Re-architecting the firm for increased value: How business models are adapting to the new AI environment

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Abstract

This paper is an examination of how technology, specifically artificial intelligence (AI), brings about changes in business models, with corresponding impacts on the fields of economics and business. Concepts such as value creation and competitive advantage have cascading effects on organizational culture and the functional framework of a firm. Data creation, management, and curation using media platforms enable enhanced scalability and logistics management such that the firm can be re-architected around a digital core. Organizational structure with functions such as marketing and human resource management are integral links in the automated value network anticipating and responding to customers' needs while providing increasing marginal rates of return to the firm. The thematic analysis used as a methodological research tool yielded examples of companies that have embraced AI platforms and this paper describes the tremendous growth these companies are experiencing. This paper critically assessed and highlighted the enormous benefits of the new business entity due to AI. There are limitations to algorithms based on historical data such as the perpetuation of bias, loss of privacy, and anti-competitive practices. The implications described include how to harness the potential benefits of technology while mitigating the drawbacks, such as the rise in the anti-competitive dominance of oligopolistic players.

Re-Architecting the Firm for Increased Value: How Business Models Are Adapting to the New AI Environment

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This paper is an examination of how technology, specifically artificial intelligence (AI), brings about changes in business models, with corresponding impacts on the fields of economics and business. Concepts such as value creation and competitive advantage have cascading effects on organizational culture and the functional framework of a firm. Data creation, management, and curation using media platforms enable enhanced scalability and logistics management such that the firm can be re-architected around a digital core. Organizational structure with functions such as marketing and human resource management are integral links in the automated value network anticipating and responding to customers' needs while providing increasing marginal rates of return to the firm. The thematic analysis used as a methodological research tool yielded examples of companies that have embraced AI platforms and this paper describes the tremendous growth these companies are experiencing. This paper critically assessed and highlighted the enormous benefits of the new business entity due to AI. There are limitations to algorithms based on historical data such as the perpetuation of bias, loss of privacy, and anti-competitive practices. The implications described include how to harness the potential benefits of technology while mitigating the drawbacks, such as the rise in the anti-competitive dominance of oligopolistic players.

Keywords: AI platforms, competitive advantage, value creation, organizational culture, bias, anti-competitiveness

Introduction

In traditional economics, the theory of the firm revolves around demand and supply; the law of diminishing marginal returns; and economies of scale, scope, and innovation among other concepts (Teece, 1993). This research topic is the impact of technology on business models such as the changes in economics principles and the subsequent ramifications for the firm. This research paper demonstrates that technology; specifically, artificial intelligence (AI), machine learning (ML), and algorithms have transformed some of these principles and led to changes in organizational culture as well as the functional framework of the firm (i.e., marketing, finance, and human resource

management). Examples based on a review of the literature demonstrate the success of companies that have adopted these technologies. Figure 1 shows the interaction between AI and business models with their corresponding impacts on value creation and competitive advantage. The organizational culture of the firm is reflected in functional departments such as marketing, human resources, management, and finance—the conduits for implementation of AI.

Figure 1. An Overview of the Paper
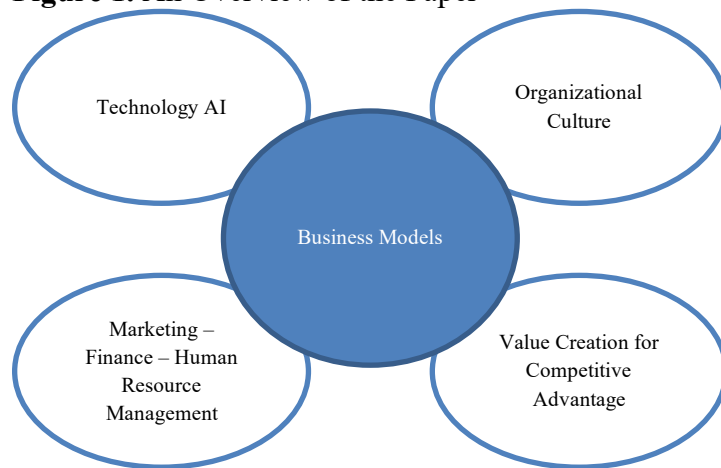
Literature Review

Definition of Business Models

Before describing the research question about how technology impacts business models, it is important to define each term—business model and technology. Osterwalder et al. (2005) defined the concept of a business model as "a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specified firm" (p. 17). To express the concept of a business model in a managerial perspective, the element of creating value emerges. The sources of value creation are links in the value chain, links with suppliers and distribution channels, timing, location, functionality among business units, and information technologies (Teece, 2019). The concept of a value network has emerged with the transition of globalization and competition from the business sector level to the business model level (Chesbrough, 2006). The value network reveals how the different activities involved in the development of the business model are used together to meet the needs of the target customer (Hagiu & Wright, 2020).

The concept of value is the blending of product, price, service, relationship, and image to be offered to the target customer (Teece & Linden, 2017). The strategic goal is to produce value features that will enable differentiation in competition. In today's competitive environment, innovation, performance, design, branding, price, reducing customer costs, risk reduction, accessibility, usability, and availability are critical factors (Corritore et al., 2020). Customer centricity and the creation of new business opportunities are at the core of the business model and the most accurate data are required to execute both purposes. Herein lies the importance of technology in collecting, managing, and curating data (Dietrich, 2008).

Although the source of the concept of business model was provided by Drucker (1954), it was first mentioned in an academic article by Bellman et al. (1957). The origin of the business model use

is seen in the economy of transaction costs (Casadesus-Masanell & Ricart, 2010; Osterwalder et al., 2005). Although the concept of business model was used in articles dealing with the concept of e-commerce, it was included in the literature as an output of the internet era in the 1950s (Luo et al., 2005). However, its association with management theory and its inclusion in the literature took place at the end of the 1990s (Keen & Qureshi, 2006).
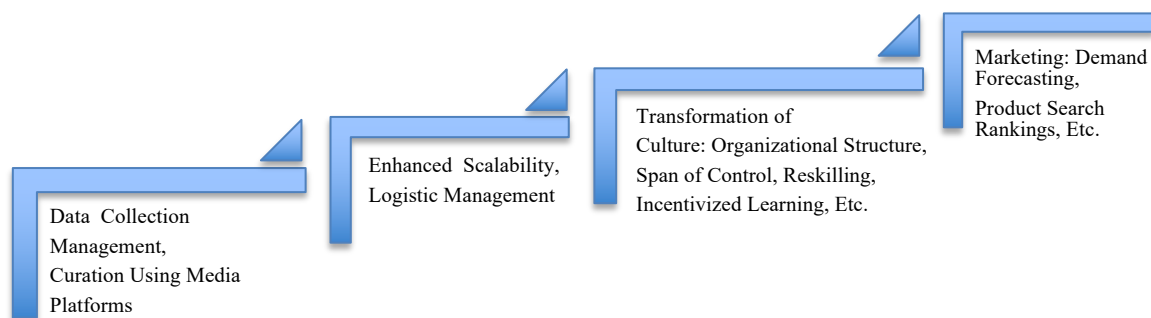
"Business models aim to bypass the marketing-technology tradeoff by employing a strategy-follows-structure approach" (Christensen & Bower, 1996, p. 199). From this point of view, it is possible to say that the perspectives related to the business model are to determine the potentials of the companies, to determine the scope of the contracts and their stakeholders, and to reveal the unique aspects of the businesses (Chesbrough, 2006). In line with these, business models focus not only on exchanging money with customers, but also on a broad set of stakeholders and better define current target markets and position the firm among its competitors.

Definition of AI

Segars's (2018) article on the topic of AI included pervasive computing, wireless networks, 3D printing, biotechnology, ML, nanotechnology, and robotics. Industries impacted were health care, education, commerce, and the environment. Three factors highlight the difference between these technological breakthroughs and others: intelligence, natural interface, and ubiquity (Bohn et al., 2005). AI encompasses ML, data analytics, deep learning, natural language processing, and several other areas (Nguyen et al., 2019; Sebetci, 2020). The objective of AI is to train computers to process massive amounts of data to discern patterns for use in decision-making. This paper emphasizes assessing how AI affects the business model.

Finding strategies to increase competitive advantage and value for the customer and the organization are the essence of economic theory (Gluck et al., 1980; Teece, 2018); but in the modern technology era, AI's impact on organizational culture; hiring and team building; marketing; and overall business processes is also critical (Alavi et al., 2005). The paper analyzes these strategies and concludes with a discussion of bias, privacy limitations, and antitrust issues. Implications of the findings and recommendations and ideas for further research are highlighted with the overall objective of unleashing the vast potential of AI to enhance business models that would maximize revenues and profits while considering ethical and societal objectives. In parallel with this, Figure 2 shows a succession of steps that evolve when AI is adopted, and firms begin architecting around a digital core.

Figure 2. Re-Architecting the Digital Core

Marketing: Demand Forecasting, Product Search Rankings, Etc.

Transformation of Culture: Organizational Structure, Span of Control, Reskilling, Incentivized Learning, Etc.

Enhanced Scalability, Logistic Management

Data Collection Management, Curation Using Media Platforms

Enhancing Scalability and Supply Chains

ML makes it easy for both local and global businesses to increase their market share in the business world and further increase their business activities. AI and ML algorithms allow business models to make calculations in a shorter time and provide data storage at an affordable price (Mailty & Das, 2017). Organizations can now use ML to coordinate entire supply chains using logistics to manage complex operations of people, goods, and supplies.

According to Bean (2018), those who adopted ML practices early were searching for ways to automate processes. ML facilitates decision making by enabling more effective and expeditious learning. One of the insurance companies that has taken important steps in ML is GEICO, which has made turnaround times prompt and proficient with Virtual Assistant (Dey & Sarma, 2022). Similarly, other insurance companies constantly update changing customer information through ML algorithms. According to Sun et al. (2019), the more data the ML model manages, the more customized the proposed customer solution. These updates improve the overall operation for the client and company bringing transparency, justice, and efficiency.

Businesses using ML take different approaches, such as creating a workbench or providing streamlined production control processes (Ambalavanan & Bala, 2020). Some enterprises use ML to make more accurate decisions at every step of the supply chain by enabling better quality control and thus lowering cost, reducing waste, and managing optimum levels of inventory (Sharma et al., 2020). Organizations can speed up the delivery of these platforms in ways that were previously unattainable with techniques such as the Analytics Workbench and the Runtime Decision Framework. These techniques have the effect of mitigating the workloads of businesses by making use of advanced ecosystems of technologies while manipulating massive data loads (Chen & Zhang, 2014).

Big Data

Big Data, as used by GEICO and Mastercard, is not only about the extraordinary size of data sets, but also high data generation speed and data diversity (Naylor, 2017). Data scientists, forecasting modifiers, statisticians, and others can now analyze semi-structured, unstructured, and structured transaction data to yield a multiplicity of results. Data sources can access and store a lot of information in a short time with the effect of internet of things technology. This includes information such as consumer clicks on the internet, consumer e-mails, filling rates and contents of surveys (Rouse, 2020). The underlying infrastructure involves data mining, computer science, ML, database management, mathematical algorithms, and statistics all working in tandem to analyze and produce results (Herland et al., 2014).

A few issues that AI users must contend with include storage, security, privacy, processing, and analysis of the *right* data, as well as the validity of results (Nguyen et al., 2019). As new technologies expand, huge amounts of data are produced quickly resulting in insufficient physical memories thus making cloud computing technologies more feasible (Jaksic & Marinc, 2019). More streamlined data results in greater revenues and profits. Forbes Insights (2019) supported that the massive amount of data collected by Mastercard has generated a profitable income stream. Since 2018, the analytics component of Mastercard's data services has outpaced its original financial services (Forbes Insights, 2019). For example, Mastercard has used payments data to

understand consumer habits by analyzing a total of 73 billion shopping transactions a year from 2.5 billion card users. Forbes Insights (2019) reported that merchants in 150 countries have earned $5.9 trillion. One analysis revealed that rewards come not only to Mastercard, but a multiplier effect also occurred for gas stations where Mastercard users spend $35 to $50 in restaurants or in supermarkets within an hour of their vicinity—all due to the targeting of customers with individualized coupons and gifts (Lee et al., 2019).

While every organization uses quantitative and qualitative data to make decisions, the strategy (i.e., the vision and mission of the organization) takes precedence; especially in an age of constant disruption where divergent, creative thinking is needed (Gocłowska et al., 2014). Hoyne (2019) provided key points on how companies should use data analytics to achieve success. The most important takeaway was not becoming so enamored with metrics that the user does not ask meaningful questions. The data might not highlight changes (or missed opportunities) in the environment, but efficacious companies use metrics as opportunities to ask more questions. As head of Google's customer analytics, Hoyne (2019) observed that successful companies try to really understand human behavior—because just as humans are not perfect, perfect data also does not exist. The collection and organization of the data for this paper follows.
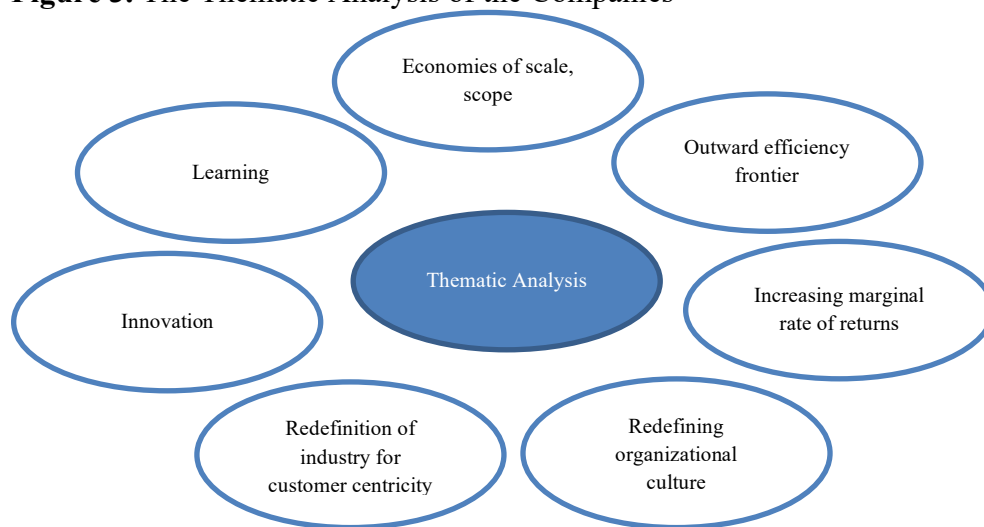
Methods

Qualitative research methods were adopted for the research. Qualitative research method is a "process in which the data obtained using data collection methods and techniques are organized and categorized and divided into themes" (Elo et al., 2014, p. 1). The content analysis, a technique of qualitative research methods, is a method of analyzing and interpreting documents (Elo et al., 2014). It is a systematic and objective way of describing and quantifying research questions (Downe-Wamboldt, 1992). By applying content analysis to the data obtained in the research, data pertaining to the companies were divided into themes. Content analysis allows for explaining words in fewer categories of content (Cavanagh, 1997). In the stages of content analysis, first, the purposes and then the location of the data related to the subjects are determined. In the next stage, a logical structure is created, and digitization is made by determining the coding categories. Finally, the obtained data are interpreted (Berg & Lune, 2019, p. 405). Figure 3 shows seven themes that emerged from the thematic analysis. These themes are discussed in the next section.

Rethinking Economic Theory

Having ensured accurate and curated data, firms can create competitive advantage in the AI era by transforming customer relationships from intermittent to continuous (Siggelkow & Terwiesch, 2019). In entertainment, Disney's MagicBand, or in the medical field implanted monitors which feed real time data to relevant parties are examples. Figure 4 shows how a technology infrastructure, revenue model, and connection architecture work together to recognize customer needs, request a product or service, and finally respond and then repeat the process endlessly. From an iterative to a continuous process, from costly high human interaction to minimal interaction, AI and ML have moved the efficiency frontier of the firm outward (Monostori, 2003); for the same price, a customer is willing to pay to receive greater fulfillment as evidenced by Amazon delivering products to customer homes at the same or lower price than the supermarket (Perrier, 2017); or the ride-sharing industry Uber and Lyft providing cheaper and more efficient transportation relative to traditional taxi companies (De Bruny et al., 2020).

Figure 3. The Thematic Analysis of the Companies

Economies of scale, scope

Learning

Outward efficiency frontier

Thematic Analysis

Innovation

Increasing marginal rate of returns

Redefinition of industry for customer centricity

Redefining organizational culture

Figure 4. Connected Delivery Model

Connected Customer Relationship

Recognize ⟶ Request ⟶ Respond

Repeat

Connected Delivery Model

Connected Architecture
Revenue Model
Technology Infrastructure
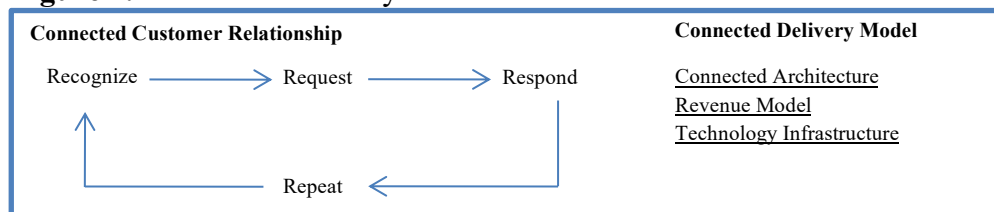
Source: Siggelkow & Terwiesch (2019)

Ant Financial Services is a phenomenal example of a company that in five years accumulated one billion customers because of what Iansiti and Lakhani (2020) refer to as a digital core. An offspring of Alibaba, At Financial Services leveraged an ecosystem to tap into the customer base of the largest global e-commerce company (Jelassi & Martinez-Lopez, 2020). Alibaba, Tencent, Facebook, and Amazon are considered AI factories with four components for success: the data pipeline, algorithms, experimentation platforms, and infrastructure (Zeng, 2018).

These examples highlight two incisive points about rethinking economic theory. One has to do with deriving economies of scale, scope, and learning; and the other, the law of diminishing marginal returns (Dietrich, 2008). The common stages of the product life cycle are market entry, market growth, product maturation, and recession. Firms build capacity while products are going through the initial stages and once they reach full capacity, they can deliver economies of scale and better value to customers and to the organization (Kabir, 2013). As products pass the introductory stage and reach maturity, the return from each additional product begins to decline relative to the money invested according to the law of diminishing marginal returns (Osterwalder et al., 2005). Iansiti and Lakhani (2020) suggested that AI companies' scalable models are on collision courses with traditional ways of economic thinking, because once firms build successful platforms, there is no limit to scale, scope, learning, and innovation and thus to marginal returns.

Another disputed aspect of economic thinking is the disruption of industries argument as an explanation for the incursion of companies such as Airbnb and Uber (Grisdale, 2021). Digital disruption is completely toppling traditional business models, creating new industries with an

emphasis on customer centricity (Walters, 2020). The very product or service offered has been reconceptualized as is the case with the hotel and taxi industries. From product innovation to delivery, the cornerstone is customer satisfaction with built-in expectations of speed, diversity, and flexibility (Cho, 2014).

These examples suggest that the traditional description of the firm and its growth trajectory in economics literature has been altered inextricably (Dietrich, 2008). It may take longer for networks and algorithms to get going but once they do there is no limit as exemplified by the exponential growth of the Facebook, Apple, Amazon, Netflix, and Google (FAANG) companies (Salmon & Thompson, 2021). Scale, scope, learning, and diminishing returns might no longer be as pertinent as they were to traditional companies (Teece, 2018). Researchers and practitioners are trying to catch up with the new fast-moving environment that technology is overhauling, but they are lagging.

Restructuring Organizations

Starting in the 1980s or even earlier, American manufacturing began to lose a competetive advantage to Japanese and later Chinese companies (Yang et al., 2009). According to Teece & Linden (2017), one of the many contributing factors was the silo-like structure of companies, resulting in lack of communication across functions. Quality control and Six-Sigma led to process-oriented thinking and integration of the supply chain across companies and industries. In the AI era, Iansiti and Lakhani (2020) called for re-architecting the firm's organization and operating model around a digital core which calls for transformation of culture, organizational structure, span of control, and more. Walmart, in its pursuit of Amazon, has reorganized operations around AI and the cloud-based architecture (Kenney et al., 2021). The new digital ecosystem calls for "a universal set of capabilities in data sourcing, processing, analytics, and algorithm development" (Teece & Linden, 2017, p. 9). This must work in partnership with the right strategy, leadership, and human resources to create and sustain a competitive advantage.

Davenport (2018) discussed three stages that firms undergo toward full deployment of AI: assisted intelligence, augmented intelligence, and autonomous intelligence. An example of the differences was presented by Mittal et al. (2019); cruise control for assisted intelligence; lane shifting technology for augmented intelligence; and self-driving cars for autonomous intelligence. At each stage, from discrete uses to full AI adoption, companies must rethink corporate strategy and the resources for implementation. For example, essential human resource requirements might now represent the following: AI-trained employees, contract technology specialists, crowd sourcing the creation of algorithms, using bots to computerize business processes and function as employees; ideas suggested by Mittal et al. (2019). Functional areas such as IT, marketing, and finance need to be aligned. The disadvantage and the most frequently encountered difficulty of predictive analytical techniques is not technical, but organizational (Desmond, 2020). Accomplishing these requires consideration that not all data-based technology is created equally (Hautamäki & Oksanen, 2018).

Platforms for Competitive Advantage and Capturing Value

Hagiu and Wright (2020) described the difference between data-enabled learning and network effects of platforms in gaining a competitive edge. Data enabled learning assumes that using

customer data and ML algorithms will suffice in beating out competitors. However, regular network effects derived from media platforms are superior because they continue bringing in more customers with little additional effort (Waldman, 2020). Companies like Google and Facebook use massive amounts of data to constantly update, curate, improve offerings, and replicate improvements. Fads, however, such as social games platforms where customer tastes change rapidly might not build the following required for a sustainable competitive edge (Pikkety, 2013). The same applies where data can be purchased easily or be reverse engineered. Switching to a competitor should be made as difficult and costly as possible to maintain and increase the customer base (Maity & Das, 2017).

Amazon's social media platform has had enormous success in updating and adding to their current customer data. Etail (n.d.) stated that there is no greater digital success story than Amazon with 310 million active members worldwide, 90 million of those are Prime members and 220 million are non-Prime members. Prime members spend an average of $1,300 per year and non-Prime members spend about $700 (Hanley, 2019). Amazon's e-commerce sales of $52.8 billion finds its closest e-commerce competitor, Walmart, with only one quarter that amount (Dudhela & Chaurasiya, 2020). Figure 5 shows the quarterly growth in revenues from 2016 to 2020. Table 1 presents stock prices for 2019 and 2020.

Figure 5. Amazon Quarterly Revenue
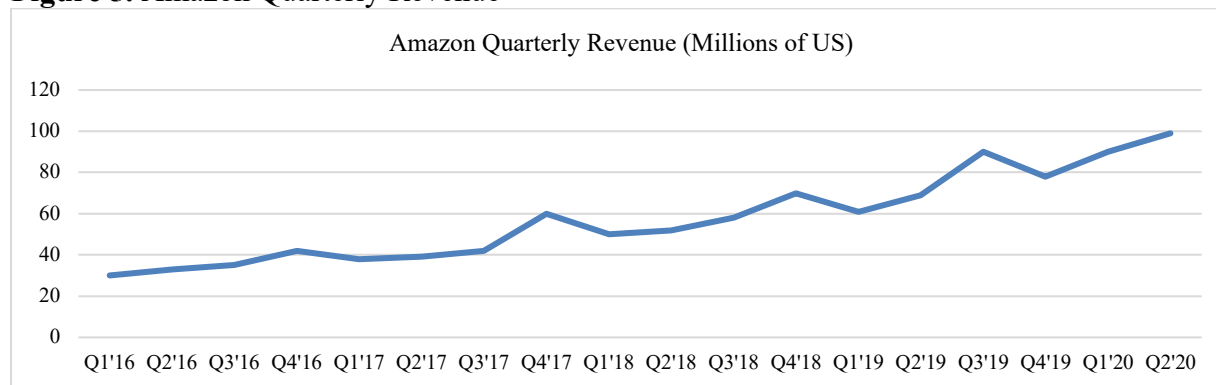
Source: Macro Trends, n.d.

Table 1. Amazon Historical Annual Stock Data

Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2020	$2,680.86	$1,898.01	$3,531.45	$1,676.61	$3,256.93	76.26%
2019	$1,789.19	$1,539.13	$2,020.99	$1,500.28	$1,847.84	23.03%

Source: Macro Trends, n.d.

Regarding value capture and the digital enterprise, Teece and Linden (2017) stated, "A well-designed business model balances the provision of value to the customers with the capture of value by the provider." (p. 8). The FAANG companies stand out as excellent examples of provision of value to customers, especially since the COVID-19 pandemic (Pisal, 2021). In addition, they have been successful at capturing value for themselves. However, much untapped potential remains in this arena. A major study by the McKinsey Institute (Chui et al., 2018) reported 400 cases spanning 19 industries where AI solved practical problems. Findings indicated that companies were only capturing 40% of potential value. The study was based on deep learning techniques based on artificial neural networks and suggested that AI techniques had the "potential to provide a boost in

value above and beyond traditional analytics techniques ranging from 30% to 128% , depending on industry." (Chui et al., 2018, p. 17).

Kabir (2013) described the untapped potential of extracting and maximizing tacit knowledge (i.e., data and functions that cannot be verbalized or is "inherently personal and difficult and impossible to codify"; Kabir, 2013, p. 239). Predictive modeling can mine, aggregate, and analyze data such that these become the input for ML and AI to map out the *rules* for different scenarios. Descriptive analytics of hyper-dimensional data can identify patterns to make sense of historical data; thereby providing management with many opportunities previously unavailable. One example is the ability of banks to identify fraud in real time among a mammoth number of transactions (Dashottar & Srivastava, 2021). Counterfactual thinking in decision-making or scenarios that encompass a vast spectrum of alternatives can also be analyzed in real time. Combinatorial thinking, a branch of predictive analytics, has the capability of analyzing the construction and optimization of algorithms, a feature critical for accuracy and validity of data and the elimination of bias (Kabir, 2013). Harnessing these opportunities and knowing when and where to deploy them are challenges of management (Benbya & Leidner, 2018).

Organizational Culture

In addition to determining the stakeholders in the companies and the scope of the company, the business models play an important role in creating not only product, but also value for a business. An expected result of this situation is an increase in the performance of the business (Abdulkader et al., 2020). AI brings innovation in many business models. Some of these are health care industry, media and banking services. According to Let et al. (2019), as a result of research conducted with more than 3000 business managers, artificial intelligence provides businesses with a great advantage in their competition. Parallel to this result, approximately 75% of business managers stated that they are considering including artificial intelligence in their business models. (Let et al., 2019).

Jack Ma, the founder of Alibaba, regards the *everything company* as embracing customers so they do not need to go elsewhere (Mak et al., 2020). Despite becoming a conglomerate, the one-stop-shopping philosophy persists with a constant drive to evolve the capabilities and innovation of its offerings (MartinRoll, 2017). Alibaba's platforms ensure that every customer's transaction become data files (Zeng, 2018). In 2007, the Alibaba management team created the vision of the e-commerce company to foster the development of an open, prosperous, and coordinated e-commerce ecosystem (Zeng, 2018). Their organizational culture places customers first, employees second, and investors third. Bezos credits ML as driving algorithms for demand forecasting and product search rankings, but primarily for quietly but meaningfully improving core operations about looking at outcomes and not being hung up on the process (Zeng, 2018).

However, culture is disseminated not only from the vision of top executives but must also be embedded in the fabric of the organization. Corritore et al. (2020) conducted extensive research on employee emails, messages on Slack, and employee reviews on Glassdoor; and tried to grasp digital traces of culture. The authors found a tendency to emphasize cultural fit at the time of hire, but cultural adaptability might be more critical because employees who can adapt quickly to fast changing forces are a better investment for the long term given the ever-increasing role of technology (Corritore et al., 2020). The new AI oriented organization means balancing trade-offs

between core values and dissonance of beliefs inherent in homogeneity or heterogeneity of culture and finding the right dynamics for effective teamwork (De Bruyn et al., 2020)**.**

AI's Impact on Marketing and Banking

The biggest advantage of AI algorithms used today is that they can work almost unmanned, identify secret codes, and have the ability to create high structures (De Bruyn et al., 2020). The most obvious example of this is deep learning. Deep learning can distinguish abstract structures in one image, describe the same structure in another image, and discover important structures that the human eye cannot see or know (Grewal, et al., 2020). This advantage of deep learning enables it to cover the deficiencies of the human eye, which cannot perceive the fine details in some mathematical structures, and to successfully fulfill some tasks that require analytical estimation methods.

Transitioning from broader topics like value creation and organizational culture, Davenport et al. (2020) described how AI has influenced the overall business strategy of a multiplicity of industries. Driverless cars represent a major change in the auto industry that will have repercussions on ancillary industries such as insurance and taxi services, security systems to avoid hacking, breathalyzers, and real estate (Cummings, 2017). However, sales are the most demonstrable success story with AI monitoring and analyzing tele-conversations as well as using AI bots to track and court customers (Davenport et al., 2020). Also evident is online retail's exponential growth threatening to shut down malls and retail outlets. Customer monitoring has also made shipping-then-shopping versus the traditional shopping-then-shipping experience more appealing to customers, exemplified by Stitch Fix which uses AI to analyze latent and current customer needs (Cao, 2021).

The previous examples suggest that a more appropriate descriptor for AI, ML, and data analytics might be intellectual and cerebral (Tarafdar et al., 2017) such as the ability of call centers to handle time-consuming and repetitive tasks, which account for 90% of customer requests (Rouse, 2020). The remaining 10% are directed toward problem solvers (Cannella, 2018). Retail, banking, and legal are areas using AI in a pragmatic, rational, or cognitive manner. Marketing presents significant opportunities for future growth both digitally and robot-assisted with analysis of voice, face, and text data. The ubiquity of technology embedded in every gadget—such as the Internet of Things or pervasive computing (Segars, 2018)—enables customers and suppliers to recognize needs, request a product or service, and, finally, respond and repeat the process endlessly as described in the connected delivery model.

Knowledge about nationality, age, and job status (Conick, 2017) enables marketers to create segments based on user profiles, social posts, and interests, and to determine the right communication strategy. To make sense of situations allows marketers to make meaningful connections with target audiences (Cannella, 2018). A well-known example is Target's analysis of shopping experiences to send potential products for pregnancy needs to a shopper's email address (Rouse, 2020).

Another example of the success of AI and ML is in the banking industry. Natural interface is the ease with which individuals can interact with machines using voice or gestures (Kaya, 2019). This feature has been instrumental in the deconstruction of the banking industry over the last two

decades (Jaksic & Marinc, 2019). Banks have been successful in training models directing customers to the pertinent services needed. What started off with teller machines and automatic check deposits has become almost exclusively online banking. With the availability of huge databases, banks have worked out a symbiotic relationship between data and capabilities (Crosman, 2018). However, there is a need for more scrutiny and regulation which could be resolved with higher order modeling as algorithms improve over time and results become more explainable (Segars, 2018).

Facebook News Feed also benefits from this technology. Everything a user likes and reads personifies their feed on Facebook. With statistical and predictive analytics, patterns in user data are identified and each action adds new data to the dataset. Instagram's *Explore* section is also personalized with the same logic for each user (Balasudarsun et al., 2018). Bughin et al. (2017) supported this view indicating how AI companies can create personalized and customized marketing campaigns by analyzing data and developing digital strategies.

AI and Implementation

Although AI has been adopted by many companies in today's business world, research indicates that widespread implementation has not yet been achieved. Columbus (2018) stated that in 2018, 84% of marketing organizations offered better solutions to their customers using AI and ML technologies; designed more successful user experiences; and achieved profitable results from their investments. More marketers have begun showing interest in adopting AI and around 98% of them are now prepared to implement it completely (Nyugen et al., 2019). However, in 2017, only 20% of marketers had implemented one or more AI solutions (Davenport, 2018). The mismatch between preparation and implementation means that AI has much opportunity for growth, especially since many factors have contributed to increased interest and feasibility (Lee at el., 2019). Some of these opportunities include increased computing capabilities to handle AI algorithms on a cheaper scale; big data and accompanying data management advances; intense interest in the field; and an expanding pool of highly skilled professionals (Crosman, 2018). Also, natural language processing such as speech recognition, robotics, and computer vision that works with the configuration and functioning of the human brain, make the qualitative and quantitative features that underlie consumer behavior more attainable (Benbya et al., 2021). Today, AI applications include neural networks, case-based reasoning, and expert systems (Jaksic & Marinc, 2019).

Technology Issues, Privacy, Bias, and Anti-Trust

AI has brought a myriad of benefits; however, major issues arise from the massive quantity of personal data secretly collected on individuals without their consent. According to Waldman (2020), the Federal Trade Commission, the United States consumer and de facto privacy watchdog, found that "one data broker's database contain information about 700 million consumers worldwide with over 3,000 data segments for nearly every U.S. consumer" (p. 107). This is a considerable amount of data considering the industry of data brokers. Data breaches are becoming common and have led to an industry of cyber security and cyber security insurance (Camillo, 2017). Waldman (2020) also drew attention to the importance of trust in the design of web pages and the policies of invasive data backup platforms. There has been a greater push for regulation to hold internet platforms responsible for trust, confidentiality, and privacy (Sicari et al., 2015). One

refinement is the concept of differential privacy in ML, designed to ensure proof of privacy, thus protecting valuable and sensitive private information. But there is room for more research in this arena.

Algorithms have become an intrinsic part of determining who gets loans, jobs, health care, and other necessities for the average person. Kearns & Roth (2019) argued that while ML is superior at sorting through mountains of data, these machines are reliant on the criteria specified for the searches. Kearns and Roth's (2019) extensive research argued that unless fairness, justice, anti-discrimination, and other moral and ethical principles are embedded in the algorithms, historical patterns will continue. For example, redlining is a discriminatory bank practice preventing applicants in certain zip codes, usually based on race and socioeconomic status, from getting loans. ML uses such tainted data to find patterns. The emphasis must be on solving the problem where three quarters of neighborhoods once marked hazardous by the U.S. Federal Housing Administration or The Home Owners Loan Corporation are still struggling economically nearly 80 years after the designation was applied (Meisenhelter, 2018). Kearns and Roth (2019) stated that this algorithm will be of great importance in determining an error related to racial discrimination. Privacy, bias, and ethics must be key factors for decision making in an AI environment (Siau & Wang, 2020).

Antitrust legislation is currently being threatened against technology companies (such as the FAANG companies with huge technology ecosystems) because they have tremendous impact on a macroeconomic scale and, specifically, on competition within each operating sector (Colllins, 2012). Amazon is an example of a company that impacts both the domestic and global economy. CEO Jeff Bezos, in a 2020 congressional hearing, provided the following statistics: Amazon employs one million persons; spent $700 million to give 100,000 Americans training programs in health care, transportation, ML, and cloud computing; and invested $270 billion in the United States, creating jobs in other sectors of the economy such as hospitality, construction, and building services (Russnow, 2020). They are huge and growing exponentially and are perceived as stifling competition for smaller companies and newcomers (Camillo, 2017). It is inevitable that restraints will have to be put in place, and they have already begun—both at the federal level in the United States and globally by governmental agencies if they do not adjust themselves.

Conclusion

The authors are aware of AI's impact on the business environment and that it portends to be as revolutionary as the Industrial Revolution at the beginning of the 19th century. Every field is being disrupted—health care, education, finance, environmental sciences, and more. Nevertheless, many challenges need to be addressed at the macro and micro-economic levels including economic inequality (Pikkety, 2013). The business environment is always in a state of flux, even more so with the current technological advances. More coordinated efforts on the part of government, business leaders, and the citizenry are intrinsic to ensuring future prosperity with justice and equity. The assumption of capable, forward thinking, and competent leadership; leveraging capital, technology, human resources; and, most importantly, the entrepreneurial spirit are all germane to the conversation. According to Base Mallick (2019), this assumption entails learning to unlearn traditional ways of thinking and developing soft skills to navigate a culture of innovation and ensure better governance over the quality of data (Massachusetts Institute of Technology, 2019).

Higher order modeling and the proliferation of technological advances can create a future that makes society more productive, efficient, and equitable by freeing people from dangerous and mundane tasks and improving the standard of living for everyone. The portrait painted in this paper is a glimpse into possibilities and evolutions yet to emerge; from tracking every citizen, telemedicine, scanning the floors of the oceans, and managing the global supply chain in a post pandemic world, the potential is limitless. Of course, more scrutiny and loss of privacy may be inevitable, but if these issues are directly addressed, then AI and ML would represent a quantum leap for every global citizen.

Implications and Recommendations

The implications drawn from this research paper are that AI platforms have been the catalyst for significant changes in business models. The COVID-19 pandemic has demonstrated the enormous impact of the FAANG companies and AI by filling the void due to lockdowns or bankruptcy. This is not only a U.S. phenomenon, but a global one. Alibaba and Tencent based in China and Amazon in the United States need special mention because of their role in the delivery of essential goods and services. Post-COVID-19, these companies can make significant contributions in the transition to a fast-moving virtual economy. Zoom has escalated this trend enabling the widespread facility of meetings and interactions anywhere and at any time.

However, an AI platform is not a panacea, nor is it the solution for every business problem. The right business model is paramount, with appropriate investment in the technology platform to support the enterprise. Moët Hennessy Louis Vuitton (LVMH), the largest luxury group in the world, has an e-commerce business for its brands (and others) called 24S (Lerma, 2020). LVMH refused to partner with Amazon because of the perceived noteworthiness of the LVMH merchandise and the risks of counterfeit (Lerma, 2020). The phenomenon of value of a business model involves a multiplicity of factors. There is considerable scope for research in setting the most efficient and effective business model with appropriate technology, an area that will be of interest to technologists and business developers.

Another challenge for an AI enabled environment is to ensure that consumers, suppliers, entrepreneurs, regulators, and other stakeholders have a voice in the deliberation about checks and balances to ensure equity. The problem is not the technology but the structural machinery that allows imbalances to develop and perpetuate. Congress and governmental agencies in the United States, the European countries, and elsewhere have been grappling with the lopsidedness of AI driven business models. Public policy, guided by democratic determination, should ascertain how to maximize growth, and improve the welfare of citizens' lives without stymieing competition.

AI has considerable influence in the synergy generated between and among activities and industries. The benefits and disadvantages of AI algorithms are being discussed and solutions to these deep-seated systemic problems are already being implemented. The Algorithmic Justice League is just one of the organizations trying to combat these practices. The scope for correcting race, sex, and other forms of discrimination offers boundless opportunities for corrective action. Just as AI techniques are being leveraged to solve far reaching problems, it can also be utilized for instituting reforms (Berreby, 2020).

Future Research and Limitations

This research focused on business models and the impact of technology on new business models. The scope of the paper was limited to AI, ML, algorithms, and their effect on marketing, finance, human resource management, and organizational culture. Another limitation of this paper was a limited related literature on this topic. Also, the research scope was limited to FAANG companies. Based on these limitations, similar research may be conducted to cover businesses in different fields other than marketing and companies that are not part of FAANG.

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