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Innovation for A More Sustainable Covid-19 Healthcare Sector was Driven by Quantum Computing

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Abstract

Due to the widespread participation of various stakeholders in the healthcare sector, even straightforward medical issues become complicated when treated conventionally. A traditional computer strategy is insufficient in the Covid-19 era, where quick and precise healthcare solutions are required, along with speedy collaboration of stakeholders including patients, insurance agents, healthcare providers, and pharmaceutical suppliers, etc. In order to create a more sustainable less stresse healthcare system, this study tries to explore the role of quantum computing in disrupting the healthcare sector through the lens of organizational information processing theory (OIPT). To ascertain the expectations of professionals in the healthcare field about quantum computing, a semi-structured interview approach is used [1-15]. To map the themes, a structured approach of coding is used, employing an open, axial, and selective approach Quantum computing in the healthcare sector The results show the potential applications of quantum computing for pharmaceutical, hospital, and health insurance firms as well as patients to have precise and speedy solutions to the issues. While previous research has concentrated on the scientific underpinnings of quantum computing, this study aims to initiate the field's exploration of organizational management theory in relation to quantum computing.

Introduction

The essence of societal growth has shifted toward technology, leading to the emergence of a variety of labels for the contemporary societal age, including the information era, digital era, new media era, and industry 4.0 era, to name a few. Information and communication technologies (ICT) serve as the fundamental tenet of connectedness and provide creative solutions to enterprises and society whose reliance on technology has unpredictably increased Every player in the technological landscape, from laypeople to companies to technological behemoths, is continuously looking to increase their level of skill in the field of technology and innovation Organizations strive to improve their current infrastructure and knowledge in order to dominate the market. According to Martnez-Vergara and Valls-Pasola (2020), disruptive technologies serve as a conduit for disruptive innovation and breakthroughs that are constantly changing business models and putting organisational performance on a roller coaster and an effort to prepare for the future, or post-digital/binary era, companies have been exploring entirely new possibilities of the technology environment. However, the detailed study of quantum computing will cast doubt on the existence of classical computers and offer a vision for wave-based technology that is more advanced than the binary technology that is currently in use. Information in the quantum realm can be encoded as 0, 1, or both 0 and 1 at once, and two particles can be seen as being both separated and Businesses like Google and IBM have argued that quantum computing may be used to advance digital innovation . Innovation and new technical breakthroughs unquestionably address the ambiguity and complexity in an organisation in order to gain technological superiority.For processing the information for all functions of any firm, the new unknowns in the quantum leap are unfamiliar.

Additionally, over the past two decades, information technology (IT) has permeated every industry, and every company strives to employ the most cutting-edge innovation practises possible. The potential of IT applications and ideas to reduce costs and improve service quality through ground-breaking breakthroughs has also altered the healthcare. Since human lives are at stake and there is a chance that quantum computing-led information systems (IS) will be able to solve a variety of problems, the adoption of such systems in the healthcare industry is essential. Scientists and organisations are vying with one another to tackle the terrible predicament that the unstoppable pandemic situation has caused around the globea huge thanks to the numerous clinical trials to create medicines and cutting-edge vaccines.Although it is still in its infancy as a viable technology, quantum computing is built on the shoulders of many scientists who have spent years using high-performance computers to solve complicated issues (HPC). Disruptive technologies, also known as DARQ (Distributed Ledger Technology (DLT), Artificial Intelligence (AI), Extended Reality (XR), and Quantum Computing, have sparked a wave of change and are providing unanticipated innovative capabilities (Q). Except for quantum computing, all other DARQ components have been adequately researched and established in society.

Research currently being conducted focuses on the technical capabilities of quantum computing, but this area has not yet been investigated from the standpoint of running a complex industry like healthcare that is directly related to the lives of humans and animals. Consequently, the purpose of this study is to investigate "what are the areas of the healthcare industry, where quantum computing can play a disruptive role in the near future?" Where can one find creative solutions for a more sophisticated healthcare system using quantum technology, more specifically Healthcare organisations are among the first to implement new and creative technical infrastructure, making them particularly susceptible to disruptions in the near future. To

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address the research issue, this study used a qualitative technique, and it adds to the body of knowledge by anticipating How various players and stakeholders in the healthcare business, such as suppliers, patients, healthcare providers, and assisting organisations like health insurance, would behave under the influence of quantum computing In order to show how organisations might go forward with adopting disruptive technologies, this research emphasises a futuristic approach to the potential applications of quantum computing in the healthcare system. This approach is based on the organisational information processing theory (OIPT). Five sections make up the remainder of the essay. The literature review is presented in Section after which are linked theories. The research strategy is described in Section 3, and the findings are presented indicates the discussion of findings and study being concluded.

Subjective Heading

There is a dearth of literature available with the management and information system viewpoint of this disruptive technology, despite the fact that a vast amount of material has arisen based on the technical know-how of quantum computing.The spread of Covid-19 calls into question the healthcare sector's capacity to address the healthcare issues facing the entire world's population.The goal of this work is to establish a link between the literature on quantum computing and healthcare organisations and organisational information processing theory in light of the current global pandemic crisis that may be used for creative solutions in the healthcare context.

Currently, there is a rare opportunity to lead the development of innovative technologies that can have a significant positive impact on society and the economy. Industry 4.0 is one of the emerging technologies that has grown to usher in the post-digital era. The quantum universe is not a binary one. One can assign either a 1 or a 0; or both 1 and 0 to the information simultaneously, which results in the particles in a quantum space behaving like a wave, with the electron spinning in two different directions at once. This causes the particles to be separate yet entangled at the same time. The idea behind quantum computing is to exploit the behaviour of atoms and fundamental particles like electrons and photons to improve computer power.A quantum computer evaluates performance in qubits, which can concurrently take the values 0, 1, and anything in between, as opposed to a classical computer, which works with bits, which can only take the values 0 or 1. Superposition is the term used to describe the capacity to be in multiple states at once. Entanglement is a different quantum mechanical event that happens when a pair or group of particles is created, interacts, or shares spatial proximity in a way that makes it impossible to characterise the quantum state of each particle separately.

Discussion

Because of this, the result will not have a deterministic resolution but will instead be based on probability (Mihara, 2011). Quantum superposition, tunnelling, and annealing are three methods employed by computers in the quantum world to process the data. The concept of quantum superposition can be thought of as a fundamental building element of quantum mechanics, whereby two quantum states can be added to produce a third, legitimate quantum state, or the opposite. Following the Schrodinger Wave Equation, superposition reflects the wave-like condition. When two or more particles are created, a condition known as quantum entanglement results, making it impossible for a single particle to unilaterally lose its quantum state. The same quantum state can be reflected by particles no matter how far apart they are. Consequently, any modify

Understanding quantum supremacy, which basically draws a line between quantum computing and classical computing is crucial. According to the idea of "quantum supremacy" a quantum computing-based device can solve problems that no classical computer, not even today's supercomputer, can possibly solve in terms of computational speed, image processing, simulation and modelling, telecommunications, and any other technological domain. This will have an impact on every industry. Healthcare, telecom, FinTech, the defence industry, and engineering are among the industries that are expected to be most impacted by quantum technology spurred innovation. Although the early use of quantum technology has already been phased out, commercialization is still a long way off. Quantum computers have significantly higher processing power and speed than supercomputers, which further opens up possibilities for finding answers to the most challenging problems. Quantum computing can be used to find novel, disruptive answers to some of the enduring, difficult issues pertaining to our way of life, our health, our environment, engineering, and business.

Radical technical advancements and industry 4.0-inspired radical innovations have caused a fundamental upheaval in the healthcare industry. Blockchain, Artificial Intelligence, Augmented Reality, Cyber Physical Systems, and Cloud Computing, to name a few, have already been widely adopted in healthcare applications.As a result, the industry is experiencing a constant whirlwind of The Covid-19 has seen the emergence of telemedicine as a secure and long-term option that can provide basic healthcare needs and guidance to large populations of people. Though assumptions and simulations can help forecast the future, unforeseen events like pandemics might not be foreseen. However, quantum computing technology is expected to provide healthcare solutions to issues that are currently intractable by computers, such as genome sequencing, the discovery of novel drugs and materials, and the development of vaccines and medications much more quickly than is currently possible, to name a few and Large amounts of data are also produced by healthcare systems with intricate information management and clinical operations major industry transformation in the upcoming years. Biogen is working with Accenture and 1QBIT to create a cutting-edge quantum-enabled molecular comparison application with the goal of enhancing advanced molecular design to hasten the discovery of drugs for difficult neurological conditions like multiple sclerosis, Alzheimer's, Parkinson's, and Lou Gehrig's disease (Accenture, 2019). Patient records, medical equipment, service applications, experiments, and other sources of healthcare data are being generated, but conventional technological systems are unable to interpret and make use of the information.When it comes to utilising the vast amounts of data and procedures in the healthcare sector, quantum computing appears to be a disruptive and promising technology. Only 31 of the approximately 250 people from all categories who are directly tied to the healthcare industry and have knowledge of the possibilities of quantum computing have been selected for further interviews. Additionally, the interview schedule has been disclosed. One-on-one interviews were done in June and July 2021 after careful follow-up. Following a brief explanation of the interview's goal, participants are given 25–30 minutes to give thoughtful responses to each question. Only 21 out of 31 have discussed their hopes and innovations that could use quantum computing to completely transform the healthcare sector. Only 20 of the responses are deemed to be useful after serious evaluation. Table 2 displays the profile of the respondents, who are hidden from R1 to R20 to maintain their anonymity. India is where the data comes from because there has been significant Covid-19-related disruption and strain on the healthcare system there in previous years.

Conclusion

The study created a thematic analysis to present the themes and sub-themes using transcription and verbatim. presents the study's research strategy. The internal consistency of the study has been guaranteed by the use of coding to transcript for the objective of triangulation, the study examined the emerging themes with secondary data. From the interview data, the study initially created the open codes for this. It then converged and extracted axial codes that corresponded to open codes. The extracted axial codes were finally mapped to selected codes. Through the triangulation method, the research questions were evaluated for validity and in-depth examination from several points of view. Table displays a three-layered strategy that demonstrates convergence using collected data, industry reports, and research publications.

This work adds to the body of knowledge on organisational theory by emphasising how OIPT applies to disruptive technologies like quantum computing. The traditional OIPT's focus on reducing ambiguity for better decision making is highlighted by the study. Study move forward by highlighting the disruptive nature of quantum technology with respect to healthcare industry. A semi-structured technique is used to plan, develop, and carry out the survey using the OIPT lens. Healthcare professionals were interviewed, and the data collected was then analysed. OIPT is better appropriate for this study since it can address information gaps that are processed by an organisation. The operations of important healthcare industry stakeholders may be disrupted by quantum computing. such as pharmaceutical companies, medical facilities, health insurance companies, and clients. Therefore, it would be crucial to understand the key aspects of technology disruption in order to refocus organisational efforts on information processing. For many organisations, pursuing the technological singularity's limits has long been a major goal. This has been made feasible by the ongoing, dynamic rise in computer power that this study has emphasised with regard to the healthcare industry.

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Conflict of Interest

The authors declare that there are no conflict of interest.

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