

ROBOTIC, DRONES, 5G AND EXTENDED CONNECTIVITY IN BUSINESS ORGANIZATION

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ABSTRACT

The study explores on the concept of robotic, drones, 5G and extended connectivity in business organization. The objectives of the study were to examine robotic connectivity in business organization; examine drones connectivity in business organization; and examine 5G connectivity in business organization. Relevant theory such as diffusion of innovation theory was adopted as the theoretical foundation of the study. The established study has shown that the use of robotic, drones and 5G help facilitates informed decisions, operations and performance of business organization. It was concluded that robotics, drones and 5G enhances operations of business and performance, thus, their use are essential its organizations are to compete favorably while conducting business. Consequently, the study recommends that the current workplaces are designed for humans in mind. As robots enter our workplaces, we need to redesign the workplaces to accommodate this new type of coworkers to foster speedy operations and performance; increased safety in the workplace would be promoted by drones. Hence, management of organizations should embrace these hi-tech changes such as drones that can result in long-term cost reductions, increased safety and improved profit margins.

Keywords: Robotic, Drones, 5G, Connectivity and Business Organization.

INTRODUCTION

The influx of technology in businesses is continuously changing the structures, processes and operations. This is because technology is a strong tool for enhanced operations, performance and competitiveness among business organizations. Specifically, 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.

In the past, the use of robots was mostly limited to factories. Therefore, industrial robots were at the core of the robotics market (Demir & Cicibas, 2017). However, the use of robots is expanding. In recent years, both remotely operated and autonomous unmanned vehicles have found many civilian and military uses (Demir et al., 2015). Autonomous cars are being tested on roads. Medical robotics is being developed to assist surgeons in various surgical procedures. Robots for educational and entertainment purposes are available for purchase. Robots are already in society. They are used in labor and services, military and security, research and education, entertainment, medical and healthcare, and personal care (Demir, 2017). All these are fostered towards the improvement of the society which is stringently tied glued to business activities.

However, previously reserved only for military use, drones are now relatively commonplace as they are being used in conducting business too. Sroba (2021) stated that drones are proving an 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.

More so, by now, a quarter of people worldwide have experienced 5G via their mobile devices. Now retail and enterprise networks, light industrial applications such as manufacturing facilities, transportation systems and other vertical industries are ready to take advantage of the faster speeds, lower latency, and higher data throughput of 5G, as these enterprises transform their networks and migrate to 5G devices (native) and 5G-ready devices. Harald (2022) stated that 5G is a game changer for Internet of Things (IoT) applications in industrial and commercial operations, enabling many new use cases, from robotic automation on the factory floor to autonomous guided vehicles (AGVs) to real-time predictive maintenance applications, and faster, more secure network connectivity for businesses. In addition, as more organizations move toward hybrid or complete remote work models in the wake of COVID-19, it underscores the need for more secure and reliable wireless solutions, better connectivity, and faster data transfer speeds. In the light of the above this paper explores on the concept of robotic, drones, 5G and their extended connectivity in business organization.

Objectives

The study seeks to achieve the following objectives:

1. To examine robotic connectivity in business organization
2. To examine drones' connectivity in business organization
3. To examine 5G connectivity in business organization

Conceptual Review

The following concepts were briefly discussed to reflect their contextual meaning in this study:

Robotic

The term robot originates from a Czech word, "robota". The meaning of robota is "forced labour". This term was first used by Karel Čapek in a science fiction play titled R.U.R. (Rossum's Universal Robots, 1920). The meaning of the word is quite striking, and it is as if robots were initially envisioned to be the slaves of people. Note that this may create interesting discussions in the future. The Encyclopaedia Britannica defines a robot as any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner (Willcocks, 2016).

However, robotics is a discipline focusing on the design, manufacturing, operation, and use of robots (Demir, 2017). There are many research areas in robotics. Up until recent years, the focus of most robotics research was artificial intelligence and robot design. Naturally, studies on social aspects of robots were limited. However, as robotic technology advances and the production and availability of robots increase, the dream of robots and people living and working together is becoming a reality. Experts began imagining these machines among people and researchers started to study the social aspects of robotics (Demir et al., 2017). There are some research areas within the overall robotics research that will especially help to integrate robots into our lives and into the workplace. These research areas are artificial intelligence (AI), human-robot interaction (HRI), social robotics, robotics and humanoids.

Drones

A drone is an unmanned aircraft. Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems (Ben & Alan, 2021). Essentially, a drone is a flying robot that can be remotely controlled or fly autonomously using software-controlled flight plans in its embedded systems, that work in conjunction with onboard sensors and a global positioning system (GPS).

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).

5G

5G is one of the latest technology buzzwords in the business world (van Rijmenam, 2022). 5G is the 5th generation mobile network. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks. 5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices (Jackson, 2021). 5G wireless technology is meant to deliver higher multi-Gbps peak data speeds, ultra-low latency, more reliability, massive network capacity, increased availability, and a more uniform user experience to more users. Higher performance and improved efficiency empower new user experiences and connects new industries.

The development of 5G technology dates from 2008, with the aim to make better use of the radio spectrum and enable many devices to be connected simultaneously. It uses higher frequency waves with shorter wavelengths than previous generations. 5G is much better at handling thousands of devices simultaneously, meaning that a single network can handle mobile phones and equipment sensors among many other forms of hardware without slowing down (Adam, 2022). The higher-frequency radio bands in which 5G operates - 3.5GHz (gigahertz) to 26GHz and beyond - have much greater capacity than their predecessors. Still, some infrastructure issues are created because cell towers must be spaced more closely to achieve a good signal. In addition, 5G wireless technology is designed to deliver much higher peak data speeds, ultra-low latency, and greater reliability and capacity than previous networks—allowing more users per cell and better performance in dense urban areas.

For 5G to work, the most important cell phone companies in the world will need to install many more transmitters and receivers near homes. It is a significant investment, requiring these companies to be wholly committed to the technology; further negotiations with small towns and municipalities over placing smaller boxes may also be necessary (van Rijmenam, 2022). Nowadays, of the countries that have begun the 5G rollout, China and the United States lead with a combined 652 cities where 5G is available. The Philippines has been able to roll out active connections in 98 cities—making it closest in terms of its rollout schedule.

As leaders focus on building new opportunities and compelling technologies, including the WiFi 6E standard and private 5G networks, they will shift their attention away from simply staying operational (van Rijmenam, 2022). Executives can benefit from the increasing value that wireless infrastructure and applications unlock by leveraging new location-based services within their networks. In other words, organisations can develop entirely new services and insights that can support their evolving business objectives (Harald, 2022).

Robotic Connectivity in Business Organization

The use of robots is expanding (Ray et al., 2008). There are various studies investigating the attitudes toward robots in various application areas (Ray et al., 2008; Syrdal et al., 2009). For example, one study found a very positive attitude toward robots for service and personal use (Ray et al. in Demir et al., 2017). Yet, it is too early to tell robots will be easily accepted in the society. People tend to accept robots and treat them as social entities and even sometimes attribute them with moral responsibilities and rights (Liu et al. in Demir et al., 2017). Some studies suggest that robotic interfaces can be intentionally designed to be persuasive (Ray et al., 2008; Graetz & Michaels, 2015). An interesting study shows that people may accept commands from a robot (Lin et al., 2011). However, currently, we do not know exactly to what level robots will be accepted in the workplace.

Nevertheless, for most businesses, robots currently exist as software or hardware which can automate routine service tasks to greater efficiency than human staff, transferring and organising data from multiple input sources to internal recording systems (Willcocks, 2016). Though this sounds like a recipe for headcount reduction, the other key finding of our research is that, in order to integrate such systems effectively, RPA must be guided by human intelligence. The possibilities for automation and robotics are set by human will and imagination – something which artificial intelligence is a long way off replicating thus ensuring humans remain in control of the workplace (Willcocks, 2016). Far from depleting workforces, humans and robots are most effective when working together. Instances of doing so have produced an influx of growth, productivity and, most importantly, satisfied customers and employees. With RPA handling those repetitive unstimulating data processing tasks which provide little-to-no job satisfaction, employees can focus on the human-intensive roles that robots cannot undertake innovation and creation, meaningful customer contact, building investor relations, running teams and departments all whilst overseeing the work of their robotic colleagues (Willcocks, 2016; Demir et al., 2017).

More so, one of the most common tasks robots perform for businesses is product assembly in an industrial space. Manufacturing robots handle tasks such as welding, sorting, assembly and pick-and-place operations with greater speed and efficiency than human workers could ever hope to achieve. The high strength-to-weight ratio of electric motors makes industrial robots a reliable option for tasks that require strength, agility, and consistency. Industrial robots also reduce the risk of workplace accidents and ensure greater control over product quality. They also can work in environments that are too extreme or unhealthy for humans (Hartman, 2017). Another area where businesses use robots is in their marketing to consumers. Technology companies produce robots to demonstrate new devices or inventions and to create a sense of innovation and progress. Robots are part of interactive displays at trade shows where they compete with more traditional marketing tools for attendees' attention. Every business needs some form of telecommunications infrastructure to communicate with suppliers and customers. Robots can simplify a business' call centre and handle incoming phone or Internet traffic to keep the channels of communication open and running smoothly (Hartman, 2017; Clement, 2020). Automated calling robots place pre-recorded calls, including appointment reminders and customer satisfaction surveys. Likewise, an automated call centre uses a programmable interface to greet callers and direct them to the appropriate information or department. Robots also perform inventory tasks for businesses with large warehouses or sorting facilities. Inventory robots are essentially driver-less vehicles that can navigate a warehouse and select specific pieces of merchandise, bringing them to employees who enter product requests into an automated system. Inventory robots save time and reduce the likelihood of human error that can cause inconsistencies in inventory tracking. A final class of robots used in business are those that entertain audiences. Robots and robotic displays appear in storefronts, in theme park attractions and in television and film programs. Some of these robots are skilfully crafted to resemble real people while others represent fantastical creatures or mechanical robots from a fictional world. Robot characters populate science fiction narratives while special effects robots endure hazardous conditions that would be unsafe for human or animal actors (Hartman, 2017).

Drones Connectivity in Business Organization

Previously reserved only for military use, drones are now relatively commonplace. 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 spotted, 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 an 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.

According to the Association for Unmanned Vehicle Systems International (AUVSI), optimal integration of drones in the U.S. will result in the creation of about 100,000 jobs and an effect of USD 82 billion on the economy by 2025. It stands to reason that a similar impact will be seen in Australia and worldwide. We must therefore be prepared to operate with confidence in this emerging space (Sroba, 2021; Willcocks, 2016).

From an engineering perspective many of their capabilities sit within inspection and audit work and we are finding they improve safety immensely. Some of what engineers do is quite dangerous work. The less time an engineer needs to be in a confined space, using ropes, harnesses and pulleys on a cliff face or a bridge, the better. A drone can half the amount of dangerous work an engineer may normally engage in which is a great outcome for all involved. Other than the obvious safety benefits, drones free up an engineer's time to think strategically, giving us the opportunity to gain a different perspective. Traditional plans and surveys delivered by on-the-ground crews can only provide so much. Once we get a drone up into the sky the options open. For example, we could create a 3D model daily for a site. This means that we can produce drawings, models and other tools for sites that are constantly changing operations and performance of businesses in the society (Demir, 2017).

5G Connectivity in Business Organization

The connectivity between 5G and business organizations lies in its benefits. According to Harald (2022), one of the significant connectivity that 5G offers to businesses is that it replaces expensive wired cable with highly reliable cellular connections. Building and maintaining wired connections is both labor intensive and expensive. Until now, however, many organizations chose wired over wireless connectivity because wired connections offered superior reliability and uptime in the absence of comparable wireless options. As 5G coverage increases and in the advent of private 5G networks, "cutting the cable" with cellular 5G business routers will be the preferred option in an increasing number of business applications. As a result, companies can expect to see faster time-to-value from their IoT initiatives, greater opportunity to eliminate costly wired installation and maintenance, and increase network uptime and resilience.

Another is that it improves data transmission speed. Data transmission speeds are exponentially higher with 5G, compared to 4G LTE. For example, while 4G is typically capable of delivering speeds of up to 100 Mbps, 5G promises speeds of 1 Gbps or more, in some cases achieving multi-gigabit speeds in large venues and in city centers (Harald, 2022; Colorado State University Global, 2021).

The primary benefit of 5G's higher speed, however, is not in time savings but in the much greater volume of data that networks can carry over the same amount of bandwidth with 5G. This dramatically increases the practicality of applying analytical processing or even AI to all that data. While this is good news for consumers, it's an even bigger advantage for industrial applications, such as factory automation in the era of Industry 4.0. As technologies like ML and AI continue to advance, downloading the volumes of data produced will require faster and more flexible networks to achieve the desired results. 5G makes that possible.

More so, 5G connectivity to business enhances lower latency enables business improvements. Latency refers to the amount of time that elapses from the moment that data is sent to the moment it is received. Latency is responsible for the delays we sometimes experience in phone calls or video conferences. The ultra-low latency that is possible with 5G communication is essential in a variety of applications, for example, in autonomous vehicles, where saving critical milliseconds is a matter of life or death. Reducing latency makes autonomous vehicles safe enough to be practical by enabling virtually instantaneous communication between vehicles on the road, as well as between vehicles, traffic signals and intersections (Harald, 2022). In industries with operations at remote worksites, low latency 5G connections allow companies to maintain a high level of service and worker safety, while increasing time reducing time to resolution and operational cost. For example, a new technician on a job could be directly supervised and instructed by a top

professional via augmented reality (AR) or virtual reality (VR) without the added expense of sending the expert out to the-site.

Furthermore, 5G connectivity to business is premised on its ability to increase device capacity. Network device capacity on 4G networks is a fraction of what 5G can handle; think one million devices, wearables, and sensors on 5G versus 1,000 on 4G, and you'll have some idea of the scope. The added capacity that 5G for business offers enables companies to scale their IoT deployments like never before. 5G for business offers better reliability and insights that would not be possible using previous wireless network technologies (Harald, 2022).

Still in the same vein 5G connectivity to business organizations enables new business models. Innovation is fueled with 5G, providing a solid foundation for capabilities like remote surgery in hospitals and remote applications for various other forms of highly skilled work. Wearable technology will find new markets in health and fitness (Harald, 2022; Adam, 2022). And automation will expand into any number of new safety and convenience product features.

Theoretical Foundation

This paper is theoretically founded on diffusion of innovation theory. This theory was postulated by Roger in 1962. He proposes that four main elements influence the spread of a new idea. These are: the innovation itself, communication channels, time and a social system. This process relies heavily on human capital. The innovation must be widely adopted to self-sustain. Within the rate of adoption, there is a point at which an innovation reaches critical mass. The categories of adopters are innovators, early adopters, early majority, late majority, and laggards (Valente & Rogers, 1995). Diffusion manifests itself in different ways and is highly subject to the type of adopters and innovation-decision process. The criterion for the adopter categorization is innovativeness, defined as the degree to which an individual adopts a new idea.

The following assumptions are tied to diffusion of innovation theory:

1. In a social system, there will always be a disparity in the level and time at which individuals within a given social system adopt new ideas, techniques, and technology.
2. Individuals and arms of institutions that adopt innovations early will naturally outperform late adopters and the laggards (Odu, 2017).

The result of this theory is that people, as part of a social system, adopt a new idea, behavior, or product. Adoption means that a person does something differently than what they had done previously (i.e., purchase or use a new product, acquire, and perform a new behavior, practice, etc.). The key to adoption is that the person must perceive the idea, practice, behavior, or product as new or innovative. It is through this that diffusion is possible (Leif in Kayode et al., 2019). Thus, adoption of a new idea, behavior, or product (i.e., "practice") does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others. Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting a practice to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation (Leif in Colorado State University Global (2021).

What this theory implies is that some organizations advance in encouraging innovative practices (artificial intelligence). However, business effectiveness lies in the manner and management adopt innovative tools such as robotics, drones and 5G within and outside the organization. It follows that manager of organizations who fail to adopt innovative practices such as robotics, drones and 5G will definitely experience ineffectiveness in the discharge of their business operations and performance. While those who embrace and practices such would be effective in operations and performance, hence grow, develop, and survive in the business world.

To contribute to this research strand, this essay explores the various ways in which Information

Systems researchers have addressed the issues while using the notion of affordances. For this purpose, we have gone through the "basket" journals within the Information Systems field. This small-scale literature screening is done to base our arguments along the issues in the Information System context. Thus, our review does not attempt to identify gaps, or synthesize evidence, in the style previous affordance reviews have done [23]. Our essay reveals the assumptions of the status quo, and considers alternative paths. To contribute to this research strand, this essay explores the various ways in which Information Systems researchers have addressed the issues while using the notion of affordances. For this purpose, we have gone through the "basket" journals within the Information Systems field. This small-scale literature screening is done to base our arguments along the issues in the Information System context. Thus, our review does not attempt to identify gaps, or synthesize evidence, in the style previous affordance reviews have done [23]. Our essay reveals the assumptions of the status quo, and considers alternative paths.

SUMMARY

The study has shown that robotics, drones and 5G enhances operations of business and performance, thus, their use are essential its organizations are to compete favorably while conducting business. Willcocks (2016) stated that the unprecedented explosion of data from the combinatorial effects of advances in cloud computing, big data, the Internet of Things, mobile connectivity, and social media demands automation to help organizations cope. Robotic Process Automation will increase productivity in the face of rising workloads. However, Sroba (2022) stated that while the positive financial implications of drone use are obvious, many have voiced concerns about instances where their use could be detrimental. Privacy concerns are a key issue for those nervous about data collection. Delivery drones need a camera and GPS to navigate destinations and people have suggested this is potentially intrusive. On the view of 5G, van Rijmenam (2022) asserted that the impact of 5G is limitless in business. Banking, retail, hospitality, and healthcare companies are implementing 5G's internal connectivity solutions. We expect that more industries will follow in the coming years.

RECOMMENDATIONS

Based on the summary of the study, the following suggestions are advanced:

1. The current workplaces are designed for humans in mind. As robots enter our workplaces, we need to redesign the workplaces to accommodate this new type of coworkers to foster speedy operations and performance.
2. Increased safety in the workplace would be promoted by drones. Hence, management of organizations should embrace these hi-tech changes such as drones that can result in long-term cost reductions, increased safety and improved profit margins.
3. Management of organizations who are yet to embrace 5G should do it to facilitate its operations and enhance performance effectively and efficiently.
4. There should be training and education of employees on the use of artificial intelligent tools such as robots, drones and 5G to enable them carry out tasks with ease while enhancing the operations and performance of the organizations.

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