

NEW RISKS RELATED TO EMERGING TECHNOLOGIES AND REPUTATION FOR CORPORATE GOVERNANCE

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Abstract

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Artificial intelligence (AI) has moved from theory into the global marketplace. The United Nations World Intellectual Property Organization released the first report of its Technology Trends series on January 31, 2019. It considered more than 340,000 AI-related patent applications over the last 70 years. 50 percent of all AI patents have been published in just the last five years. The challenges, potential risks, and opportunities for business and corporate governance from emerging technologies, especially artificial intelligence, have been summarized as whereby machines and software can analyze, optimize, prophesize, customize, digitize and automate just about any job in every industry. Boards of directors and executives need to recognize and understand the new risks associated with these emerging technologies and related reputational risks. The major research question of this paper is how boards of directors and executives can deal with both risk challenges and opportunities to strengthen corporate governance. Accordingly, the following sections of this paper discuss key risk management issues: deep shift risks, global risks, digital risks and opportunities, AI initiatives risks, business risks from millennials, business reputational risks, and conclusions.

Keywords: Artificial Intelligence, Risk Management, Corporate Governance, Technology Risks

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1. INTRODUCTION

Artificial intelligence (AI) has moved from theory into the global marketplace. A United Nations World Intellectual Property Organization (WIPO) released its first publication in the WIPO Technology Trends series on January 31, 2019. It considered more than 340,000 AI-related patent applications since the 1950s over the last 70 years. 50 percent of all AI patents have been published in just the last five years. The top five companies for AI patent applications as of the end of 2016 are IBM (8,290), Microsoft (5,930), Toshiba (5,223), Samsung (5,102), and NEC Group (4,406). Considering the trends in AI techniques, machine learning far outpaces all others with 89% of filings mentioning this AI technique and

40% of all AI-related patents. Within the general category of machine learning, deep neural learning is the fastest-growing AI technique with a 175% increase between 2013 and 2016. AI, machine learning, deep neural learning, natural language processing, and computer vision, coupled with the advances of quantum computing and cloud-based AI, have all been called key components of a Fourth Industrial Revolution with major implications for risk management (Castelluccio, 2019).

For example, Binder Dijker Otte & Co. (BDO), the fifth largest professional services network in the world, surveyed 500 C-suite leaders from 55 countries, covering all major industries, to ask about the biggest risks facing their businesses now and into the future. The *BDO Global Risk Landscape*

Report found the biggest risks that business executives are most unprepared for are as follows (BDO, 2017):

- CEOs (Chief Executive Officers): failure to innovate and technological changes (88%);
- CFOs (Chief Financial Officers): regulatory risk and technological changes (78%);
- CROs (Chief Risk Officers): regulatory risk and technological changes (75%).

A McKinsey Global Institute Report (McKinsey Global Institute, 2017) analyzed the automation potential of 46 countries, representing 80% of the global workforce. Several factors were considered, including the percentage of work activities that could be automated using current technology, the number of full-time employees that could be affected, and employee wages. The types of activities that have a high potential for automation are physical tasks in highly structured and predictable environments, data processing, and data collection. The types of activities that have a considerably lower potential for automation are unpredictable physical work, interactions with others, applying expertise, and managing others which is the least susceptible to automation.

The report analyzed the automation potential of several select countries or regions with large populations and/or high wages. It listed the percentage of activities that could be done by robots or machines, using technologies currently available:

- Japan, 55%
- India, 52%
- China, 51%
- Europe Big Five (France, Germany, Italy, Spain and the United Kingdom), 47%
- The United States, 46%
- Remaining countries, 50%

This McKinsey report found that about half of the activities people are paid to do could potentially be automated worldwide by adapting current technologies, accounting for nearly \$16 trillion in global wages of which \$2.7 trillion was the U.S. wages. Robots and AI will bring widespread benefits to businesses, especially increased performance, by reducing errors and improving quality and speed. In some cases, outcomes may exceed human capabilities. Based on McKinsey's scenario modeling, automation was estimated to raise productivity growth globally by 0.8 to 1.4 percent annually (McKinsey Global Institute, 2017).

Such findings can provide insight for corporate executives and boards of directors to help plan for competitive advantages as robots and machines become more commonplace. A director for Redwood Software, a global robotic process automation UK company, commented:

"If we don't focus on technology and understand it, we're going to have less and less relevance in industry. The better I am at predicting the future and responding, the better I'm preparing now to have a future. It's important for executives to understand and anticipate how automation will shape the world economy, as well as be aware of which regions are likely to be affected the most. If you're not prepared, then your long-term prospects are pretty dim, and I don't see how you can honestly be competitive. Processes that were once thought impossible to change or improve will do both in short order" (Wolfe, 2017).

A U.S. technology consultant, Anslee Wolfe, observed that being aware of the global impact of automation may potentially help create new industries and that global automation serves as a crucial reminder that firms must adapt to survive in the future. He said:

"It's coming whether you're ready or not. Our whole economy has to be focused on this. The countries that are able to manage that change the best; those are going to be the new leaders in the world. Humans must provide critical thinking and should be putting a focus on human interaction which robots can't replace. However, as machine learning gathers enough data and perfects its algorithms, AI will be able to make better and more informed decisions than humans can" (Wolfe, 2017).

The same observations and advice are also relevant for boards of directors as they try to enhance and bolster corporate governance in the face of such challenging technological risks and opportunities. Also, boards of directors need to recognize and understand the new risks associated with the behavior of millennials, and the challenges to business reputation in a world where many activities are more transparent and widely publicized.

Thus, the major research question of this paper is how executives and boards of directors can deal with both risk challenges and opportunities. We discuss key risk management challenges for boards of directors and present a framework to identify the new risks related to emerging technologies and reputation. The goal is to help boards and their companies deal with technological and societal changes and develop a working knowledge of the new forces in the corporate risk management regime.

The paper is divided into nine sections. The second section reviews the relevant literature and develops a governance framework to identify new risks related to emerging technologies and reputation. The next six sections discuss each of the identified new risks, respectively deep shift risks, global risks, digital risks and opportunities, AI initiatives risks, business risks from millennials, and business reputational risks. The last section provides concluding remarks and suggestions for future research.

2. LITERATURE REVIEW AND METHODOLOGY

The role of corporate governance in risk management has received increasing attention from both academic and policymakers perspective after the financial crisis of 2007-08. Previous literature finds evidence that appropriate governance mechanisms are critical to ensure effective risk management in a corporation. Gouiaa (2018) examined the relation between corporate governance systems and risk management practices. He found that corporate governance attributes related to the board's structure, directors' characteristics, and the board's operating process play a significant and important role in establishing an integrative risk management approach. Eleftheriadis and Vytas (2018) measured the risk and performance of public companies by assessing economic risk, operational risk, generic satisfaction of the administration, and the generalized self-efficacy of the administration.

Their results showed relationships for the management of risk on the administrative and financial levels. Mohamed Metwally, Ali, Diab, and Hussainey (2019) reviewed risk management and its relationship to management accounting and control and argued that an illusion of control led to some unintended consequences. Mensah and Gottwald (2016) surveyed 134 risk management professionals and found a significant relationship between the role of a chief risk officer, the presence of an audit committee, and the support of top management and the level of ERM deployment. Grove and Clouse (2016) developed a risk management approach, using financial fraud prediction models and ratios, for a strategy of international investing with improved corporate governance. Without such a strategy, investments of four Chinese companies destroyed \$34.5 billion in market value.

Several recent studies extend the literature and explore the sustainable dimension of corporate risk management. First, with the sustainability emerging as a source of competitive advantage, sustainability risks are growing and expanding its horizon in enterprise risk management. Braendle, Mozghovyi, and Huryna (2017) found that sustainability risks occurred when companies aspired to reach maximum competitive advantages and gain competitive benefits compared to their rivals. Sustainability risks connected to the competition were divided into several groups where environmental, legal, financial, behavioral, and state-related risks were found to be the most crucial ones. Second, the link between innovation, sustainability, and risk management is perceived to be stronger. Moro, Visconti, and Quirici (2014) analyzed technical or social innovation, concerning the creation and commercialization of new products, strategies, and management for the impact on microfinance institutions. They argued that to the extent that technology (with access to the internet, social networks, cashless electronic payments, etc.) reshapes the equilibriums among different stakeholders, it is likely to have important corporate governance consequences, softening the conflicts of interest among stakeholders and making the business model more resilient with positive externalities on both sustainability and outreach.

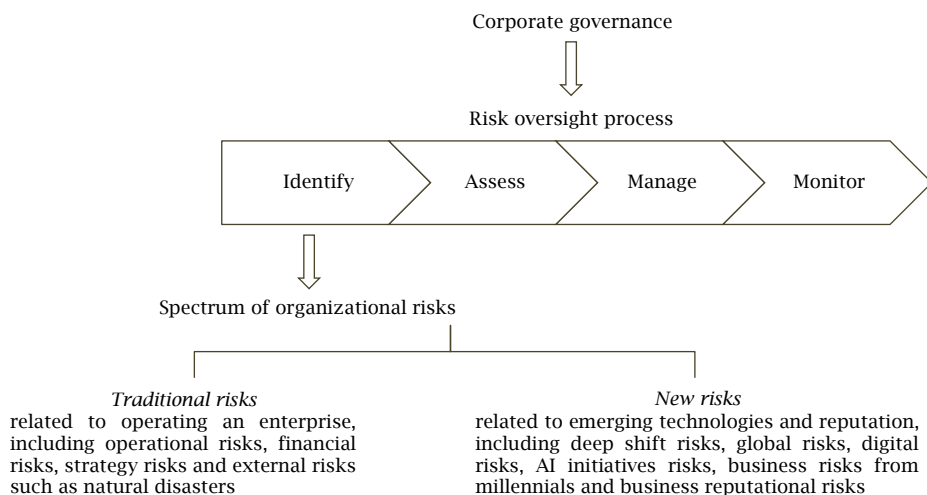
However, one strand of the literature shows that within a corporation, there is still a limited understanding of corporate governance and risk

management practices. Zulu (2014) surveyed 116 Human Resource (HR) managers to investigate whether they are aware of the strategic imperative of enterprise risk management. The results indicated that in general and across all sectors, issues related to risk management are not necessarily part of HR culture. In addition, both the public and private sectors lack the commitment to invest in risk management trainings as part of the cultural change programs. Grove and Patelli (2013) compared and assessed the risk management and corporate governance practices of both Bear Stearns (bailed out by the U.S. government) and Lehman Brothers (not bailed out by the U.S. government and precipitating the 2008 global financial crisis). Both banks only started risk management committees one year before their crises and these committees only met once or twice. Both banks also had weak corporate governance practices. Similar results for both risk management and corporate governance were found at Countrywide Financial Corporation which hugely facilitated the 2008 financial crisis by issuing “no-doc” mortgages to unqualified borrowers (Yale, Grove, & Clouse, 2013).

In particular, none of the existing literature has studied new risks relating to emerging technologies and reputation for corporate governance. This paper seeks to draw research attention to these new forces in corporate risk profile and help boards of directors develop an understanding of them to enforce effective oversight.

We employ an enterprise risk management framework and incorporate the new risks to fill in the gap. As Figure 1 illustrates, the risk oversight process comprises four key stages: identify, assess, manage, and monitor. The identification stage defines the universe of risks that could have material adverse impacts on a corporation. The assessment stage provides information on risk exposures and measurements. Risk management involves controlling and mitigating inherent risks to a level that is in line with risk appetite. A monitoring and review stage follows to ensure appropriateness and relevance. The focus of this paper is the first stage, risk identification. We expand the corporate risk spectrum to new risks that occur as a result of technology advancement and reputational damages. These new risks are deep shift risks, global risks, digital risks, AI initiatives risks, business risks from millennials, and business reputational risks.

Figure 1. A framework for risk governance and risk identification



3. DEEP SHIFT RISKS: TECHNOLOGY TIPPING POINTS AND SOCIETAL IMPACT

In 2016, World Economic Forum's Global Agenda Council on the Future of Software & Society surveyed more than 800 executives and experts in the information and communications technology sectors and asked them to estimate when 21 key technology "tipping points" would be reached and when the deep shifts would enter mainstream society. The deep shifts refer to the monumental societal shifts with "far-reaching impacts on human health, the environment, global commerce, and international relations" (Castelluccio, 2016). These radical shifts are expected to change the risk regimes and consequently have significant impacts on companies' risk management. The following are their informed estimates about the 21 tipping points, the corresponding timelines, and the impact on risk management.

1. *Implantable technologies*: The tipping point will be the first implantable mobile phone to be made available. The expected date is 2023 per 82% of respondents. They cited Intel's prediction that there will be "practical computer-brain interfaces" by 2020.

2. *Our digital presence*: By 2023, 80% of people will have a digital presence on the Internet, with an accompanying increase in transparency, information exchange, and privacy problems per 84% of respondents.

3. *Vision as the new interface*: By 2023, 10% of reading glasses will have a direct connection to the Internet per 86% of respondents.

4. *Wearable Internet*: By 2022, 10% of clothing worn by the public will be connected to the Internet per 91% of respondents.

5. *Ubiquitous computing*: By 2024, 90% of the world population will have regular access to the Internet per 79% of respondents.

6. *A supercomputer in your pocket*: By 2023, 90% of the population will have smartphones that will be "literal supercomputers" per 79% of respondents.

7. *Storage for all*: By 2018, 90% of people will have unlimited and free (advertising-supported) storage per 91% of respondents.

8. *The Internet of and for things*: By 2022, there will be 1 trillion sensors connected to the planet's network per 89% of respondents.

9. *The connected home*: By 2024, more than 50% of Internet traffic delivered to homes will be to appliances and devices, rather than for communication or entertainment per 70% of respondents.

10. *Smart cities*: By 2026, there will be the first city with more than 50,000 inhabitants and no traffic lights per 64% of respondents.

11. *Big data for decisions*: By 2023, a federal government will replace its census with big data sources per 64% of respondents.

12. *Driverless cars*: By 2026, the number of driverless cars will total 10% of all cars on the U.S. roads per 79% of respondents.

13. *Artificial intelligence (AI) and decision making*: By 2026, there will be the first AI machine on a corporate board of directors per 45% of respondents.

14. *AI and white-collar jobs*: By 2025, 30% of all audits will be performed by AI per 75% of respondents.

15. *Robotics and services*: By 2021, there will be the first robotic pharmacist in the U.S. per 86% of respondents.

16. *Bitcoin and the Blockchain*: By 2027, 10% of the global gross domestic product will be stored on blockchain technology per 58% of respondents.

17. *The sharing economy*: By 2025, there will be more trips taken via car-sharing than by private cars per 67% of respondents.

18. *Governments and Blockchain*: By 2023, there will be tax collected for the first time by a federal government via a Blockchain per 73% of respondents.

19. *3D printing and manufacturing*: By 2022, the first 3D-printed car will be in production per 84% of respondents.

20. *3D printing and human health*: By 2024, the first transplant of a 3D-printed liver will happen per 76% of respondents.

21. *3D printing and consumer products*: By 2025, 5% of consumer products will be printed in 3D per 81% of respondents.

4. GLOBAL RISKS

With the deepening of globalization, global risks have drawn increased attention to the corporate world. These risks are caused by uncertain events in the global scope and would have widespread impacts in at least two different continents. The global risk landscape is expanding in terms of both the magnitude and complexity over time. Aon is a leading global professional services firm providing risk, retirement, and health solutions. Its bi-annual *2019 Global Risk Management Survey* was based on responses from more than 2,600 risk managers from 33 industries, representing small, medium, and large organizations operating in 60 countries (Aon, 2019). The survey results were summarized by the Top 10 risks both for 2019 and projected risks for 2022. The same ten risks occurred for both years with some reshuffling and the 2022 risk order is presented as follows:

1. Economic slowdown/slow recovery (number one in both years);
2. Accelerated rates of change in market factors;
3. Cyber-attacks/data breach;
4. Commodity price risk;
5. Failure to innovate/meet customer needs;
6. Increasing competition;
7. Business interruption;
8. Failure to attract or retain top talent;
9. Cash flow/liquidity risk;
10. Damage to reputation/brand.

Cyber-attacks risk first entered Aon's Top 10 list in 2015 at number nine and its importance has grown steadily over the past four years. North American participants ranked it as their number one risk and a 2018 study by the World Economic Forum reached a similar conclusion. According to Symantec, a global software company, the United States was the country most affected by targeted cyber-attacks between 2015 and 2017 with 303 known large-scale attacks. Emphasizing the importance of technology, disruptive technologies

risk, and supply chain failure have moved from number 20 and number 19 in the 2017 survey to number 14 and number 12 in the 2019 survey, respectively.

A key insight from the 2019 survey is that organizations need to be more prepared for the broad range of risks that threaten their ability to continue growing, protecting their brand, and serving clients and stakeholders. Concerning the number one risk of an economic slowdown with a slow recovery, companies are more sensitive to volatility, particularly from emerging risks, such as cyber-attacks, disruptive technologies, and business interruption from non-physical threats. These risks are less well understood, as there are less experience and less data available to help manage them. As a result, risk readiness has declined to its lowest level in 12 years (Aon, 2019).

Similarly, the United Bank of Switzerland (UBS) published a *Global risk radar* report which analyzed six ongoing risk themes. UBS assessed risk probabilities for base risk cases (> 50% probability) and additional risk cases as either high (30% to 50%), moderate (20% to 30%), low (10% to 20%) or very low (< 10%). It used an average of four risk dimensions: the likelihood of occurrence within the next six to twelve months, the urgency of how soon the event would likely take place, the geographic scope of the extent of regional/global financial and economic contagion, and expected market impact of how much returns of affected asset classes would deviate from the baseline. The six ongoing risk themes are summarized by various risk scenarios as follows (UBS, 2017a):

1. *Central banks taking a step back*: The base case is no immediate danger for markets. The risk case is that the withdrawal of central bank support causes the end of the current economic cycle, assessed as very low (< 10%).

2. *North Korea*: The risk of decisive military action remains low. The base case is a diplomatic process. The risk case is military escalation threatening a regime collapse, assessed as low (10% to 20%).

3. *Middle East escalation*: The base case is no meaningful disruption to energy exports. The risk case is that escalating tensions disrupt energy exports, assessed as very low (< 10%).

4. *Failure of Trumponomics*: The base case predicted that the U.S. corporate tax would be lowered to 25%-30%, which became 21%. Tax reform was the only one of Trump's major economic stimulus packages to be enacted as infrastructure spending or healthcare reform have yet to occur. The risk case is the failure of Trumponomics, assessed as moderate to high risk (30% to 40%), especially since the tax reform has only benefitted the rich and major company shareholders with stock buybacks. Also, since there have been few new capital investments by the U.S. companies, the U.S. economy has not been stimulated to grow by the tax reform act.

5. *Rising protectionism*: The base case is that no broad-based protectionist measures will occur. The risk case is rising protectionism, assessed as low risk (10% to 20%).

6. *China credit crunch*: The base case is orderly deceleration. The risk case is regional or sector-specific credit crunch, assessed as low risk (10% to 20%).

5. DIGITAL RISKS AND OPPORTUNITIES

Technology advancement drives both growth and challenges. Companies are looking to embrace emerging technologies to remain competitive while exposing themselves to more risks as a consequence. The risks brought by the new digital technologies are generally considered as digital risks. The major digital risks are emphasized by this quote from the CEO of a major U.S. consulting company: "Digital is the main reason just over half of the companies on the U.S. Fortune 500 have disappeared since 2000" (UBS, 2017b). Similarly, UBS technology analysts have observed: "We believe many companies still do not understand the level of disruption AI could create during the next few decades. If companies fail to integrate AI into their business models, they run the risk of market share losses and potential extinction, the magnitude of which should exceed that of the recent technological forces like e-commerce and smart devices" (UBS, 2017b). Major digitalization and related risk impacts on companies and corporate governance have been analyzed (Grove, Clouse, & Schaffner, 2018). Also, the digital risks of cybersecurity for enhanced corporate governance have been analyzed (Grove, Clouse, & Schaffner, 2019; Grove et al., 2018) and discussed for purposes of information security risk management (Grove et al., 2018).

The risks and challenges of digital technology were emphasized by the CEO of Aviva, a multinational insurance company and the U.K.'s largest insurer: "We've got much more to do. It's about investing in growth assets. It's about investing in digital. It's about investing in automation, new products, and being innovative, and we are certainly doing that as well" (UBS, 2017c). For example, such risks and opportunities in the insurance industry have led to a new term, *Insurtech*. It is similar to the risks and opportunities of a traditional brick-and-mortar retailer. By moving online and using mobile apps, a retailer can leverage its existing operations to potentially target and service more customers. With the data collected through apps and online sites, the retailer can better analyze the needs of each customer's tastes and needs and offer products targeted for each individual customer.

An insurance company can make a similar transformation in order to have more accurate risk assessment and pricing, more personalized solutions, more efficient operations and processes, and improved customer experiences and satisfaction. In summary, *Insurtech* is the technology driving such potential improvements and reducing risks. One insurance example demonstrates the potential of *Insurtech*, comparing traditional auto insurance to future auto insurance with the following eight insurance operations. These eight process improvements with emerging technology are also relevant to the fundamental, basic operations of all business types, not just insurance, as follows:

Distribution Channel

Traditional: mainly through agencies and referrals from car dealers with some telemarketing and online channels.

Future: primarily through mobile apps and online platforms.

Underwriting/Pricing

Traditional: pricing of auto insurance primarily based on the driver's own record of accidents/claims and the car cost.

Future: most cars will be equipped with telematic devices to track and collect detailed data on usage and driving habits/behavior. Pricing will be based on usage (miles-driven) and driving behavior.

Incentives

Traditional: no-claims bonus can result in lower premiums.

Future: premium discount for positive behaviors, such as safe driving with no accidents.

Price Comparison

Traditional: time-consuming as customers need to submit information to different insurers or agents or brokers in order to obtain several price quotes for comparison.

Future: easy online aggregators provide price quotes from different insurers in a matter of minutes.

Purchase Process

Traditional: manual processing of documents which can take days to become insured.

Future: fast turnaround time as documents can be submitted through mobile apps, taking a few clicks to buy insurance coverage.

Customer Engagement

Traditional: very little ongoing customer engagement.

Future: through connected devices and mobile apps, insurers will be able to regularly provide customers with personalized advice, such as routes and road/weather conditions, to help avoid accidents and enhance the driving experience. AI can help analyze driving habits, identify weaknesses, and help drivers improve. Cars will be equipped with sensors that can detect collisions and alert emergency personnel within seconds. Insurers will be able to provide quick on-site assistance if necessary.

Claims

Traditional: time-consuming process with plenty of documentation involving the agent, surveyor, and claims assessor. Often it takes weeks from an accident to a claim payment.

Future: cars will be equipped with sensors that can measure the estimated damage in the event of an accident. Claims will be submitted online. More detailed data on the accident will allow for quicker and more accurate assessment of claims. The claim cycle will only take days. For example, a Japanese insurance company recently announced that it will replace more than 30 employees with AI, based on IBM's Watson technology, and the company estimated that it will save \$1 million per year. Blockchain technology will also reduce the number of fraudulent insurance claims.

Customer Retention

Traditional: determined by pricing, relationship with an agent, and customer satisfaction, particularly if there was a claim.

Future: ongoing customer engagement helps boost loyalty. The existing insurer will have the most data on a driver's behavior, will be in the best position to assess his/her risk, and be able to provide more attractive rates and premiums.

6. AI INITIATIVES RISKS

Artificial intelligence (AI) has evolved to be the dominant new force to shake the business world. It is considered to be a double-edged sword. While the potential improvements brought by AI could be enormous, it may give rise to a host of unexpected outcomes, so-called AI initiatives risks. In late 2018, Deloitte surveyed 1,100 information technology and line-of-business executives from US-based companies to obtain a cross-industry view of how their organizations are adopting and benefiting from cognitive computing/AI. Respondents rated the top AI risks and challenges for their companies' AI initiatives as follows:

- Implementation challenges;
- Integrating AI into the company's roles and functions;
- Data issues, e.g., data privacy, accessing, and integrating data;
- Cost of AI technologies/solution development;
- Lack of skills;
- Challenges in measuring and proving business value.

Top potential risks from AI initiatives were provided by the respondents as follows:

- Cybersecurity vulnerabilities of AI;
- Making the wrong strategic decisions based on AI;
- Legal responsibilities for decisions/actions made by AI systems;
- Failure of the AI system in a mission-critical or life-or-death context;
- Regulatory noncompliance risk;
- Erosion of customer trust from AI failures;
- Ethical risks of AI.

Cybersecurity threats are giving some companies pause in adopting AI initiatives per the respondents as follows:

- Moved ahead with AI initiatives despite cybersecurity concerns;
- Experienced a cybersecurity breach relating to AI initiatives within the last two years;
- Slowed an AI initiative in order to address cybersecurity concerns;
- Decided not to start an AI initiative due to cybersecurity concerns;
- Canceled or halted an in-progress AI initiative due to cybersecurity concerns.

Such risk concerns are reflected in the top AI business use cases developed by the respondents' companies as follows:

- Information technology
- Quality control/defects
- Cybersecurity
- Predictive analysis
- Customer service, including virtual assistants
- Risk management

Deloitte concluded that its survey results clearly show that growing numbers of companies are becoming more sophisticated in their usage of AI technologies. However, key risks from AI initiatives remained a challenge for risk management, especially navigating the "last mile" of behavior change, i.e., involving a company's end-users in the development, implementation, and operation of AI

initiatives. It urged companies to start selecting the business use cases that can deliver measurable value through AI-powered capabilities while also assessing risk (Deloitte Insights, 2019).

Cheatham, Javanmardian, and Samandari (2019) confirmed the survey results of Deloitte and showed that AI can lead to significant unintended consequences for companies, including data difficulties, security snags, model misbehaving and interaction challenges between people and machines.

7. BUSINESS RISKS FROM MILLENNIALS

Company executives and boards of directors need to keep up with current trends in society for both risk challenges and opportunities. Millennials, one of the largest generations in history, are moving into its prime spending years and setting the trends for decades to come. It is important to understand millennials' behavior and its economic impacts. Millennials have a set of priorities and preferences sharply different from prior generations (Cummings, 2017). And their social media behavior is fueled by both a Fear of Missing Out (FOMO) and a Fear of Joining In (FOJI), similar to the old Wall Street mantra of greed versus fear behavior (UBS, 2017a). There are many complex reasons why millennials behave differently, including less financial stability and memories of growing up during the great recession caused by the 2008 financial crisis, which has led to the term "psychologically scarred millennials". Accordingly, millennials are killing countless products, services, and industries, from napkins to "breastaurants", which causes disruptions in the economy and affects how companies do businesses. Such risks are considered as the generation risks brought about by the millennials.

Here are 19 businesses millennials have been killing (Taylor, 2017):

1. *Casual dining chains like Buffalo Wild Wings and Applebee's*: Millennials are more attracted than their elders to cooking at home, ordering delivery from restaurants, and eating quickly in fast-casual or quick-serve restaurants.

2. *Beer*: Millennials prefer wine and spirits to beer and are drinking less alcohol than older generations. Beer has lost an 11% market share to wine and hard liquor from 2006 to 2017.

3. *Napkins*: Millennials are opting for paper towels over napkins. Only 56% of shoppers bought napkins in the past six months, compared to 86% who bought paper towels. Paper towels are more functional than napkins and can be used for more purposes and millennials are more likely to eat meals out of the home.

4. *"Breastaurant" chains like Hooters and Twin Peaks*: Millennials are 19% less likely to search for breasts on pornographic websites. The number of Hooters locations in the U.S. has dropped by more than 7% from 2012 to 2016 and sales have dropped.

5. *Cereal*: 40% of millennials said cereal was an inconvenient breakfast choice because they had to clean up after eating it. Instead, they are turning to convenient options with the minimal cleanup that can be eaten on the go, from yogurt to fast-food

breakfast sandwiches. Cereal sales dropped 5% from 2009 to 2014.

6. *Yogurt - especially light yogurt*: There has been a growing demand for natural, protein-rich foods that fill up health-conscious millennials, instead of simply low-calorie and low-fat options, like in the 1980s and 1990s. This trend has been a huge help for Greek yogurt, which appeals to customers, especially millennials, seeking a filling and convenient option packed with protein.

7. *Golf*: Millennials are not picking up the game and boomers are aging out so the game is in decline.

8. *Motorcycles*: Millennials are adopting motorcycling at a far lower rate than prior generations. Motorcycle sales at Harley-Davidson, which represents half of the U.S. big-bike market, were down 1.6% in 2016 and overall U.S. sales fell 3.9% in 2016.

9. *Homeownership*: Homeownership is hitting record lows among millennials, due to tighter credit standards and lifestyle changes, including delayed marriage and children. These factors are not expected to change in at least the medium term.

10. *Home-improvement stores like Home Depot and Lowe's*: Millennials' reluctance to buy homes could ultimately hurt these retailers. Millennials are redefining the American family as they are delaying marriage and childbirth at rates never seen before. Concerning the impact on housing, millennials do not need the same space, permanence, and practicality that most Americans want out of their housing.

11. *Diamonds*: Fewer millennials are pursuing marriage and those who increasingly choose non-traditional rings. Sales of diamonds have slowed globally.

12. *Department stores like Macy's, Sears, and J.C. Penny*: Millennials flock to fast-fashion brands, like H&M and Zara, and do more shopping online. These traditional department chains have been closing hundreds of stores. Millennials are less drawn to aspirational, designer brands and are perfectly happy saving money by buying private-label lines that hurts traditional department stores. When millennials do spend money, they're spending more on experiences like restaurants and traveling.

13. *Designer handbags*: Millennials have lost interest in such brands as Michael Kors and Kate Spade which have been forced to sell their handbags at major discounts. Also, millennials often lack the money to spend on such bags.

14. *Bars of soap*: Almost half of all U.S. consumers believe bar soaps are covered with germs after use, a feeling that is particularly strong among millennials (60%), as opposed to older consumers (31%). Bar soap sales fell 2.2% from 2014 to 2015.

15. *Fabric softener*: Millennials don't even know what the product is for. Sales of liquid fabric softeners fell 15% in the U.S. from 2007 to 2015.

16. *Gyms*: While millennials like to work out, they are ditching gyms in favor of boutique, class-centric centers. They don't want to be tied down to

gym subscription companies which lost 5% of their gym visit share in 2016 to boutique fitness visits.

17. *Football*: Millennials are dropping cable at an increasing rate, leaving them to watch games in groups or simply stay updated on their mobile devices, i.e., iPhones. Both college and pro football attendance and viewership have declined in the past several years.

18. *Banks*: Millennials distrust financial establishments and rarely visit physical banks. Coming out of the financial crisis, millennials have a massive distrust of existing financial services. Nearly 75% of millennials with a bank account visit a bank branch once or less a month and 40% never visit physical banks. Thus, bank branches and physical bank locations may soon be a thing of the past.

19. *Oil*: Millennials' conception of the oil industry means that it may struggle to find workers and customers in the future. McKinsey found that 14% of millennials say they would not want to work in the oil and gas industry because of its negative image, the highest percentage of any industry. They question the longevity of the industry and see the industry's careers as unstable, blue-collar, difficult, dangerous, and harmful to society (Taylor, 2017).

Studies also found that millennials would rather spend their money on "experiences" than on purchasing goods (Saiidi, 2016; Fromm, 2017). The substantial purchasing power of millennials means that such a trend would force companies to rethink their business models and make adaptations accordingly.

8. BUSINESS REPUTATIONAL RISKS

Warren Buffett once said: "It takes 20 years to build a reputation and five minutes to ruin it." A corollary is that it takes five minutes for the true nature of corporate culture to emerge, and 20 years to change it. With the Wall Street emphasis on "making the quarterly numbers," there may be little motivation to do the necessary long-term investments and changes needed to overcome the ruin of a reputation (Henning, 2017). However, the *Aon 2019 Global Risk Management Survey* had reputational risks, or risks resulting from "damage to reputation/brand", as its number ten global risk.

Recent examples abound to emphasize business reputational risks. Equifax, a U.S. credit-monitoring company, disclosed a data breach from hacking on September 7, 2017, where hackers may have stolen the personal information of 143 million Americans, one of the largest hacks ever. The company said that it had learned of the hacking on July 29 but did not disclose this hack publicly until September 7. A required Securities and Exchange Commission (SEC) report for executive trading showed that on August 1 and August 2, Equifax's CFO sold shares worth \$946,374, the President of Equifax's U.S. information solutions division sold \$584,099 and another divisional President sold \$250,458 for a total of almost \$1.8 million (Riley, Sharpe, & Robertson, 2017). In the week following from the public disclosure on September 7 through September 13, the Equifax stock fell from \$142.72 to \$96.66, a 32% drop, which destroyed \$5.5 billion in market capitalization. By early March 2019, one and

½ years later, the stock had only recovered to \$110.76 which was still a \$3.8 billion market cap destruction of 22% from September 7, 2017.

The U.S. Justice Department criminal investigation, aided by the Federal Bureau of Investigation, found Equifax had learned about a major breach of its computer systems even sooner than September in early March. Using this earlier timeline, the CFO sold shares on May 23 for \$1,910,160, and on May 21 for \$6,455,346. Even just a little sooner on February 28, the CEO sold 74,346 shares worth \$9,742,299 and six other executives sold 41,913 shares worth \$6,424,595 (MarketWatch, 2017). None of these executives had pre-determined stock sale plans to mitigate insider trading allegations (Koren, 2017). Equifax's Chief Information Officer and Chief Security Officer both resigned on September 15. The CEO resigned on September 26 but will receive \$18 million in retirement payouts (Surane & Melin, 2017).

Over twenty-five lawsuits have subsequently been filed against Equifax and forty U.S. states have joined a probe of its handling of the data breach. The U.S. Senate Democratic Leader, Chuck Schumer of New York, compared Equifax to Enron: "It's one of the most egregious examples of corporate malfeasances since Enron" and called Equifax's treatment of consumers afterward disgusting and its inability to protect data deeply troubling (Thomson Reuters, 2017). Another U.S. Senator, Elizabeth Warren of Massachusetts, called on the Equifax executives to return some of their compensation (Surane & Melin, 2017).

Another recent example of reputational risk is Wells Fargo. Its fraudulent cross-selling efforts from 2011-2016 created 1.5 million bank accounts, 565,000 credit card accounts, and 800,000 car loan insurance policies - all unauthorized by Wells Fargo customers. Consequently, \$185 million in penalties and fines have been paid by Wells Fargo and 5,300 employees fired. The former CEO and the former executive in charge of this cross-selling have both resigned and had to claw-back \$75 million in compensation (Cowley, 2016). From its March 2017 peak of \$58.67 to early March 2019, or two years later, Wells Fargo stock traded at \$49.02, down 16%, for a total of \$44 billion in recent market capitalization destruction.

Another reputational risk problem is Volkswagen which rigged its sales growth and profits by designing software to defeat diesel engine emission requirements in order to make its short-term performance and executive compensation goals. After Volkswagen admitted to installing "defeat devices" in more than 11 million diesel engine vehicles worldwide in September 2015, it lost 1/3 of its market cap in one week. From its September 2015 peak of \$212.70 to early March 2019, or 3 and ½ years later, Volkswagen stock traded at \$151.70, down 29% for a total of \$30 billion in recent market capitalization destruction. It should take years for the full Volkswagen emissions scandal to become apparent (Medland, 2016).

A June 2016 settlement with U.S. Volkswagen car owners and U.S. regulators totaled \$14.7 billion: \$10 billion on 475,000 2.0-liter diesel vehicle buybacks and \$4.7 billion to mitigate pollution from such vehicles. In July 2016, the state of New York said Volkswagen was exposed to state penalties of

over \$500 million and filed a lawsuit with the New York State Supreme Court. The state of Massachusetts joined this lawsuit and its attorney general commented: "This is an example of a company that not only engaged in deception and fraud on a brazen scale but covered up that deception. The conduct reflects a corporate culture that had no regard for the law, no respect for the American people, and no regard for the environment or people's health." This New York lawsuit also criticized Volkswagen's board of directors for awarding about \$70 million in salary and bonuses to the CEO and other management board members in 2015 and summarized: "Recent actions demonstrate that the company's culture that incentivizes cheating and denies accountability comes from the very top and, even now, remains unchecked" (Ewing & Tabuchi, 2016).

Concerning board independence, the Volkswagen board of directors had major independence problems in addition to its performance-rigging, ethical problems. Nine of the twenty board members (45%) are or have been Volkswagen executive managers (Minow, 2015). If the union and local government board members, all with strong, possibly dependent, economic links to Volkswagen, are included, there were fourteen of the twenty members (70%) who could be non-independent. According to one commentator on Volkswagen's board, "Outside views rarely penetrate. It's an echo chamber" (Stewart, 2015).

A financial analyst said that this Volkswagen incident was one of the biggest corporate scandals of recent years and summarized corporate governance at Volkswagen: "VW was an organization full of hubris, you know, dominate the world and walk-on-water type of thinking. This has all led to the situation we are in now. It is that hubris, equating to a lack of understanding of the meaning of corporate responsibility at the top - as opposed to easily pointed fingers at the action of a handful of rogue employees - that is most chilling" (Medland, 2016). Similarly, the CEOs and boards of collapsed, fraudulent companies have gradually slid into the intent to deceive "as hubris consumed them and they did whatever it took to maintain their unique and revered status in the marketplace" (Jennings, 2006, p. 275).

Another reputation risk problem with hubris by top management and failure of corporate governance by the board of directors is ExxonMobil. In November 2015, the New York attorney general started an investigation of Exxon for lying about the risks of climate change. Exxon was aware in the 1970s that carbon dioxide from oil and gas burning could have dire impacts on the earth, and Exxon's board of directors was fully briefed by Exxon's own scientists decades ago on such risks. However, Exxon decided to "emphasize the uncertainty in scientific conclusions" and from 1998 to 2005, Exxon contributed almost \$16 million to organizations designed to muddy the scientific waters. However, in 2007, Exxon acknowledged that the earth's warming was caused in large part by carbon dioxide and promised to no longer fund climate change deniers and their "junk science" (Egan, 2015).

All these reputational risk problems can lead to major disruptions at companies that can generate

employee attitude problems. Attitude is a valuable corporate asset that needs to be developed and harnessed. A global corporate consultant, Noah Fleming, has found that the employees, who complain the most or are most hesitant to adopt new strategies and changes, are usually the worst performing ones. Conversely, almost always the top performers are the ones who look at something new or fresh and ask themselves how they can apply it to their work. As an employee, instead of being negative and saying, "This won't work," it was recommended to change the attitude to "How can this work" or "What if this works?". Instead of "Why will this fail?", ask "Why will this succeed?" (Fleming, 2017).

9. CONCLUSIONS

The major research question of this paper is how executives and boards of directors can deal with both risk challenges and opportunities. Accordingly, the major sections of this paper discussed key risk challenges for boards of directors and corporate governance in order to help their companies deal with emerging technological and societal changes: deep shift risks, global risks, digital risks and opportunities, AI initiatives risks, business risks from millennials, and business reputational risks.

Emerging technologies have rapidly reshaped the business world with both challenges and opportunities. Gartner consulting firm estimated that the number of connected devices is growing by 5.5 million units per day and could reach a total of 20.8 billion by 2020 (UBS, 2017b). The Netscape founder observed: "Software is eating the world" (Freidman, 2016) and the Tesla founder, Elon Musk, warned: "Artificial intelligence is the biggest risk that we face as a civilization" (Leins, 2017). Tom Freidman, the author and newspaper op-ed columnist, summarized these AI challenges: "We are in the middle of a change in the climate of technology. We're moving into a world where machines and software can analyze (see patterns that were always hidden before); optimize (tell a plane which attitude to fly each mile to get the best fuel efficiency); prophesize (tell you when your elevator will break and fix it before it does); customize (tailor any product or service for you alone) and digitize and automate (just about any job). This is transforming every industry" (Freidman, 2017). In contrast, Alibaba founder, Jack Ma, provided the opportunistic perspective: "New technologies, such as artificial intelligence and big data, will only broaden the room of imagination for mankind" (UBS, 2017d).

Recognizing and understanding the opportunities and consequences of these risks related to technology advancement becomes an important part of a company's corporate governance process, policies, and procedures. Korn/Ferry Institute (2013) observed: "If a board is not bothered about digital, I would sell your shares in that company!". This paper attempted to fill in the void in the literature by identifying the risks to companies and their boards of directors from many emerging technologies, the behavior of millennials, and reputational concerns. If companies can successfully incorporate these new risks, it should lead to enhanced corporate governance.

The main limitation of this study is how fast technology is changing, especially for the topics discussed in this paper: deep shift risks, global risks, digital risks and opportunities, AI initiatives risks, business risks from millennials, and business reputational risks. Future research in this field may extend to key technology updates for organizational, social, and corporate governance impacts. For example, field studies of how companies are dealing with emerging technology impacts and risks, especially with a corporate governance perspective. Another area for future research concerns the ethical implications of the impact of technologies.

For example, confidentiality now has a new dimension related to cybersecurity, proprietary data, databases, and the cloud. Objectivity generally means lack of bias but now there are machines and algorithms that learn so the potential bias may now extend from just humans to algorithms. Also, AI and machine learning impact ethics as they intermix learning, judgment, and making decisions which will become hybrid, part machine, and part human (Butcher, 2019). In addition, future research could develop a quantities framework to assess and analyze the risks to broaden our understanding of the nature and scope of risk governance.

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