

Assessing the Potential Effects of Disruptive Technologies on Business Models: A Case of Saudi Arabia

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How to cite this paper: Alqahtani, F., Alshehri, A., Mulyata, J., & Cranfield, D. (2024). Assessing the Potential Effects of Disruptive Technologies on Business Models: A Case of Saudi Arabia. *Open Journal of Business and Management*, 12, 3417-3445.

<https://doi.org/10.4236/ojbm.2024.125171>

Received: June 21, 2024

Accepted: September 15, 2024

Published: September 18, 2024

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Abstract

The aim of this study is to investigate the effects of disruptive technologies such as social media, big data, and artificial intelligence (AI) on the business models in Saudi Arabia. Thus, the study is set with the view of assessing the probable impacts of disruptive technologies and exploitation of competitive advantage by organizations. Disruptive technologies have been at the forefront of influencing business direction and strategies. Many businesses, particularly those of small or medium size, are confronted with the challenges of budgeting for digitalization, strategic plans, expansion, and other related issues. It is necessary to mount up and gallop with a strategic vision that is supported by the dynamism of the company model that is best suited. More emphasis is placed on exploring how technology can assist corporations to compete within the current existing market environment since the role of technology in assessing the performance of a firm has become relevant. While the government of Saudi Arabia has recently been implementing measures to change the orientation of the economy and shift toward the digital economy with the help of programs such as the National Transformation Program and Saudi Vision 2030, local businesses cautiously approach the implementation of new technologies as the existing market players are afraid of disruption and the costs of integration are high. The study will be significant in determining the best strategies for companies in Saudi Arabia to adopt in order to take advantage of the opportunities presented by disruptive technologies. The method of this paper is based mostly on reviews and employs a qualitative approach more prominently than quantitative methods. This paper's findings revolve around disruptions, including artificial intelligence (AI), blockchain, and the Internet of Things (IoT), which are disruptive to Saudi Arabia's

business strategy, significantly influencing the business model. It stresses potential radical reconfigurations within commercial organizations as well as challenges like a lack of awareness and funding.

Keywords

Disruptive, Technologies, Innovation, Saudi Arabia, Businesses

1. Introduction

One of the most powerful countries in the Middle East, the Kingdom of Saudi Arabia, is undergoing rapid economic and social transformation at the present time. This shift has been driven by the development of new technologies and the advent of the so-called “Fourth Industrial Revolution” (Schwab, 2017). The Fourth Industrial Revolution, which has been indicated by the integration of digital, physical, and biological systems, is actually changing our everyday lives, the manner in which we work, and the way in which we interact. It is also leading to major changes in the ways organizations are managed, and in the ways, those create and deliver value to customers due to disruptive technologies. Technological advancements, and more specifically, the Fourth Industrial Revolution, have greatly impacted the Kingdom of Saudi Arabia’s business environment. A study (Manyika et al., 2013) revealed that by 2025, through the application of disruptive technologies, including advanced robotics and automation of knowledge work, it could reach \$6 trillion in effects on labor costs globally. Approximately \$3 trillion would be spent by businesses globally on information technology (Manyika et al., 2013). However, it has opened a door for innovative technologies to appear and possibly create great disturbances in well-developed markets and businesses.

It is important to shed light on disruptive and know how it changes the business models. To the same point made by Erwin Danneels (2004), disruptive technology is described as a constituent of technological change, which falls under a specific pattern and yields forecastable results. Disruptive technologies transform or build industries (Al-Ruithe, Benkhelifa, & Hameed, 2018). Studies on disruptive technologies, such as in businesses, often explore how enterprises can move to the next level in the digital customer engagement value chain (Al-Ruithe, Benkhelifa, & Hameed, 2018). For instance, the advancement in the Internet is a disruptive technology, as it has facilitated and brought about new ways of carrying out business and significantly impacted the business model. These technologies are changing companies and providing immense possibilities for reducing costs, increasing productivity, and developing new strategies. For this reason, they have the capacity to greatly alter the styles (strategy/business model) of conducting business operations in Saudi Arabia.

Innovation has had a significant effect on Saudi Arabia’s business model. The

Saudi government has made it a top priority over the past few years to foster the growth and diversification of businesses. As a result, more businesses in the country now have access to funding and other resources. It would here be important to point out that Saudi Arabia has been considerably active when it comes to innovation, which in turn means that business expansion here has been fueled by the spirit of innovation. Financial incentives such as subsidies, grants, and other forms of governmental encouragement have all been adopted to support and foster the development of innovative products and services. As a result of such policies, companies have been able to come up with new and innovative ideas in products and services to enhance their operation and profitability. Considering the experience, it is now real that with the help of innovation, numerous companies were able to enter many areas that were earlier so difficult to enter and, thus, developed their client base to an enormous extent. Hence, it generated more employment and, thereby, lowered the jobless rate, thus the poverty rate in the country. Findings of a survey conducted at the Massachusetts Institute of Technology (2013) reveal that digital business organizations have a 26% higher median profitability than their counterparts. This shows the relevance of disruptive technologies and how they affect business models to achieve business goals. As a result of innovation, business models are now able to get a hold of the latest technology as well as increasing their efficiency.

Entrepreneurial activities in Saudi Arabia have been enhanced and altered by the use of disruptive technologies that have changed the fortune of business operations (model) in relation to the availability of new sources of funding such as venture capital, angel investors, and government grants. The nature of business has developed through the adoption of technology, easier ways of working, hence improved returns and competitiveness through reduction in personnel. Marketing communication through the Internet and social media has made this possible, and through technology, firms can serve their clients better and even hold long-term relationships with them. In addition, technology supersession has reformatted the supply chain processes, thus resulting in reduced cost and appropriate inventory systems. In general, it is apparent that technology has helped to open international markets, improve access to qualified workers, and provide the tools that allow companies to compete throughout the world.

This research paper's core objective is to evaluate disruptive technology's potential effects on revolutionizing business models in Saudi Arabia. To assessing this, understand the business models that are currently employed in Saudi Arabia and if these models can be disrupted (vulnerability to disruption) by new technologies, to assess the effects that disruptive technologies may have on the current business models in Saudi Arabia, to explore the possibilities of the existence of business models to be disrupted in the future, and to provide recommendations on how disruptive technologies may be integrated into the Saudi Arabian business models to optimize their efficiency and profitability, and, therefore, enhance business innovation. The literature review section will give

the current findings of research on disruptive technologies and how this research has impacted business models in Saudi Arabia. This section will look into the theories and then review literature that has been reviewed in other studies to establish the research theory. In the next section, the research methodology will detail the research design and procedure followed in the study. The results section will, therefore, be used to discuss the research findings so as to highlight the effects of disruptive technologies on the Saudi Arabian business models as well as outline the strategies that organizations can employ to counter the effects of disruptive technologies. Finally, the conclusion will highlight the main implications of the research study represented in this article and the suggestions for further research to offer future research direction.

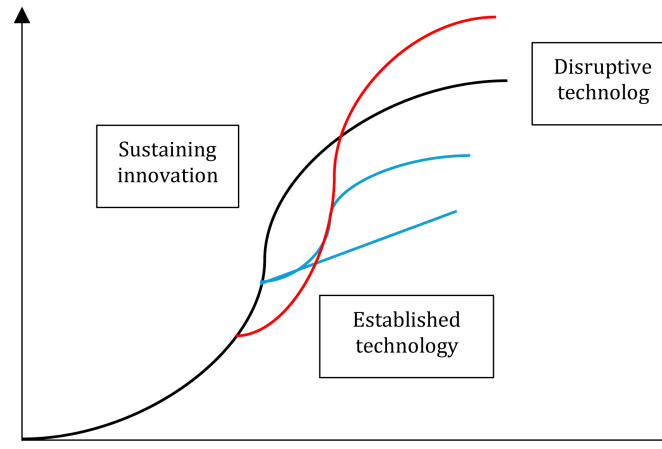
2. Literature Review

The rapid development of disruptive technologies in recent years has significantly influenced many facets of contemporary life, and this impact is only expected to increase. Therefore, it is of tremendous interest to investigate how new technologies might affect the status quo in Saudi Arabia's commercial sector. In this overview of relevant literature, this paper will examine the current level of knowledge on this subject and draw attention to significant findings, practical applications, and future directions.

2.1. Disruptive Technologies and Business Models

Disruptive technologies are those that bring about fundamental changes in traditional business models. Technologies disruptive could both establish new marketplaces and value chains while also upending current ones (Schwab, 2017). Technology, such as the Internet, AI, robotics, blockchain, etc., are all examples of disruptive technologies (Osakuade & Moore, 2023). Many of these innovations are the result of fusing together previously independent technologies to produce a novel framework (Al-Ruithe et al., 2018). Disruptive technologies are defined by their ability to upend established norms and business models in their respective fields (Chen et al., 2022). These typically necessitate a different set of resources than those already in use, as well as the incorporation of new technology and business models. This may necessitate rethinking traditional methods of doing business or developing brand-new methods, procedures, or products and services. Data and analytics are frequently used in disruptive technologies to learn more about consumer habits, market tendencies, and other topics (Osakuade & Moore, 2023). When used in the business world, disruptive technologies have the potential to both disrupt and create totally new markets and value networks. They may improve product variety, decrease prices, boost quality, and open up previously inaccessible markets. They may also present chances for businesses to better utilize resources, cut costs, and develop innovative new offerings (Al-Ruithe et al., 2018). According to Pham and Ho (2015), high-end innovation, which refers to innovation with exceptional performance, is often a

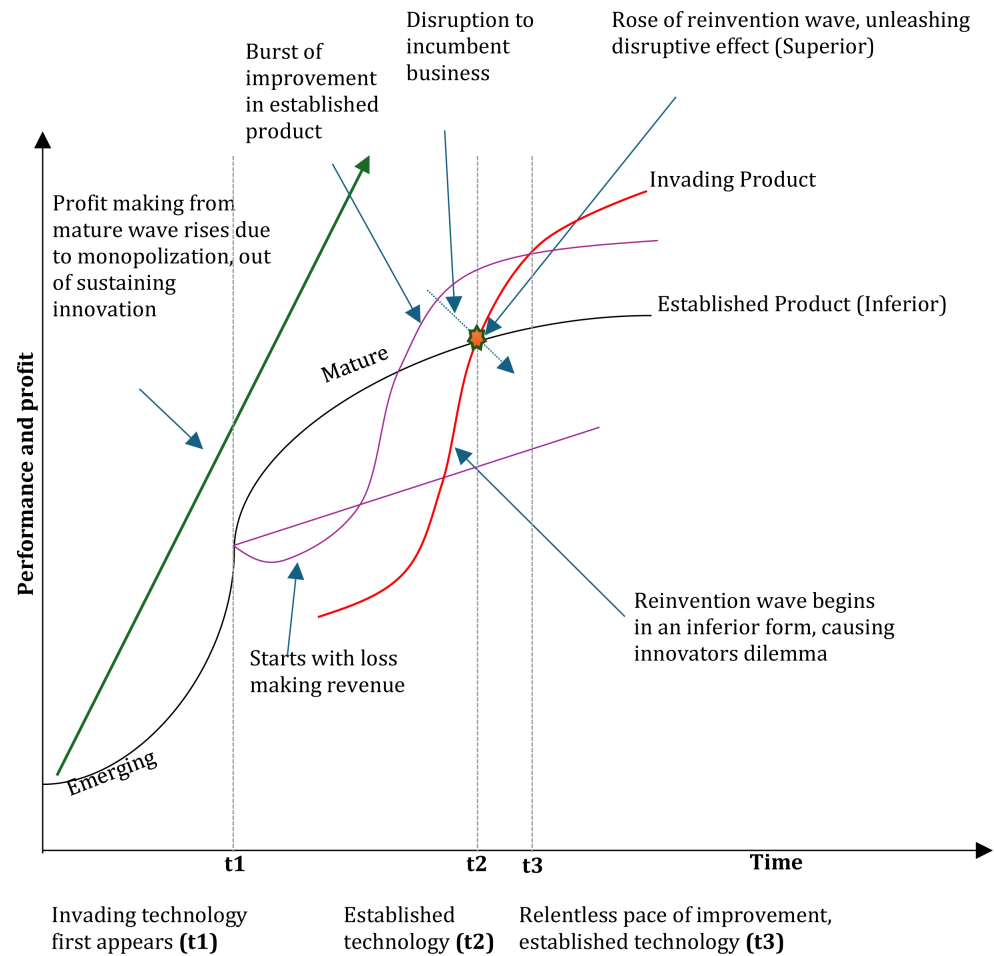
crucial component in influencing the intention to embrace innovation in most studies on innovation diffusion. Basically, innovation disruption occurs when a new product outperforms current goods in meeting market demand throughout the process of innovation diffusion (Ho, 2022).



Graph 1. S-curves for both well-known and disruptive technologies (Utterback, 1994).

As shown in **Graph 1**, Utterback (1994), employs the S-curve model to depict the life cycle, which states that the development of a technology, industry, or product follows an S-shaped curve over time. In addition, new players into the industry are most likely to come up with innovative technologies. Thus, it is challenging to predict how disruptive technology will change the market, and sometimes, even those who create disruptions might experience disruption. Hence, incumbent players (big fish), as well as the nodes of economic activities, often migrate (Utterback, 1994). Therefore, **Graph 2** below has been introduced to provide additional clarity through the three S-curves in detail about the disruptive technologies.

By definition, disruptive technologies are innovative technologies that initially operate in a niche market with inferior performance but eventually redefine the market and its value proposition and displace the traditional technologies or incumbent firms (Utterback, 1994). These technologies mostly begin as specialized solutions but can quickly become disruptive by revolutionizing and displacing incumbent technologies. Results in major realignments of industry conditions and market relations. It can radically affect existing industry models based on its ability to offer innovative solutions for tackling existing issues, create entirely new market niches, and make previous solutions irrelevant. Sustaining innovations in the S-curve's upward movement refers to incremental advancements (gradual) made to a technology or product's performance, efficiency, or functionality to obtain market acceptance. It is not necessary that it is always incremental; it can be quite radical, too (Dalum, Pedersen, & Villumsen, 2022, Technological Life Cycles: Regional Clusters Facing Disruption). These innovations are mostly incremental in nature and require new knowledge and



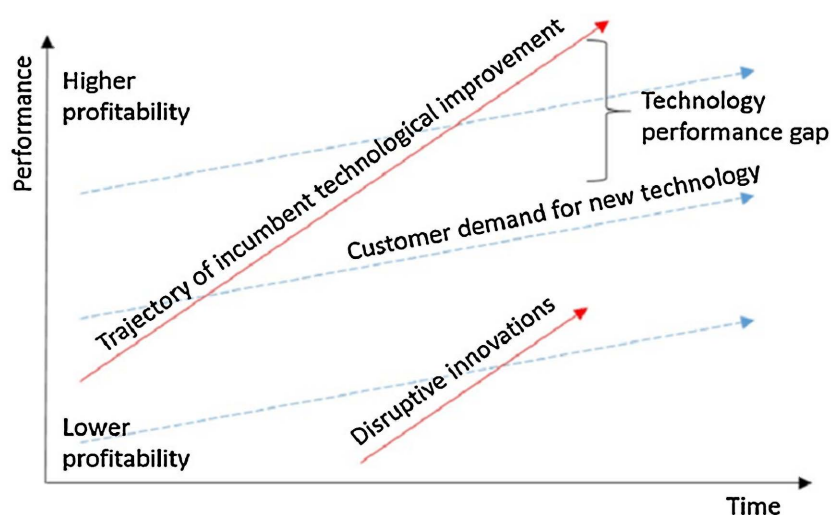
Graph 2. S-curves in details of disruptive technology (Author’s Create).

technological evolution on the existing ones. Whereas established technologies are those that are in the mature stage in terms of the technological cycle. They are commonplace, fine-tuned, and well-incorporated in today’s marketplace activities.

Clayton Magleby Christensen’s (1997) there were three principal components of disruptive innovation in the disk drive industry. **Graph 3**, related to the Clayton Christensen (1997) theory about disruptive innovation, represents disruption over-time between incumbents’ technologies and disruptor innovations. Therefore, these components assist in increasing knowledge about the insights related to disruptive technologies, as shown in **Table 1**.

2.2. Impact of Disruptive Technologies on Saudi Arabia’s Business Models

Recent research has shown that disruptive technologies may have far-reaching effects on Saudi Arabia’s business models. For instance, a study investigated the effects of technological disruption on small engineering and architectural enterprises in Saudi Arabia (Qattan, Fakeerah, & Qattan, 2021). Specifically, the vague



Graph 3. Disruptive innovation in the disk-drive industry (Christensen, 1997).

Table 1. Principal components of disruptive innovation.

Three principal components of disruptive innovation	Insights
1. Technological progress outstrips customer demand	<ul style="list-style-type: none"> • In many fields of business, the rate of technological advancement can outpace the demand of customers, • It is possible for incumbents to overserve the market by manufacturing more advanced products than are required by customers, • This results in a disconnect between the performance that companies offer their clients and the needs of those clients, • This void creates an opportunity for new competitors to break into the market.
2. Crucial distinction between sustaining and disruptive innovation	<ul style="list-style-type: none"> • It's possible for numerous forms of innovation to arise within a sector, • The vast majority of innovations are incremental and serve to enhance products and services along the performance metrics most valued by the mass market, • The ability to sell more of their products to their most valuable customers at higher prices and with greater margins is a key benefit of sustaining innovations for market leaders, • In contrast to the more common incremental innovations, disruptive innovations are more likely to have a significant impact on a market, • In the beginning, disruptive innovations perform worse than established ones on standard performance metrics, • Innovations with the potential to disrupt the market offer a unique combination of benefits that attracts customers on the market's periphery, especially those with low purchasing power, • Some characteristics include being less bulky, less expensive, more easily accessible, and more hassle-free.
3. Established customers and profit models constrain investment in new innovations	<ul style="list-style-type: none"> • Large organizations with stable, reliable sources of revenues, such as mass production industries, might be reluctant to consider radical innovations because of the risks they pose to alienating consumers or moving away from traditional revenue streams. • The larger firms may not consider taking risk in this venture, whereas those new players in the market may. • It is always perverse of incumbents not to come up with such technologies as those that offer low margins, target a segment that is smaller than the segment served at the time by present consumers, and offer inferior products and services.

notion that digitalization, facilitated by disruptive technologies, is advantageous only for the companies of the “new generation,” which ostensibly offer exclusively digital goods and services, has to be dissipated (Aral, 2013). For instance, disruptive technologies like electronic selling and digital commerce, where business transactions are conducted electronically, point to the fact that it is possible to target almost all potential consumers instead of limiting itself to a few customers present in the specified region, as pointed out by Clow and Baack (2004). In the same regard, several authors showed how disruptive technologies could redefine business models and presented the opportunities and the value of such innovations in their theoretical papers. For instance, Renatus Michael (2014) conducted a study focusing on the influence of the Internet and e-marketing in enhancing businesses profitability, customer base, and organizational growth. The author found that these benefits can be realized by firms of all sizes (Michael, 2014). Furthermore, El-Gohary et al. (2008) state that digital media and E-Marketing provide a boost to small and medium businesses, resulting in an improvement in performance that also contributes to the overall economy of the country and, as a result, increases the number of job opportunities available to people who are currently without work (El-Gohary, Trueman, & Fukukawa, 2008). According to Boersma and Kingma (2005), the primary issue of businesses was the organization of their internal management information systems, such as ERP and CRM (Boersma & Kingma, 2005). Examples of a technology that can likely be disruptive in some sectors and environments include enterprise resource planning (ERP) and customer relationship management (CRM) systems. Adopting advanced technology to perform many tasks that were time-consuming and requiring great effort from employees has been a threat to traditional company processes and functioning. These platforms have enhanced the capacity of choosing the data and the productivity of companies through offering them the bird’s-eye perspective of the operations and consumer data. Most organizations have seen a tremendous benefit in adaptive ERP and CRM management systems that have replaced traditional corporate practices. From Kauffman and Walden’s (2001) perspective, these changes have mainly targeted internal business process changes that are confined within the organization’s Four Walls, such as optimization, efficiency, and overbearing cost reduction. Cesaroni and Consoli (2015) argued that the utilization of digital sources in business has broadened the support and assistance to firms for the purpose of maximizing consumer consciousness, creative ways, and processes of trade for the purpose of achieving efficiency and effectiveness. All that sales and marketing teams are supposed to do is digitize everything, and that would, of course, save the company a lot of time and money in the long run. Chen et al. (2013) noted that large corporations are strategic since they can coordinate and construct their digital portfolio due to the availability of resources and capabilities. As a result of ongoing advancements in Internet and mobile technology, previously established connections to the Internet have been transformed into nearly limitless connectivity (Bradley &

Bartlett, 2011). As a consequence, the impact of networks has increased beyond all bounds, and accessibility of information, trade business, and entertainment is unrestricted (Shankar & Balasubramanian, 2009). According to Fudurić et al. (2018), customers can access a greater amount of content on a variety of devices, and their usage of the Internet may soon surpass that of conventional media. The proliferation of wireless networking and the growth of social media has become pervasive in people's day-to-day lives (Deng, Zhou, Wu, Qin, & Liu, 2018). According to Watson et al. (2002), digital/disruptive technology can be utilized to deliver value to consumers in a variety of ways, all of which serve to widen customers' awareness of and experiences with regard to the relationship between time and location. Williams et al. (2010) pointed out that digitalization is one of the most important sources for both obtaining market dominance and customer value because digital services can be obtained online, and digital agreements can be made through the use of the Internet. The disruption of business caused by the emergent of new technology is currently leading to new business processes, which are currently replacing the current corporate environment that is now customer-centric.

The use of disruptive technologies in Saudi Arabia has the potential to completely alter the economic landscape of the country. The adoption of these cutting-edge technologies is anticipated to have far-reaching effects on the economic structure of the country since they will disrupt established methods of doing business and give businesses new opportunities to differentiate themselves. Optimizing operations is a key area where disruptive technology may have an effect on Saudi Arabian company practices. Automation, efficiency gains, and lower operating expenses are just some of the benefits that modern technology have brought to the business world. This can aid companies in streamlining their operations and concentrating on what they do best. In addition, innovative technologies might help organizations learn more about their clientele. Businesses can learn more about their customers' tastes and habits by collecting and analyzing consumer data. It can be utilized to create tailor-made offerings that are sure to please. This information can also be used to improve marketing techniques, which in turn will boost customer retention and loyalty, as well as revenue. Finally, disruptive technology can inspire creative thinking within companies. Using cutting-edge tech, companies can create innovative goods and services with which to compete.

- **Increased Automation:** Many of the manual operations that Saudi Arabian enterprises rely on today can be automated with the help of disruptive technologies like artificial intelligence (AI), the Internet of Things (IoT), and robotics. Automating routine tasks can make them easier to manage and complete, freeing up resources for more strategic endeavors. As a result, there will be increased productivity and decreased expenditures.
- **Enhanced Efficiency:** To further streamline operations, lessen operating expenses, and enhance customer service, firms in Saudi Arabia might adopt

disruptive technology. Automation and AI can help complete tasks more quickly, freeing up manpower for more strategic endeavors. This has the potential to improve the productivity and competitiveness of Saudi Arabia's commercial sector.

- **Improved Customer Experience:** Businesses in Saudi Arabia can give their customers a better overall experience by using disruptive technology to deliver individualized care. By using AI and data analysis, businesses may learn more about their customers' habits and interests, allowing them to better cater to those customers.
- **Increased Revenue:** Organizations in Saudi Arabia can boost their bottom lines by adopting disruptive technologies. The use of automation and AI can help organizations save money and time, which they can then use toward expansion.

3. Research Gap

This article fills a knowledge vacuum by examining the effect of disruptive technologies on the business models of Saudi Arabia and the regional economy. It's important to investigate how the use of innovative technologies in company models has boosted growth in the area's economy. The influence of disruptive technology on Saudi Arabian firms should also be compared to those of other Middle Eastern countries. As a result, have a firmer grasp on how disruptive technologies are used and impacted in various fields. In addition, it is important to investigate the obstacles and solutions used by Saudi Arabian companies as they adopt disruptive technology. This will help in identifying areas that need improvement regarding the region's acceptance and implementation of technology.

Some core research questions that arise are: in light of disruptive technologies, "How does the case of Saudi Arabia depict the alteration in the conventional business models, along with the main strengths and weaknesses of the kingdom's businesses?" and "How does the concept of disruptive technologies fit in changing the structure of doing business in Saudi Arabia, and what are the strategies of using the technologies to improve organizational performance and customer relations, as well as to increase competitiveness?". The two research questions were derived from the overall existing literature review on disruptive technologies and their effects on the business model globally. The literature reviews most themes; how technologies such as AI, IoT and blockchain can significantly boost efficiency, cut costs and improve customer interaction (Schwab, 2017; Brynjolfs-son & McAfee, 2014), the challenges businesses face when implementing these technologies—like the need for skills and infrastructure (Chen et al., 2022; Osa-kuade & Moore 2023) and the vital role of data and analytics, in reshaping business strategies (Al-Ruithe et al., 2018). The researchers developed research questions to investigate how Saudi Arabia's distinct economic and regulatory landscape affects the adoption and consequences of disruptive technology on business models. The purpose of the questions is to reveal the particular strengths

and weaknesses of Saudi firms in this situation and to determine effective strategies for using these technologies to improve organizational performance, customer relations, and competitiveness. This technique guarantees that the study is firmly based on both theoretical insights and practical issues that are pertinent to the Saudi market. This research paper attempts to fill the research gaps in the lack of context-specific studies that specifically focus on Saudi Arabia instead of generalizing findings from other regions and the need for sector-specific insights. Although there is a broad comprehension of the effects of disruptive technologies, the availability of localized studies is restricted due to the distinctive economic, cultural, and regulatory conditions in Saudi Arabia.

4. Research Method

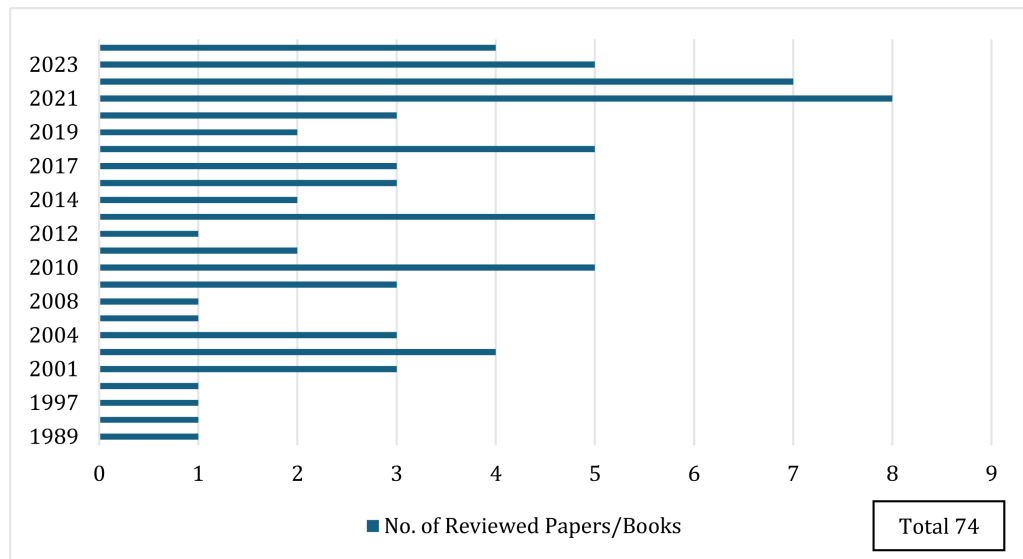
This research paper critically analyses the existing literature, which is derived from various authoritative sources such as books, articles, reports, and previous research. It offers the relevant research in full and synthesizes the major insights. Due to the small number of articles meeting our criteria, we were forced to collect our data in a more traditional manner.

A guide for the approach that will be taken in the research paper will be provided by the research method that is described below:

Researching the Books: Articles, papers, and studies discussing the effect of disruptive technologies on business models in Saudi Arabia will be uncovered through a thorough search of academic databases such as Scopus, JSTOR, ProQuest, and Google Scholar. Books for example, “The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail (Christensen, 1997)”, “Integrated Advertising, Promotion and Marketing Communications (Clow & Baack, 2004)”, “Digital Ecosystems in the Clouds: Towards Community Cloud Computing (Briscoe & Marinos, 2009)”, “Design of Emerging Digital Services: A Taxonomy (Williams, Chatterjee, & Rossi, 2010)” etc. are used as reference for deeper understanding of disruptive technology and its role in the business model. In **Graph 4** below, I showed the time (year) of reviewed papers.

Methods of selection: For the purpose of this paper, this study utilizes meta-analysis in order to the results obtained from the literature review analysis have been screened according to the following acceptance and rejection criteria. This is primarily an analytical paper mainly involving a review, where the use of the qualitative method of data collection and analysis is more prevalent than the quantitative method. Business articles where Saudi Arabia has been mentioned as a country that was impacted by disruption technology on business models will be used. Articles that fail to address disruption technology or lack a compelling Saudi Arabian focus will be rejected.

Gathering and analyzing data: Another element of this approach is that, based on the findings of the articles, reports, and research, it will be possible to highlight the key results and insights that relate to the likelihood of disruptive technologies affecting the business models in Saudi Arabia. To achieve this, one



Graph 4. No. of reviewed papers/books (Author's Create).

has to identify technologies, industries, and business models that have been impacted, challenges, and risks of embracing such technologies.

Analysis and synthesis of the data: According to Hansen et al. (2022), in a qualitative meta-analysis, case studies are used in a meta-synthesis protocol to identify influential variables or patterns and derive a meta-causal network (Hoon, 2013). A complete overview of how disruptive technologies may alter business models in Saudi Arabia will be provided by synthesizing the results of the examination of relevant papers, reports, and research, and we compared and analyzed them thoroughly. A large number of publications providing more comprehensive reviews and incorporating most of the arguments made in other articles were chosen once the analysis was finished. It's possible that the lack of systematic research can be attributed to the relative newness of the field. In this way, articles made it possible for us to adopt a more methodical strategy for synthesizing the most important findings. This paper also noticed that the specific insights gained from one study complement the others. As part of this, this study will be on the lookout for insights concerning the widespread use of disruptive technologies in the country.

By using this methodology, the review article will be thorough, methodical, and strong; hence, it will serve as a valuable resource for researchers, practitioners, and policymakers in Saudi Arabia who are interested in the effect of disruptive technologies on business models.

5. An Insight into the Business Model Evolution in Saudi Arabia

This results in radical shifts in established competitive strategies and industrial structures through the creation of new markets and the destruction of existing ones by disruptive technologies such as AI, blockchain, cloud computing, 3D

printing, nanotechnology, and the Internet. It means they have different needs for resources and technologies, which sometimes means a change in traditional practices. Consumption patterns and market trends are analyzed for the purpose of making decisions and predictions. Disruptive technologies can disrupt or re-configure value networks, transform or create new markets, enhance product variety, decrease costs, and increase quality and access to new markets. These also offer challenges that can help companies use resources efficiently, reduce expenses, and create new products. Businesses need to ensure that they are flexible in their operations in order to suit present-day technological advancements and customer demands.

There has been a change in the nature of Saudi Arabia's economy as the country diversifies its sources of income, which fundamentally alters the business environment of the country. The Vision 2030, which launched the long-term strategic framework for economic and social development of the country, has entailed changes that include reforms aimed at reducing startup costs for businesses, ease of dealing with the government, and favorable taxation regimes. During this transition, e-commerce has been significant since the government has acknowledged it as an essential sector of the growth of the economy. The current attempts in the process of privatization have created opportunities for shares to get into the private sector, and this has attracted international investors in technologies, energy from renewable sources, and infrastructural developments. In pursuit of these goals, the business model will adapt to the new requirements and challenges as the country and the business develop.

The transformational disruptive forces have introduced new concepts in the Kingdom of Saudi Arabia's business structures and dynamics on the path for economic diversification and efficiency improvement, additional and increased investment, and most importantly, empowered consumers. The dependence on oil production is diminishing, and other fields of business, such as high technology and services, are being explored. Another factor that makes it ideal for business interruptions as a startup is cost reduction and efficiency due to technological advancement. Self-sustainable employment opportunities as well as FDIs have also been lured by disruptive technologies in information technology, renewable energy, and business industries, improving the country's growth in the economy and establishing more job openings. The adoption of Information technology has expanded significantly across the Saudi Arabia, especially with innovations such as cloud computing, artificial intelligence, and big data analytics. These technologies have resulted in enhancement of efficiency and innovation, hence drawing more investors in technology industries across the globe. The flows of FDI in ICT sector raised from SAR 893 million to SAR 7.2 billion ranging from 2010 to 2022, and the highest of SAR 16.4 billion recorded in the year 2019 and a mean of SAR 4695 billion (Little, 2021; Bardesi, 2024). Foreign investment has spurred the creation of tech clusters and innovation zones, have helped expand the Saudi Arabian technology industry, and foster skilled em-

ployment opportunity (Alharbi, 2023). The kingdom of Saudi Arabia has shown significant efforts to increase its portion of renewable energy using the improvement of solar and wind technology (Alharbi & Csala, 2020). By so doing, large-scale renewable energy projects have been realized through adoption of highly disruptive contemporary technologies in execution of the aforementioned areas. The renewable energy industry has continued to receive international investors, where some green projects such as NEOM smart city, and several solar and wind power plants (Boretti & Castelletto, 2022). They are not only the source of fast-paced development of renewable energies, but also contribute to the creation of new job places in the sphere of green technologies and related fields. Technological advancements of the disruptive technologies, for instance, blockchain, IoT, and advanced analytics have brought changes to the Saudi Arabian business environment through improvement of operations and the creation of new markets and opportunities. It is with these technologies that international investors have seen an opportunity to invest in the changing business environment. Internet shopping and innovations in technology have put the consumer in a unique position and enabled the providers of services to have a better understanding of their customers. The shift in power and those in the economy are expected to sustain new changes to steer the country in a new direction.

Disruptive technologies are expected to bring drastic changes to the Saudi economy and the overall business environment while opening new opportunities. The one area where disruptive technology can start to make a difference is in the area of operating at higher efficiency and, at times, with increased speed as a result of the adoption of new technologies such as automation. They can also enhance their understanding of customers' trends and patterns for the specific purpose of developing relevant products and enhancing the strategies used in marketing with the aim of increasing customer loyalty and hence revenues. Embracing disruptive technologies can also catalyze a new way of thinking and make it possible to produce new products and goods with which to compete. Also, an increase in the application of computer systems to provide regular day-to-day solutions and data analysis can assist Saudi Arabian enterprises to enhance productivity and reduce their expenditures, hence increasing competitiveness.

Cloud computing as a support for the technologies of digital transformation It is important to acknowledge that cloud computing is an inherent part of the infrastructure that enables the transition to a new level of development (Briscoe & Marinos, 2009). Cloud computing has played a crucial role in realizing Vision 2030's digital transformation goals related to data management, storage, and processing in Saudi businesses. At the moment, the most popular and promising technologies in many spheres, such as retailing and educational services, are virtual reality (VR) and augmented reality (AR), as they provide opportunities to improve customers' relations and internally optimize different processes. These technologies help to get rid of physical prototypes and enhance supply chain affairs. Thus, potential users of VR and AR can improve training activities and

reduce costs and time. The use of blockchain technology can be a decentralized, secure, and transparent technology that has the ability to change the traditional business model for higher productivity and openness in different sectors. Based on the survey conducted online by Deloitte, 58% of the respondents claimed that the impact of blockchain's capacities will be significant in the future. The following industries stand to benefit the most from blockchain technology in Saudi Arabia (Deloitte's 2019 Global Blockchain Survey, 2019):

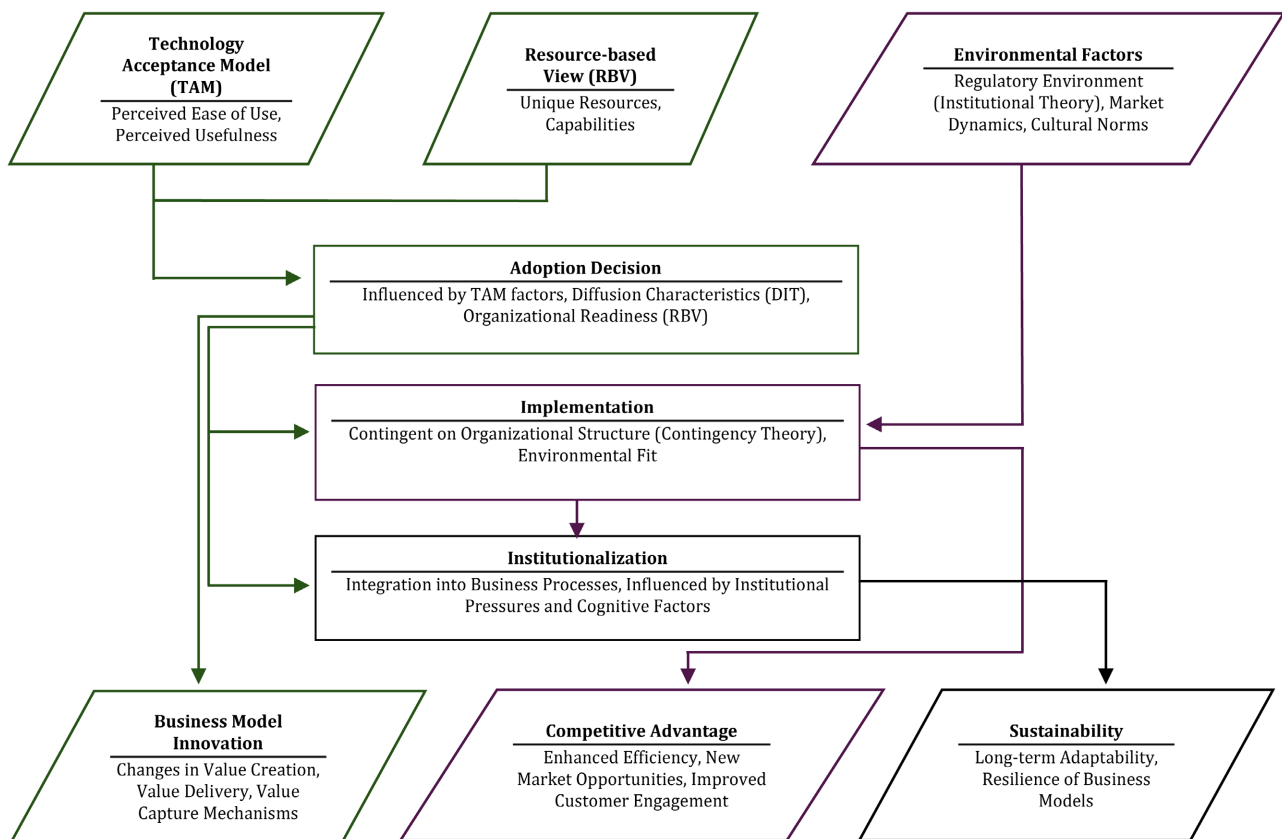
1) Finance: This type of distributed database can transform the system of financial operations and exclude middlemen like banks or payment service providers. This leads to a quicker means of transacting with less or no charges involved in the processes (Vinciguerra, Cappellieri, & Pizzo, 2021; Jepkemei & Kipkebut, 2019). This can help Saudi Arabian citizens and businesses alike make financial transactions more effective and accomplish more (A-khateeb, 2021). Blockchain improves the transparency of any process by offering a distributed and untamperable record. This minimizes fraud and makes transaction records more secure from any form of tampering. In Saudi Arabia's financial sector, this can increase the volume of both trust and compliance, which is quite important in a region that prides itself on its commitment to consistency of transparency and anti-corruption efforts (A-khateeb, 2021). New innovative products like smart contract applications and decentralized finance (DeFi) platforms are possible (Schär, 2020). These innovations can provide new forms of investment and financial services in striving to meet the customers' needs in Saudi Arabia.

2) Supply Chain Management: An added advantage of the solution is its ability to maintain an unalterable and easily traceable record of every transaction and activity that takes place within the supply chain. This can enhance traceability and accountability in a business, which helps to eliminate fraudulent activities and mistakes (Chang, El-Rayes, & Shi, 2022). For companies in Saudi Arabia, this comes as improved quality assurance and effective management of the supply chain (Azmi, Sweis, Sweis, & Sammour, 2022). Blockchain can be used to enhance automation and coordination in supply chain management, thereby decreasing paperwork, time delay, and inefficiency across various participants. This is particularly useful, especially in operations that involve various supply chain networks, such as the oil and gas industries. It also helps in managing better working relations with suppliers and business partners as it presents proven records of the business transactions. It can foster confidence and relations in the Saudi supply chain networks that would undoubtedly improve the relations between organizations.

3) Voter Verification: Voting systems could benefit from the use of blockchain technology because records are interception-proof, making voting systems more transparent as well as safer. For instance, it can be used in improving the security measures in the electoral processes and the voting systems, thereby eradicating issues of fraud among other social vices that have bearing on the votes (Berenjestanaki, Barzegar, El Ioini, & Pahl, 2023; Chaudhary et al., 2023). As it

can eliminate the inaccuracy that usually comes with voting and also make the process easier and faster. This can be especially effective in the case of general, or presidential, elections, or in referendums when timely and precise results are the most important.

4) Real Estate: Through the use of the blockchain, real estate deals can be easily executed and documented in real estate, thus being secure. This can eliminate the possibility of fraud within a short span of time, minimize paperwork, and quicken the process of buying and selling (Saari, Vimpari, & Junnila, 2022). For Saudi Arabia, this translated to a better and more effective RE market and an increase in the confidence levels of the property market (Faal & Albalwi, 2024). This makes it possible to enhance transparency in a sector like real estate, where issues such as property title and ownership can be verified. It will be especially relevant in the context of Saudi Arabia, as the real estate sector is experiencing significant expansion, and it is vital to gain the confidence of both foreign and domestic investors. This means that through the use of blockchain to encourage property transfers, real estate firms' equities can greatly benefit from the disposal of current conventional techniques by cutting many overhead costs as well as fees. This can also result in property sales being cheaper for both the buyer and seller when property transactions occur in Saudi Arabia.



Graph 5. Theoretical framework for impact of disruptive technologies on business models in Saudi Arabia (Author's Create).

As indicated in **Graph 5**, the basic availability and implementation of technology within the scenarios (TAM) and the Diffusion of Innovations Theory explain the necessity of employing resources (RBV), the adaptability of organizational structures (Contingency Theory), and integration into an industry's institutional standards (Institutional Theory). Davis's Technology Acceptance Model (TAM) forms the basis for understanding how technological characteristics impact the adoption process. Particularly, it discusses the role of perceived ease of use and perceived usefulness that influences people and firms to adopt new technologies (Dalum, Pedersen, & Villumsen, 2002; Davis, 1989). Thus, in the context of the Saudi Arabian economy, TAM contributes to the understanding of why some firms agree to employ disruptive technologies such as artificial intelligence and blockchain (Sofinska, 2024). The tech-savvy users are more likely to innovate as the perceived ease of use and perceived usefulness serve as the primary vectors for the adoption of disruptive technologies. It assists in explaining the nature and determinants of the Saudi business organizations inclined towards adopting new technologies. Taking TAM as its foundation, the Diffusion of Innovations theory (DIT) continues the study of how certain innovations gain usage in a society or organization (Ho, 2021). They consist of the nature and attributes of the innovation, the communication media used, time and the social structure. It provides the structure for examining the pace and extent of disruption and the nature of technology taking place in various sectors in Saudi Arabia (Almaiah et al., 2022), including identification of first movers and elements that might either promote or curb the diffusion of disruptive technologies. It offers understanding of the processes of diffusion of disruptive technology in the business environment of Saudi Arabia. Thus, it draws attention to pioneers and defines the characteristics of enablers and barriers to the dissemination of these technologies. Resource-based view (RBV) theory posits that only organizations having resources and capabilities that are valuable, rare, costly, and non-substitutable to the competitors can obtain sustained competitive advantage in the long run (Gupta, Tan, Ee, & Phang, 2018). In context to Saudi Arabia, RBV is applied on the basis of understanding how firms built on their existing resources, like human capital technologies, how they capitalize on or integrate with disruptive technologies (Alkandi, 2021; Furr & Eisenhardt, 2021). This emphasizes the local resources necessary for an organizational improvement program to be successful in its technological epitome. Contingency theory postulates that organizational performance is a function of the matching of organizational attributes like structure and processes with contingencies, which are characteristics of the organizational situation. Using this theory assists in explaining how Saudi businesses have to modify the approaches and organizational frameworks for improving the disruption technologies in the light of certain environmental factors and organizational requirements (Drejer, 2002; Hamann, 2017; Chew, Alharbi, Khaw, & Alnoor, 2023). This deals with the issue of how well one is placed to meet this requirement by having an understanding of how

well organizations' characteristics match up with external contingency factors. Institutional theory is concerned with constraining processes that reshape organizational activities and determine the form of institutional pressures, norms, and cognitive factors that affect organizational action (Currie, 2011; Yuga & Anas, 2020). Thus, institutional theory is particularly important in KSA when considering factors that determine the regulatory and appropriation levels of disruptive technologies, which include legal and cultural patterns and norms constituting the organizational field (Buqawa, Al-Harbi, & Almahamid, 2018; Zighan, 2022; Al-Fugaha et al., 2024). It also looks at the application of these technologies in business and how they affect sustainable business and compliance.

The framework deals with the fundamental factors that include the actual technology acceptance at the basic level and the diffusion process, the internal resources in the adoption process, the contingencies, and the institutions in this process. Thus, the research incorporates these approaches and presents a more nuanced view of the forces that influence technological adoption and innovation in the Saudi context while offering both theoretical and practical contributions. This approach also focuses on the topic of disruption benefits within the context of Saudi but also stresses how disruptive technologies may happen in the specified environment. The implementation of disruptive technologies in organizations results in improved business performance. This includes attaining more efficiency, cutting on costs, as well as enhancing the engagement and satisfaction of the clients. Applying disruptive technologies, Saudi businesses get a better position in the market compared to their rivals as well as develop exceptional value propositions for users. The framework also focuses on the fact that the aim is always the sustainable development of the business. This entails instituting long-term operating structures and fortifying organizations to constantly withstand the ever-changing market conditions and technological updates.

6. Results and Discussion

This section summarizes the main and significant findings of the research study. Therefore, this research paper provides a detailed explanation of the key findings determined from the previous studies, specifically from 1997 to 2023, which present these findings as relevant to changing the business model. This paper has selected studies on disruptive technology that primarily focus on evaluating the potential impacts of these technologies on business models (Table 2).

This research study has several propositions based on the comprehensive literature review, which gives the researchers insights into the Saudi Arabian business model:

- Disruptive technologies, such as AI, IoT and blockchain, are set to transform business practices in Saudi Arabia by boosting efficiency, cutting expenses and enhancing customer interaction.
- The incorporation of these technologies in Saudi Arabia is shaped by elements

Table 2. Studies chosen for their relevance to disruptive technology.

Study	Key Findings	Relevance to change Business Model
Christensen (1997)	Disruptive technologies can help generate new markets, while existing ones may go through some radical changes.	In this regard, the fact remained that more and more companies faced increasingly advanced technologies, which means that businesses have to constantly try out new ideas and adapt.
Pine & Gilmore (1999)	Disruptive technologies can be useful for companies in that they can offer tailored products and services based on the needs of customers.	Business ventures can utilize disruptive models to create more personalized offerings while catering to users' specifications, notably to meet individual purchaser demands.
Porter (2001)	Several disruptive technological solutions used in a variety of industries seek to reduce entry barriers.	There is a necessity to establish that businesses should be prepared to compete with new entrants into the industry, typically new entrants or entrant competitors such as start-ups and similar.
Eisenhardt & Sull (2001)	Disruptive technologies that can create innovative business models can significantly challenge existing regulatory paradigms.	Managers are forced to navigate through regulatory hazards that shift business strategies to conform to newly implemented laws or exploit legal loopholes.
Malone (2004)	Efficient ways of delivering goods and services could be brought about through the adoption of disruptive technologies.	By adopting disruptive technology, businesses have the potential and opportunity to enhance the productivity and quality of their operations.
Arthur (2009)	This is in line with the fact that one of the effects of adopting disruptive technologies involves creating entirely new business domains.	Disruptive technology is beneficial in exploring other business opportunities that were previously unexplored as well as penetrating new consumer markets.
Tapscott & Williams (2010)	Disruptive technology can create a new paradigm of interaction and co-production within the collaboration framework.	Utilizing disruptive technologies, businesses can establish a closer link between the client, business partners, and the development of new goods and services.
Hagel III et al. (2010)	Disruptive technologies are capable of creating new pools of partners, suppliers, and even competitors.	Companies must consequently be cognizant of the environment within which they function and adapt, as needed, their corporate strategies.
Rachel & Roo (2010)	Disruptive technology is responsible for creating new business models, and such models may include sharing of products, renting, or leasing of products and services.	Companies thus gain the flexibility to shift from the mere sale of things and tangible products to actual services and experiences through leveraging disruptive technology.
Ramaswamy & Gouillart (2010)	With disruptive technology, for instance, companies could be able to transition from product-centric to customer-centric strategies.	Integrated technologies can assist business organizations to be more knowledgeable about their consumers, which in turn creates more sustainable and intimate relations between the business organizations and those consumers, and most importantly, the loyalty of those consumers is enhanced.
Anthony (2012)	The rate of change in sectors may increase, and the frequency of changes may occur more frequently due to the innovation of disruptive technologies.	Thus, the environments in which specific businesses operate must be flexible and dynamic in the sense that they should be capable of adapting to rapidly evolving rates of technological advancement and, therefore, to the needs of their customers.

Continued

McGrath (2013)	The appearance of disruptive technology could change customers' tastes and how they use products and services.	Organizations and companies also have the duty to gain insight into the dynamism of clients' demands and adapt their business models to meet those demands.
Brynjolfsson & McAfee (2014)	Corporate organizations should be in a position to deploy disruptive technologies that may lead to automation and efficiency of existing processes, thus enhancing productivity and reducing costs in the long run.	Disruptive technologies can enhance efficiency and profitability for businesses as a result of promoting the embrace of such technologies.
Schneier (2015)	Technologies that transform established systems can reveal new threats and challenges in the protection of personal information and computer systems.	It is for this reason that companies must make data privacy and cybersecurity priorities to protect their assets and maintain their clients' trust from new and sophisticated threats.
Abraham et al. (2015)	Technology-intensive firms show that when disruptive technology is managed, especially with maturity, years in business, education level, founders, or celebrity status, net income is significantly boosted, and hence, they are rewarded with higher incentive pay.	Incorporating disruptive technology into the business model can significantly improve the profitability of an organization and thus bring higher incentives for the CEO to work hard.
Epstein et al. (2017)	Potential business models previously unattainable could become viable as a result of disruptive technology being integrated.	Disruptive technology gives businesses the chance to raise their profitability and create other streams of income.
Tuenpusa et al. (2021)	Technological advances are introducing more forms of disruption in labor arrangements and thus implying the need for speed up in adapting skills in the workforce through improvement in technical-vocational education and training (TVET systems). The priority actions would be to design the educational policies in the frames of the elements of technologies, create the databases of the demands in the given labor market, and advance the governmental and educational branches in the joint educational orientations corresponding to the given technological requirements.	TVET programs have to ensure that businesses acquire improved models through the integration of disruptive technologies that can only be accomplished by upskilling the workforce comprehensively. The ability to respond to changes in technology and qualifications needed to function in today's world will prove critical in sustaining the competitive edge and productivity within the dynamic environment.
Chen et al. (2022)	Industry clusters can either be threatened or benefit from disruptive innovation depending on the case of the industries; hence, lock-in and inertia are major challenges. Strategies that can be employed include bottom-up innovation policies, external knowledge acquisition, and spin-up and knowledge alliances between incumbents and spin-off organizations.	When it comes to disruptive technology, change means that businesses have to transition from conventional ways of operation towards one that incorporates innovations. These include the acquisition of outside knowledge and cross-functional efforts with the purpose of integrating disruptive innovations and maintaining a competitive edge.
Osakuade & Moore (2023)	Industry 4.0 can greatly improve efficiency and quality of automotive production; therefore, the gradual implementation is recommended. Beginning from sectors such as paint shops being most effective. Some of the key areas of concern have been recognized as the necessity of employee training and the elimination of communication gaps on the intra- and inter-organizational levels.	Applying disruptive technologies such as Industry 4 into automobile production changes the traditional business models by improving the range and quality of products and services through the availability of smart technologies that can work automatically and coordinate production processes and make decisions by themselves. The adoption of these technologies can offer a competitive advantage and result in outstanding changes to the production flow as well as overall costs.

such as the economic diversification objectives of Vision 2030 current infrastructure and regulatory structures.

- Companies in Saudi Arabia that effectively incorporate technologies will secure an edge in local and international markets.

To summarize the findings of this paper, this academic article analyses how disruptive technologies might affect existing industries in Saudi Arabia. It begins with a look at the role that technology plays in Saudi business strategies and how it is a catalyst for innovation in a wide variety of industries. In this work, we focus on some examples of disruptive technology, especially artificial intelligence, blockchain, and the Internet of Things, and how they can change the status quo of many conventional Saudi Arabian business practices. The rest of the research assesses the disruptive technologies that affect or change the business model. The report of this paper concludes by stressing the importance of Saudi Arabian enterprises seizing the opportunities presented by disruptive technologies, which have the ability to usher in entirely new types of enterprises. However, they also noted other obstacles, such as a general lack of knowledge about the technologies, little funding, and skepticism about their reliability (Almaiah et al., 2022). The researchers conclude that disruptive technologies have the potential to alter the Saudi Arabian corporate landscape significantly but that in order to exploit this potential fully, firms will need to devise methods to overcome the obstacles they provide (Al-Ruithe et al., 2018).

This study presents a central significance in terms of how Saudi Arabia will be affected by the new era of technology. It is important to compare the findings with previous research in order to clarify this. With the global trend featuring Schwab (2017), such technologies as AI, IoT, and blockchain are indeed improving the service delivery situation of these enterprises in Saudi Arabia. This parallels Brynjolfsson and McAfee's (2014) observation that such technologies stand to transform traditional business models around the world. However, the study also found particular challenges that are unique to Saudi conditions, such as readiness for establishing infrastructure, the regulatory framework, and the level of people's ability to work. These are relatively rarely explored in global studies. For example, Chen et al. (2022) and Osakuade & Moore (2023) focus more on the technological benefits and competitive advantage without attending much to the local and contextual challenges that face Saudi companies. Accordingly, this study contributes to the literature in that it starts to point towards these Saudi-specific resistances, indicating that while Saudi enterprises would stand to gain significantly when they adopted disruptive technologies, they also face various obstacles that are unique to the environment. At the same time, the findings indicate that early adopters of these technologies are likely to gain an edge over their rivals. This confirms earlier research by Al-Ruithe et al. (2018). However, this study goes further by arguing that there is a crucial link between the effectiveness of technology adoption in Saudi Arabia and its alignment with Vision 2030's strategic objectives. This adds a degree of sophistication to the discussion that shows, in Saudi Arabia, success with disruptive technology adop-

tion is not just about having technical capacity but also requires being in tune with national development.

To the discussion of the implications of disruptive technologies for Saudi Arabian Business Models. Disruptive technologies are upending business models worldwide, including Saudi Arabia. It is crucial to consider the consequences of these technological advancements, as they are profoundly affecting the region's conventional economic practices (Schwab, 2017). Disruptive technologies can help businesses and consumers in several ways. Competition, the need for new skills and infrastructure, and the potential disruption of existing client relationships are just some of the difficulties that can arise as a result of these trends (Brynjolfsson & McAfee, 2014).

Disruptive technologies force us to re-evaluate our business practices, which is one of their most significant consequences. For continued success in today's fast-paced business environment, companies must adapt their plans to take full advantage of emerging technologies like AI and automation (Chen et al., 2022). New technology and equipment may need to be purchased, and employees may need to be retrained or given further education in order to effectively utilize these resources (Osakuade & Moore, 2023). It's also important for businesses to think about how they may leverage the technology to develop new products and services or enter untapped areas (Manyika et al., 2013). Businesses must also think about how disruptive technologies may affect their consumer relationships and how they might utilize technology to improve those connections. An additional significant effect of disruptive technologies is the elevated significance of data. It is important for Saudi Arabian businesses to understand the potential value of the data they produce and how to use it to guide strategic decision-making and long-term planning (Schwab, 2017). Also important for businesses to think about is how they can use data to give them a leg up in the marketplace, such as by employing predictive analytics to guide new product and service creation.

The potential effects of disruptive technology on Saudi Arabia's business paradigms should not be ignored. One example is the potential need to reevaluate pricing and pricing strategies, as well as how to forge new connections with customers in an increasingly digital marketplace (Chen et al., 2022). Additionally, businesses should think about how data sharing may affect them, as well as the privacy and security concerns that may arise from such an action. There has been a significant impact of disruptive technology on business models in Saudi Arabia, and businesses need to be ready to adapt their strategies to stay competitive and profitable. Organizations can improve their standing in the market and open up new avenues for growth if they think through the consequences of disruptive technologies (Al-Ruithe et al., 2018).

7. Conclusion, Limitations and Recommendations

In conclusion, disruptive technologies certainly have the potential to significant-

ly change the traditional business models in the Kingdom of Saudi Arabia. Therefore, consumer engagement, cost efficiency, and flexibility might create new opportunities for disruptive technology in the Saudi market (Schwab, 2017). In addition, the possibility that these technologies can be modified in order to fulfil the particular requirements of the Saudi Arabian market is not something that should be undervalued. However, Saudi business leaders must take a proactive and strategic approach to deploy disruptive technologies successfully (Brynjolfsson & McAfee, 2014). Thus, new leaders will need to recognize and make opportunities to capitalize on these technologies in Saudi business. Through this action, Saudi Arabian businesses will be able to benefit from the competitive advantages that disruptive technologies can provide in the global economy, which is currently undergoing rapid change (Manyika et al., 2013).

7.1. Limitation

This paper study found several limitations on the effects of disruptive technologies on the Saudi Arabian business model. First of all, this paper used qualitative methodology while supplying a deep understanding, which may lack the generalizability for the statistical rigour of quantitative research, which limits the findings to wider contexts. Secondly, the paper focused on secondary data sources such as existing literature, books, articles, and previous research, which may provide preferences through the original references and methodologies. Therefore, the lack of primary data collection indicates that present-time understanding from directly affected stakeholders is not captured (Manyika et al., 2013). With fast development of disruptive technologies in the present, such as artificial intelligence (AI), Internet of Things (IoT), and blockchain, may cause the research's findings to become outdated as new advancements emerge (Schwab, 2017).

7.2. Recommendations

The paper includes several actionable recommendations, with some specifically highlighted. Saudi Arabian businesses can enhance their sustainable growth and competitiveness by using disruptive technologies, expanding the opportunities for new markets, analyzing a giant quantity of data with the help of big data and artificial intelligence, investing in advanced digital infrastructure, creating a solid e-commerce platform, increasing the opportunities of collaborative platforms, and introducing blockchain applications for increasing the efficiency of transactions. To maximize the benefits of these technologies, businesses should clearly define technical goals, encourage innovation and originality, invest in employee training, collaborate with relevant parties, adopt a data-driven approach, and implement agile practices to adapt to changing market conditions. These strategies will enable businesses in Saudi Arabia to improve their operations, increase their competitiveness, and capitalize on emerging opportunities in the global market. Companies in Saudi Arabia can maximize their growth and innovation

through the usage of disruptive technologies if they implement the aforementioned tactics. The following recommendations can also help Saudi Arabian businesses make the most of their adoption of disruptive technologies. Firstly, it is important for businesses to have a plan in place for adopting disruptive technologies once they have determined how best those technologies may help them achieve their goals. Secondly, companies should promote a culture of innovation that values exploration, experimentation, and teamwork among their staff in order to keep pace with the rapid pace of technological change. Thirdly, businesses should put resources into training and retaining employees who have the knowledge and experience to make the most of disruptive technologies. Fourthly, it is important for businesses to form partnerships and collaborate with other parties, such as those providing technology, educational institutions, and community members, in order to pool their resources and expertise. The fifth is organizations should use big data and analytics to guide their technology spending and development. Finally, Companies need to start using agile approaches because they can quickly iterate and adjust to new market conditions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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