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Pioneering Digital Transformation in a Future-Ready World

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Abstract: *In today's rapidly evolving business landscape, digital transformation has become imperative for companies aiming to thrive in the long term. This paper explores the concept of digital transformation and its significance in preparing organizations for the opportunities and challenges of a future-ready world. Digital transformation involves leveraging digital technology to fundamentally reshape corporate processes, business models, and customer experiences. Key technologies driving this transformation include artificial intelligence (AI), the Internet of Things (IoT), edge computing, 5G technology, blockchain, and cybersecurity. While digital transformation offers immense benefits such as improved efficiency, enhanced customer experiences, and increased innovation, organizations face barriers such as cultural resistance, organizational silos, and regulatory constraints. Overcoming these obstacles requires a concerted effort, including fostering a culture of innovation, breaking down organizational barriers, and adhering to regulations. By embracing digital transformation and leveraging emerging technologies, organizations can position themselves for success in an increasingly digital world.*

Keywords: Digital transformation, Artificial intelligence, Internet of things, Edge computing, Cybersecurity

I. INTRODUCTION

In the ever changing business environment of today, digital transformation has become a critical approach for companies looking to prosper in the long run. Organizations must change to remain competitive and relevant as technology continues to grow at an unparalleled rate. This article examines the idea of digital transformation and how important it is to get companies ready for the possibilities and difficulties of a world ready for the future.

Utilizing digital technology to radically alter corporate procedures, business models, and consumer experiences is known as digital transformation. It includes a broad variety of activities, such as adopting automation and artificial intelligence as well as cloud-based solutions. Fundamentally, digital transformation calls for a mentality and cultural shift that goes beyond simply implementing new technology. According to Westerman et al. (2011), organizations need to embrace innovation as a fundamental value and be prepared to question conventional wisdom [1].

The growing digitalization of society is one of the main forces behind the digital transformation. Customers are expecting more and more seamless digital experiences as they get more tech-savvy and connected. To be competitive, organizations need to adjust to these changing expectations. For instance, in the retail industry, internet rivals that provide easy shopping experiences and tailored suggestions based on consumer data are putting more and more pressure on established brick-and-mortar establishments [2].

Furthermore, companies may open up new doors for innovation and growth thanks to digital transformation. Organizations may obtain important insights into consumer behavior and market trends by utilizing data analytics and machine learning. This enables them to create more focused plans and make better decisions. For example, the digital transformation of the healthcare sector has resulted in the creation of novel technologies like remote patient monitoring and telemedicine, which have improved patient outcomes and access to care [3].

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Starting a digital transformation path is not without its difficulties, though. Employees who are resistant to change or who lack the skills needed to properly use new technology may be a challenge to organizations. Additionally, there may be concerns around data security and privacy, particularly as organizations collect and analyze increasingly large volumes of customer data [4].

The advantages of the digital transformation exceed the disadvantages by a wide margin. Organizations may improve customer experiences, cut expenses, and simplify processes by implementing digital technology. For instance, the use of IoT devices and sensors in the industrial sector allows companies to track the operation of their equipment in real-time, facilitating predictive maintenance and reducing downtime [5].

Furthermore, firms can maintain their agility and responsiveness in the face of quickly shifting market conditions thanks to digital transformation. Organizations may obtain a competitive advantage by promptly adapting to evolving market trends and client preferences through the use of cloud-based technologies and agile processes [6].

Organizations hoping to prosper in a world prepared for the future must embrace digital transformation. Organizations may seize new chances for development and innovation while being flexible and sensitive to changing market conditions by adopting digital technology and cultivating an innovative culture. The benefits of digital transformation make the difficult but worthwhile road worthwhile. Companies that can effectively handle the challenges posed by digital transformation will become leaders in their fields and be well-positioned for success in the digital era. Thus, in order to better equip firms for upcoming possibilities and challenges, the current study attempts to identify major trends and developing technologies influencing the digital environment.

II. EMERGING DIGITAL TECHNOLOGIES

2.1. Artificial Intelligence (AI) and Machine Learning

Machine learning (ML) and artificial intelligence (AI) have become disruptive technologies that are changing a number of sectors. Organizations may improve workflows, eliminate human engagement in repetitive operations, and simplify processes using AI-driven automation. In addition to increasing operational effectiveness, this frees up important human resources for more strategic projects. Robots with AI capabilities, for instance, can automate assembly lines in the manufacturing sector, increasing efficiency and reducing costs [7].

Furthermore, AI makes predictive analytics possible by using complex algorithms to go through big information and find patterns or trends. This enables businesses to more accurately predict future results, consumer behavior, and market changes. Businesses may proactively modify strategy, reduce risks, and seize new possibilities by using data-driven forecasts [8]. AI-driven predictive analytics are used in finance to estimate investments, identify fraud, and evaluate risk, allowing organizations to make well-informed decisions quickly [9].

A subtype of artificial intelligence, machine learning algorithms are essential for promoting efficiency and innovation in a variety of sectors. Over time, these algorithms improve decision-making processes by gradually revealing hidden insights through recurrent data learning. To identify possible disorders, forecast treatment outcomes, and customize treatment regimens, for example, machine learning algorithms evaluate patient data in the healthcare industry [10]. Similar to this, machine learning algorithms drive recommendation engines in e-commerce, offering clients tailored product recommendations based on their likes and previous actions [11]. Automation, predictive analytics, and data-driven decision-making are among the areas that AI and ML technologies are revolutionizing. Organizations may improve operational effectiveness, spur innovation, and obtain a competitive edge in the current digital economy by utilizing these technologies successfully.

2.2. Internet of Things (IoT)

A fundamental change in how systems, sensors, and devices interact and communicate with one another is being brought about by the Internet of Things (IoT), which has resulted in the massive accumulation of data from physical settings. Because of the ability to do real-time monitoring, predictive maintenance, and process optimization, the proliferation of IoT devices is revolutionizing several sectors.

IoT devices collect data from a variety of sources, including infrastructure, machinery, and environmental variables. They are outfitted with sensors and communication capabilities. These devices send data in real-time for processing and analysis to centralized systems or cloud platforms. In the industrial sector, for instance, Internet of Things (IoT) sensors

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affixed to machinery gather information on temperature, vibration, and performance indicators, offering insights into the condition of the equipment and its operating efficiency [12].

One of the main advantages of IoT technology is real-time monitoring, which gives businesses instant access to information about their surroundings and activities. Organizations can see irregularities, spot possible problems, and react quickly to events by continually monitoring data streams from IoT devices. In the energy industry, for example, Internet of Things (IoT) sensors installed on power grids track voltage levels, electricity usage, and grid stability, enabling utilities to optimize distribution networks and avert outages [5].

Additionally, IoT makes predictive maintenance easier by using machine learning algorithms and data analytics to detect equipment breakdowns and performance deterioration. Organizations may reduce downtime, prolong asset lifespans, and proactively plan maintenance tasks by examining past data and identifying trends that point to potential problems. This approach not only reduces operational costs but also improves reliability and asset utilization [5].

Additionally, by offering insights into operational workflows and resource consumption, IoT facilitates process improvement. Organizations may find inefficiencies, improve production schedules, and more efficiently distribute resources by evaluating data gathered from IoT devices. For instance, IoT sensors in agriculture track temperature, crop health, and soil moisture content, allowing farmers to maximize harvests and optimize irrigation schedules [12]. In summary, real-time monitoring, predictive maintenance, and process optimization are made possible by the widespread use of IoT devices and sensors, which is revolutionizing several sectors. Organizations may increase operational effectiveness, boost dependability, and create new avenues for innovation and expansion by utilizing IoT technologies.

2.3. Edge Computing

By moving computation and data storage closer to the point of data generation, edge computing represents a revolutionary approach to data processing. This reduces latency and allows real-time processing for a variety of applications, including industrial automation, smart cities, and autonomous vehicles.

Data processing has historically been centralized in distant data centers or cloud environments, necessitating the long-distance transmission of data for analysis and storage. However, this centralized method has proven ineffective and impracticable due to the proliferation of IoT devices and the growing amount of data created at the network edge. This problem is addressed by edge computing, which enables quicker processing and reaction times by relocating computer resources closer to the data source.

Without sending data to centralized data centers, enterprises may analyze data locally in almost real-time by implementing edge computing infrastructure at the network edge. This greatly lowers latency, improving the performance of time-sensitive applications. Edge computing, for instance, allows onboard sensors and cameras in autonomous cars to interpret data locally, facilitating quicker decision-making and reaction to changing road conditions [13].

Furthermore, edge computing disperses computational duties among several edge nodes, improving the scalability and dependability of distributed systems. By enhancing fault tolerance and resilience, this distributed design makes sure that operations continue even in the case of hardware malfunctions or network outages. For instance, in industrial automation, edge computing enables distributed control systems to process data locally, reducing dependency on centralized control systems and improving overall system reliability [13].

Additionally, edge computing helps businesses get around restrictions on bandwidth and privacy issues that arise when sending sensitive data via a network. Organizations can reduce the quantity of data transferred across the network, lowering bandwidth needs and lowering privacy threats, by processing data locally at the edge. This is especially critical for applications like banking and healthcare, where data security and privacy are critical [14].

Edge computing is a paradigm change in data processing that makes it possible to handle and analyze data in real time at the network edge. Edge computing offers several benefits, including decreased latency, improved scalability and dependability, and solutions for bandwidth and privacy issues by moving processing and data storage closer to the site of data creation. As organizations continue to adopt IoT technologies and embrace the era of interconnected devices, edge computing will play a critical role in enabling the next generation of innovative applications and services.

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2.4. 5G Technology

A new age of connection is about to begin with the implementation of 5G technology, which has the potential to transform communication networks and open up a plethora of creative applications. Compared to earlier generations, 5G networks provide far higher bandwidth, reduced latency, and more dependability, opening the door for revolutionary developments across a range of sectors.

5G technology is expected to open up new opportunities in applications like autonomous systems, augmented reality, and virtual reality due to its expanded capabilities. 5G networks' fast data rates and low latency enable the delivery of realistic AR and VR experiences with fluid real-time interactivity. For instance, 5G makes it possible for cloud-based gaming systems to provide gamers on mobile devices with responsive gameplay and high-fidelity visuals [15].

Furthermore, 5G technology makes it possible for autonomous systems—such as industrial robots, drones, and self-driving cars—to be widely used. Autonomous cars can already make split-second judgments based on real-time data from cameras and sensors thanks to 5G networks' extremely low latency, which increases road safety and efficiency. Similar to this, 5G-enabled drones and robots in the industrial sector may carry out duties including maintenance, surveillance, and inspection with more accuracy and independence [16].

Moreover, 5G technology has the potential to completely transform the healthcare industry by facilitating telemedicine, medical imaging applications, and remote patient monitoring. Healthcare practitioners may now transmit medical data in real-time and monitor patients' vital signs, consult virtually, and do procedures remotely with little latency thanks to 5G networks' high capacity and dependability[17].

In conclusion, the introduction of 5G networks, which provide better bandwidth, lower latency, and greater dependability than earlier generations, marks an important turning point in the development of communication technology. 5G technology has the potential to revolutionize several sectors and improve our lives in the digital age by enabling new applications like autonomous systems, augmented reality, and virtual reality.

2.5. Blockchain

Blockchain technology is transforming a number of sectors by providing transparent, safe, and decentralized solutions for a variety of uses, such as digital identity verification, supply chain management, and transactions. Fundamentally, blockchain is a distributed ledger that securely and irrevocably logs transactions, guaranteeing participant confidence and transparency.

The decentralized aspect of blockchain technology, which does away with the need for middlemen and centralized authority in transactional operations, is one of its primary characteristics. A network of nodes validates and verifies transactions recorded on the blockchain, lowering the possibility of fraud, manipulation, and censorship. A high degree of security and trust is provided by this decentralized design, which guarantees transactions are visible and unchangeable [18].

In the financial sector, blockchain technology has become quite popular and is upending established procedures including trade financing, remittances, and cross-border payments. Financial organizations may lower transaction costs, simplify settlement procedures, and lessen counterparty risk by utilizing blockchain technology. For instance, by doing away with the requirement for correspondent banks and middlemen, blockchain-based systems like as Ripple are allowing real-time, low-cost cross-border payments [19].

Furthermore, by improving transparency, traceability, and efficiency all the way through the supply chain, blockchain technology is revolutionizing supply chain management. Blockchain ensures authenticity and regulatory compliance by tracking the movement of commodities from the point of origin to the point of sale by recording transactions on a shared ledger. This level of transparency reduces the risk of counterfeit products, improves inventory management, and enhances trust among supply chain partners [20].

Furthermore, by offering safe and impenetrable identity management solutions, blockchain technology is redefining digital identity verification. Blockchain-based identity management solutions provide people autonomy over their digital personas, facilitating safe and secure sharing of private data with reliable parties while upholding confidentiality and privacy. This has important ramifications for sectors including government, banking, and healthcare where safe identity verification is essential [18]. In conclusion, supply chain management, digital identity verification, transactions, and other traditional procedures are being disrupted by blockchain technology, which offers transparent, safe, and

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decentralized alternatives. Organizations may increase efficiency, trust, and transparency in their operations by utilizing blockchain technology, which also opens up new avenues for innovation and expansion.

2.6. Cyber security

Cybersecurity has become a top priority for businesses of all kinds in the current digital ecosystem. Businesses are actively looking for cutting-edge solutions to reduce risks and safeguard critical data as a result of the sophistication and frequency of cyberattacks increasing. New technologies that are gaining popularity as efficient ways to strengthen cybersecurity defenses include biometric authentication, zero-trust architecture, and AI-driven cybersecurity solutions.

Artificial intelligence and machine learning algorithms are used in AI-driven cybersecurity systems to improve threat identification, incident response, and security analytics. Large volumes of data may be analyzed in real-time by these AI-powered systems, which can spot patterns, abnormalities, and possible security breaches more quickly and accurately than with conventional techniques [21].AI-driven cybersecurity solutions help enterprises stay ahead of cyber attackers and proactively protect against cyberattacks by constantly learning and reacting to emerging threats.

A paradigm change in cybersecurity strategy away from the conventional perimeter-based approach to security is represented by zero-trust architecture. A zero-trust approach limits and verifies each user's and device's access to resources and data, regardless of where they are on the network. This strategy employs stringent access controls and authentication procedures to prevent unwanted access, assuming that threats may come from both internal and external sources [22]. Organizations can reduce the danger of insider attacks and lessen the impact of lateral mobility by using a zero-trust architecture.

Traditional password-based authentication techniques can be replaced with more user-friendly and secure biometric authentication technologies. Biometric identification systems employ distinct biological traits like fingerprints, face recognition, or iris scans to accurately and reliably confirm users' identities [23]. By lowering the possibility of unwanted access, biometric authentication not only increases security but also enhances user experience by doing away with the need for complicated passwords and frequent credential resets.

Cybersecurity continues to be a major worry for businesses all over the world due to the growing sophistication of cyber attacks. Novel strategies for reducing cyber threats and safeguarding sensitive data are provided by emerging technologies including biometric identification, zero-trust architecture, and AI-driven cybersecurity solutions. By leveraging these advanced technologies, organizations can strengthen their cybersecurity defenses, safeguard against evolving threats, and maintain trust and confidence in their digital operations.

III. BARRIERS TO DIGITAL TRANSFORMATION

Organizations hoping to adapt and prosper in the quickly changing business environment of today must address cultural, organizational, and legal impediments to digital transformation. These obstacles may restrict the potential advantages of digital transformation projects as well as obstruct innovation and advancement. Nonetheless, businesses may get through these obstacles and effectively traverse the digital transformation journey by comprehending these issues and putting practical solutions in place.

Cultural obstacles are frequently caused by employee lack of digital literacy, fear of losing one's job, and opposition to change. Many businesses have deeply ingrained cultures that value consistency and predictability above creativity and adaptability. Organizations need to promote a culture of creativity, cooperation, and ongoing learning in order to go across cultural obstacles.According to Burghin et al. (2018), this may be accomplished by staff training initiatives, leadership buy-in, and open communication on the advantages of digital transformation[6]. In addition to helping to improve attitudes about change and establish a climate that is more favorable for digital transformation projects, encouraging experimentation and rewarding accomplishments may also assist.

Organizational silos, antiquated systems, and bureaucratic procedures are frequently the root causes of hurdles to digital transformation. Information cannot move freely throughout an organization or be integrated digitally if departments are siloed and there is a lack of cross-functional cooperation. Organizations should eliminate silos, promote cross-functional cooperation, and provide workers the freedom to collaborate on projects with shared objectives in order to overcome organizational hurdles [24].Reorganizing organizational hierarchies, revamping procedures, and acquiring

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cooperative tools and technologies that promote communication and information exchange may all be necessary to achieve this.

Significant obstacles to digital transformation can also come from regulatory restrictions, especially in highly regulated sectors like banking, healthcare, and telecommunications. Regulations pertaining to data security, privacy, and compliance may impede innovation and restrict the uptake of new technology. Organizations must interact with legislators and regulators, remain up to date on regulatory changes, and take proactive measures to meet compliance requirements if they want to overcome regulatory obstacles. Investing in strong cybersecurity defenses, putting privacy-by-design into practice, and carrying out frequent audits may all contribute to ensuring compliance and building stakeholder and consumer trust.

In addition to addressing these barriers individually, organizations can take a holistic approach to digital transformation by aligning cultural, organizational, and regulatory efforts towards common objectives. This requires strong leadership, clear vision, and effective governance structures to drive change and monitor progress. By establishing dedicated digital transformation teams, creating cross-functional steering committees, and setting clear KPIs and milestones, organizations can ensure accountability and measure the impact of digital transformation initiatives [5].

Organizations may also take advantage of outside alliances and networks to get around obstacles and hasten the digital transformation process. Working together with startups, industry associations, research centers, and technology suppliers may give access to resources, best practices, and knowledge that enhance internal capabilities. Organizations may generate synergies and open up new avenues for growth and competitiveness in the digital age by forming strategic partnerships and encouraging an open and innovative culture [6]. Overcoming organizational, cultural, and legal obstacles to digital transformation calls for a deliberate effort. Organizations may succeed in navigating the challenges of digital transformation by overcoming these obstacles and cultivating an innovative culture, dismantling organizational silos, adhering to laws, and utilizing external collaborations. By embracing change and embracing the opportunities afforded by digital technologies, organizations can position themselves for long-term success in an increasingly digital world.

IV. CONCLUSION

It necessitates a thorough and progressive strategy that takes into account the major developments and new technologies reshaping the digital environment. It becomes clear from this investigation that digital transformation is not just an option but also a must for businesses looking to stay relevant and competitive in an increasingly digital environment. Organizations may set themselves up for success in the future by recognizing and embracing major trends including artificial intelligence (AI), the Internet of Things (IoT), edge computing, blockchain, 5G technology, cybersecurity, and quantum computing. These technologies have the enormous potential to transform business processes, improve consumer experiences, and spur innovation in a wide range of sectors.

Moreover, overcoming organizational, cultural, and legal obstacles is necessary for digital transformation projects to be effective. To assure the widespread use of digital technologies and overcome resistance to change, organizations need to cultivate a culture of creativity, cooperation, and constant learning. Creating an agile and digitally empowered business requires breaking down silos, reorganizing procedures, and adhering to rules.

To further promote change and track advancement, digital transformation calls for capable governance structures, strong leadership, and a well-defined vision. To stay ahead of the digital race, one must also use ecosystems, collaborate with outside partners, and keep up with industry advancements.

Organizations may set themselves up for long-term success and future readiness by embracing digital transformation and utilizing the potential of new technology. While the path to digital transformation may be difficult, there are big benefits for companies that lead the way in creativity, flexibility, and resilience in a constantly changing digital environment. Organizations may prosper and take the lead in a world driven by digital innovation that is future-ready with the correct approach, attitude, and skills.

REFERENCES

[1]. Westerman, G., Bonnet, D., & McAfee, A. (2022). Leading digital: Turning technology into business transformation. Harvard Business Review Press.

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[2]. Rogers, D. (2016). The digital transformation playbook: Rethink your business for the digital age. Columbia University Press.

[3]. Singh, S., Bhatt, P., Sharma, S. K., &Rabiu, S. (2021). Digital transformation in healthcare: Innovation and technologies. In Blockchain for Healthcare Systems (pp. 61-79). CRC Press.

[4]. Holzinger, A., Weippl, E., Tjoa, A. M., &Kieseberg, P. (2021, August). Digital transformation for sustainable development goals (SDGs)-a security, safety and privacy perspective on AI. In International cross-domain conference for machine learning and knowledge extraction (pp. 1-20). Cham: Springer International Publishing.

[5]. Manyika, J., Chui, M., Bisson, P., Woetzel, J., Dobbs, R., Bughin, J., &Aharon, D. (2015). The Internet of Things: Mapping the value beyond the hype. McKinsey Global Institute.

[6]. Bughin, J., Catlin, T., Hirt, M., & Willmott, P. (2018). Why digital strategies fail. Harvard Business Review, 96(3), 52–61.

[7]. Mathew, D., Brintha, N. C., &Jappes, J. W. (2023). Artificial intelligence powered automation for industry 4.0. In New Horizons for Industry 4.0 in Modern Business (pp. 1-28). Cham: Springer International Publishing.

[8]. Agrawal, A., Gans, J., & Goldfarb, A. (2018). Prediction Machines: The Simple Economics of Artificial Intelligence. Harvard Business Review Press.

[9]. Hassan, M., Aziz, L. A. R., &Andriansyah, Y. (2023). The role artificial intelligence in modern banking: an exploration of AI-driven approaches for enhanced fraud prevention, risk management, and regulatory compliance. Reviews of Contemporary Business Analytics, 6(1), 110-132.

[10]. Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., &Corrado, G.Sebastian Thrun& Jeff Dean, (2019). A guide to deep learning in healthcare. Nature Medicine, 25(1), 24-29.

[11]. Laudon, K. C., & Laudon, J. P. (2004). Management Information Systems: Managing the Digital Firm. Pearson.

[12]. Lee, I., Kim, I., & Lee, K. (2015). The Internet of Things (IoT): Applications, investments, and challenges for enterprises. Business Horizons, 58(4), 431–440.

[13]. Shi, W., Cao, J., Zhang, Q., Li, Y., & Xu, L. (2016). Edge computing: Vision and challenges. IEEE Internet of Things Journal, 3(5), 637-646.

[14]. Bonomi, F., Milito, R., Natarajan, P., & Zhu, J. (2014). Fog computing: A platform for internet of things and analytics. Big Data and Internet of Things: A Roadmap for Smart Environments, 169-186.

[15]. Orlosky, J., Kiyokawa, K., &Takemura, H. (2017). Virtual and augmented reality on the 5G highway. Journal of Information Processing, 25, 133-141.

[16]. Rahman, M. M., Khatun, F., Sami, S. I., &Uzzaman, A. (2022). The evolving roles and impacts of 5G enabled technologies in healthcare: The world epidemic COVID-19 issues. Array, 14, 100178.

[17]. Peralta-Ochoa, A. M., Chaca-Asmal, P. A., Guerrero-Vásquez, L. F., Ordoñez-Ordoñez, J. O., & Coronel-González, E. J. (2023). Smart healthcare applications over 5g networks: a systematic review. Applied Sciences, 13(3), 1469.

[18]. Swan, M. (2015). Blockchain: Blueprint for a New Economy. O'Reilly Media.

[19]. Tapscott, D., &Tapscott, A. (2016). Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World. Penguin Random House.

[20]. Iansiti, M., & Lakhani, K. R. (2017). The Truth About Blockchain. Harvard Business Review, 95(1), 118–.

[21]. Sarker, I. H. (2022). AI-based modeling: techniques, applications and research issues towards automation, intelligent and smart systems. SN Computer Science, 3(2), 158.

[22]. Pfleeger, C. P., &Pfleeger, S. L. (2012). Analyzing computer security: A threat/vulnerability/countermeasure approach. Prentice Hall Professional.

[23]. Alsaadi, I. M. (2015). Physiological biometric authentication systems, advantages, disadvantages and future development: A review. International Journal of Scientific & Technology Research, 4(12), 285-289.

[24]. de Waal, A., Weaver, M., Day, T., & van der Heijden, B. (2019). Silo-busting: Overcoming the greatest threat to organizational performance. Sustainability, 11(23), 6860.