack-illegal-drone- usage-doubles-sa/

Graetz, G., & Michaels, G. (2015). Robots at work. CEP Discussion Paper No 1335,http://eprints.lse.ac.uk/61155/1/_____lse.ac.uk_storage_LIBRARY_Secondary_libfile_share_repository_Content_Centre_for_Economic_Performance_Discussion_papers_dp1335.p df, Accessed on 04.10.2017.

Greenwood, S. 2016, April. Drones on the horizon: new frontier in agricultural innovation. ICT Update, pp. 2-3.

Guerin, D. 2017. Global drone regulations database [online]. [Cited 22 July 2017]. www.dronregulations.info

Harald, R. (2022). What can 5g do for business: Enterprise, industry and transportation. https://www.digi.com/blog/post/5g-for-business-enterprise- industry-transportation

Hartman, D. (2017). What are robots used for in a business? https://bizfluent.com/info-7783825-robots-used-business.html

Jackson, M. A. (2021). Artificial intelligence and business operations. Journal of Computer Sciences, 6(1), 56-63.

Lin, P., Abney, K., & Bekey, G. A. (2011). Robot ethics: the ethical and social implications of robotics. MIT press

Kayode, A.E., Irele, A.O., Agunbiade, F.J. & George-Kayode, B. (2019). ICT for Effectiveness and Job Performance of Staff in the Universities in Nigeria. Texila International Journal of Academic Research: Special Edition, 3(1), 1-9.

Odu, S. (2019). Technostress and office/information managers' job effectiveness in tertiary institutions in Rivers State. Unpublished M.Sc Dissertation, IAUE.

Ray, C., Mondada, F., & Siegwart, R. (2008). What do people expect from robots?. In Intelligent Robots and Systems, 2008. IROS 2008. IEEE/RSJ International Conference, 1(1), 3816-3821.

Sroba, K. (2021). How will drones impact the business environment? https://www.ghd.com/en/perspectives/how-will-drones-impact-the-business-environment.aspx

Syrdal, D. S., Dautenhahn, K., Koay, K. L., & Walters, M. L. (2009). The negative attitudes towards robots scale and reactions to robot behaviour in a live human-robot interaction study. Adaptive and Emergent Behaviour and Complex Systems.

Van Rijmenam, M. (2022). The impact of 5G technology on business and when 6g will come? https://www.thedigitalspeaker.com/impact-5g-technology- business/

Willcocks, L. (2016). How organizations can embrace automation. https://blogs.lse.ac.uk/management/2016/05/09/how-organisations-can- embrace-automation/