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GOING GREEN: CARVING A NICHE IN A GLOBAL MARKET

Ahmed Maamoun, University of Minnesota Duluth

ABSTRACT

Making businesses and products greener is becoming mainstream and moving toward being a necessity alongside efficiency, quality, and profitability. Today, reduced environmental impact is being viewed as the new way of doing business. In other words, “business as usual” is no longer a viable option. This applies to a host of industries and product categories—apparel, chemicals, building materials, packaging, food and beverages, consumer goods, and retailing. Prominent businesses commonly express a commitment to sustainability. Such commitment is often expressed in terms of “a desire to payback,” “to invest in communities,” “to be a global citizen,” “to be socially responsible,” “to engage in fair trade,” or “to save the planet.” Implementation may vary from company to company, but the basic theme remains the same: we may be a for-profit company, but we stand for more than just making money.

A balanced, clear communications program must be blended together and disseminated through the company’s various marketing channels. Care must be taken when communicating about greener products and practices. There must be a factual authentic science-based story to be told and the message must be modest and transparent to demonstrate how the product or service helps customers with their sustainability needs. Sustainability-oriented companies can stand out by using fewer resources, enhancing quality, supporting good causes, and reducing costs. When a company manages to eventually reach this point of having a truly greener product or practice that is communicated in a proper way, everyone wins. Customers’ needs are met and brand loyalty is maintained.

Sustainability is not going anywhere and the focus on greener products and sustainable brands is here to stay. The demand for sustainable products and practices will continue to boom. The companies that truly provide these products and benefits without greenwashing or increasing costs will be the big winners.

INTRODUCTION

It’s 2022. There are 8 billion people on the planet, compared to only 2 billion a century ago. Recently, the United Nations Department of Economic and Social Affairs estimates that the global population, while growing slowly at under 1%, will still reach 8.5 billion by 2030; 9.7 billion by 2050; and 10.4 billion in 2100. This equates to a 31% increase in Earth’s population by the end of the century. Half of the world’s population lives in seven countries: China (1.426 billion), India (1.417 billion), United States (338 million), Indonesia (276 million), Pakistan (236 million), Nigeria (219 million), and Brazil (215 million). Moreover, next year (2023), India will

exceed China's population and become the most world's most populous country (United Nations DESA, 2022).

Earth's natural resources are under more pressure than ever before. We are using more energy and creating more pollution than ever before. There is a rising world population and more importantly a growing middle class in over-populated nations such as Brazil, China, Egypt, India, and Russia. With the increased wealth and aspirations, there is a desire to have products that more developed nations have: Mercedes Benz cars, Apple iPhones, Coke, McDonald's hamburgers, Levis jeans, Samsung TVs, etc. More of these products means more pressure on the planet's finite and non-renewable resources, such as wood, water, oil, coal, natural gas, lead, aluminum, and steel. Just a few decades ago, corporations had one mission: Maximize profits for shareholders. Back then, sustainability was some idealistic notion. Today, a company that does not express commitment to sustainability will have a hard time earning consumers' trust and business. Businesses commonly express a commitment to corporate social responsibility and sustainability. Such commitment is often expressed in terms of "a desire to payback," "to invest in communities," "to be a global citizen," "to be socially responsible," "to engage in fair trade," or "to save the planet." Implementation may vary from company to company, but the basic theme remains the same: we may be a giant company, but we stand for more than just making money. A commitment to sustainability is not a cost-free option. For example, if a company decides to donate 1% of its profits to an environmental cause, the shareholders of that company are effectively making that donation. The focus of this paper is to highlight the significance of sustainability and describe some big players in that field in today's world. These firms are clearly seeking differentiation and competitiveness through sustainability. Amazon, for instance, is the leader when it comes to shopping online. Walmart is king in brick-and-mortar format. The future of retail will be shaped by one of these two companies, and sustainability will be a decisive factor. The same goes for other leaders in their industries; such as H&M, P&G and Starbucks. Business as usual is not an option, and the rival that better utilizes sustainability and green initiatives will win in the next decade.

SUSTAINABILITY

Some people argue that sustainability is the new "must do" that businesses must embrace, or perish. How corporations conduct business has changed forever. Maximizing profits is no longer the only justification for a company's existence. More companies are jumping on the sustainability bandwagon for a number of reasons. Nonstop population growth along with rising affluent middle class in many parts of the world—all chasing the same dream of extravagant consumerism is placing demands on the earth's natural resources. The creation of more products means more pollution, increased greenhouse gases, more resources extracted, and more disposable waste. We use more resources, consume more energy, and create more waste than ever before. In fact, we are currently "spending at a deficit"—using more natural resources to meet the demands of consumption worldwide than the earth can substitute each year. All humans have one thing in common. We breathe the same atmosphere and eat from the same oceans. Our communication, transportation systems, and economies are interconnected. And now, probably

more than ever, we seek the same kinds of lifestyle and consumerism. Global population has risen from 2 billion in the early twentieth century, to 8 billion in 2022; and is expected to surpass 10 billion in 2100. The pressures on the earth's natural systems are unmistakable and are growing with the exploding global middle class. Sustainability is no longer an idealistic notion, as there is an amplified concern about dwindling resources and the amount of pollutants getting into our food and bloodstreams.

Sustainability has been defined in many ways, but the most commonly used definition is the one drafted by the United Nations World Commission on Environment and Development (Brundtland Report, 1987). The report defined sustainability as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. More and more corporations, governments, financial institutions, and consumers are taking sustainability seriously and things will never be the same. Large corporations must lead the way by making both their practices and products more sustainable. Sustainability is no longer some idealistic concept; it is at the forefront of development. Company leaders are putting their money on sustainability, and things will never be the same. A sustainable business not only will command respect from customers, it can save money and resources in the end.

Companies that do well are described in accounting terms as being “in the black”. This is the accounting term for being profitable. The “black” shows up in the bottom line of the financial statement. Business practices that simultaneously benefit the business, society, and the environment help a firm become more sustainable. The triple bottom line refers to the economic, environmental, and social impacts of an organization. Here the company reaches out to its stakeholders rather than shareholders. However, the triple bottom line approach does not negate the drive for profits, it just does so in the context of also considering people and the planet. Consumers have higher expectations than ever of the companies they buy from, and this is impacting the brands they choose.

Thanks to the Internet and social media, companies cannot hide behind marketing slogans and advertising campaigns. They must match their actions with their claims. Conflicting stories, manipulations, and hypocrisy weaken the message by eroding consumers' trust. Companies must engage stakeholders to create value. For obvious reasons, companies aren't completely credible in telling their own stories. A sustainable message embraces the contribution of customers and other stakeholders in building the brand's reputation. The message must also deliver benefits such as quality, value, and convenience. Also, the message must empower customers and society. Sustainable brands help their customers to live better and more fulfilling lives. Brands don't have to be perfect, but they do need to be authentic and transparent about their impacts, and they do need to show continuing improvements in the way they are addressing their environmental and social impact. We have a long way to go to get to a fully sustainable economy—and it will take a commitment from all parts of the economic system, including consumers, to get there. However, the degree to which a company aligns a meaningful brand promise with the way it designs, builds, and delivers its brand to market is key.

It is imperative that companies are aware of current environmental and resource issues, and hold themselves accountable for the impact of their products. Companies also need to begin looking beyond the surface, as the impact of products stretches deep into the supply chain. This

includes raw materials that are harvested in a plantation that has destroyed the rich biodiversity of a tropical rain forest, to the minerals in your electronics that are mined from a country that is exploiting its citizens.

Environmental concerns of shoppers could be summarized as follows (Iannuzzi, 2018):

- *The amount of waste that's produced.*
- *The damage to wildlife and loss of biodiversity.*
- *The amount of resources left for future generations.*
- *The impact on climate change.*

Sustainability market pressures have been affecting all industrial sectors. Seven examples are listed in the next section. Those seven companies were selected as they have made an explicit and consistent commitment to sustainable practices. Their target markets have acknowledged their sustainable activities and hence they are thriving. They also come from different industries management cultures, and origins. The main theme they have in common is sustainability.

SUSTAINABLE COMPANIES IN THE 2020S

Aldi is a German discount supermarket chain with over 10,000 stores in 20 countries. Aldi sells frequently purchased grocery and household items, mainly under its private brands, which aim to meet or exceed the national brands on taste and quality. Ninety percent of all products are Aldi-exclusive brands, procured primarily from the same manufacturers that make national brands. This helps provide high-quality products without the additional costs of advertising and marketing usually associated with national brands. The company thinks grocery shoppers are moving toward nimble, easy-to-traverse stores instead of roaming warehouses-like supermarkets that take longer to navigate. The majority of Aldi's stores are around 12,000 square feet with just five aisles and are designed to stock merely 1,000 SKUs. In contrast, a conventional supermarket tends to carry 40,000–50,000 SKUs, while a Walmart Supercenter might have over 140,000 items, spanning an average of 187,000 square feet per store.

The company is taking a number of steps to help combat the global plastics catastrophe. It is noteworthy that by 2050, there will be more plastic than fish in the world's oceans! ALDI US, a chain with more than 1,800 U.S. stores in 35 states, is committed to plastic packaging reduction (Breyer, 2019). Aldi has always charged shoppers for bags -- which encourages consumers to bring their own. Their use is coming under fire across the U.S. as plastic waste fills the world's waterways. New York lawmakers recently approved a ban on single-use plastic bags, forcing residents to pay for paper ones or re-use their own during store visits. As consumer awareness grows, more restaurants and retailers have come out with plans to curtail the use of plastics and use more eco-friendly materials (Patton, 2019). The company plans to reach the following set of goals by 2025 through working with its suppliers:

- *100 percent of ALDI packaging, including plastic packaging, will have reusable, recyclable or compostable packaging.*
- *Packaging material of all ALDI-exclusive products to be reduced by at least 15 percent.*
- *100 percent of ALDI-exclusive consumable packaging to include How2Recycle label.*

- *Implement an initiative to make private-label product packaging easier for customers to reuse.*
- *Guide continuous improvement of product packaging by internal expertise and external evaluations.*

Amazon was founded by Jeff Bezos in 1994 to sell books online but turned into the largest e-commerce marketplace and cloud computing platform in the world as measured by revenue and market capitalization. The trillion-dollar company has declared its adherence to four principles: customer obsession rather than competitor focus, passion for invention, commitment to operational excellence, and long-term thinking. These principles represent sources of Amazon's competitive advantage. When Amazon first started, sustainability was not even on its radar. It was a small company in Seattle, Washington, and Bezos would drive the packages to the post office himself in his 1987 Chevy Blazer. In fact, Amazon did not appoint a sustainability executive until 2014, when Kara Hartnett Hurst became the first sustainability director. The sustainability practices and green initiatives Ms. Hurst has developed have transformed Amazon into a socially responsible, caring company, with particular emphasis on packaging improvements and renewable energy commitments.

One of the biggest opportunities for increasing the sustainability of product distribution lies in the area of green building. Warehousing, for example, occurs in buildings like factories, distribution centers, retail stores, and office buildings. Commercial and industrial buildings are responsible for nearly half of all energy consumption and greenhouse gases in the U.S. It stands to reason that cutting energy costs should start with the buildings. Amazon understood that well, and renewable energy and energy conservation has been a priority for the e-commerce giant. For example, the corporate headquarters in Seattle was remodeled using sustainable, energy-efficient building design. The buildings' interiors feature salvaged and locally sourced woods, energy-efficient lighting, composting and recycling alternatives, as well as public plazas and pockets of open green space. As of January 2019, the U.S. Green Building Council has certified 26 of Amazon's Seattle buildings as meeting or exceeding LEED standards. Of the 26, 18 are certified LEED Gold and four have achieved LEED Platinum certification for sustainable design and construction methods. Amazon's newest buildings in the Denny Triangle area of Seattle are heated through an innovative, and energy efficient district energy system that recycles heat generated at a neighboring data center. Amazon also focuses on sustainable design in its international locations. For instance, Amazon.de's corporate offices in Munich, Germany, have been Gold-certified for environmental design by the German Sustainable Building Council, based on the offices' energy-efficient interiors and use of sustainable building materials. Amazon's fulfillment center in Beijing, China, maximizes the use of natural lighting, saving thousands of kilowatt-hours of power usage each month. Furthermore, Amazon Wind Farm Texas, launched in 2017 generates more than 1,000,000 megawatt hours of clean energy annually from over 100 turbines. As of December 2018, Amazon hosts solar energy systems on 43 fulfillment facility rooftops worldwide, with the capacity to generate over 70 megawatts of power. Amazon has also set a goal to host solar energy systems at 50 fulfillment network buildings by 2025.

Although the 'Everything Store' is all about customer satisfaction, shiny and sophisticated packaging doesn't influence online shoppers' loyalty or buying behavior much. So,

Amazon came up with Frustration-Free Packaging to reduce waste and costs in 2008. The program involves using packaging that is made of 100% recyclable materials, easy to open, and designed to ship items in their original packaging, hence eliminating the need for additional boxes. Amazon celebrated the 10-year anniversary of Frustration-Free Packaging in 2017. The company claims to have eliminated more than 244,000 tons of packaging materials over the last decade. The e-tailing gigantic company has also eliminated the equivalent of 305 million shipping boxes in 2017 thanks to a third-party packaging waste reduction program, Give Back Box. In brief, the program (www.givebackbox.com) gives consumers an efficient way to reuse the shipping boxes in which they receive their many Amazon purchases. Simply reusing those boxes helps cut down on some of the massive waste associated with the growth of online shopping. But the solution goes a step further, as it allows Amazon shoppers to fill the boxes with unwanted items. By printing out a label on Amazon's Give Back Box site, they can have the boxes shipped to the nearest Goodwill facility. Goodwill pays the shipping costs, then exhibits the received goods for sale in its stores. For Amazon, the move gives it a way to address accusations of environmental waste, associated with the millions of packages it ships to consumers. It also avoids additional shipping costs, because Goodwill picks up that tab. For Goodwill, the initiative is expected to increase donations substantially. For Amazon consumers, Give Back Box makes it easy to get rid of outdated or unneeded items, while they also enjoy the intrinsic rewards that come from donating to a worthy cause or even get a tax deduction.

Amazon is even considering shipping to Prime members only once a week. The so-called "Amazon Day" service will be voluntary and targets customers who are troubled about their carbon footprint. Consolidating purchase deliveries will cut down on emissions associated with sending a delivery truck to the same customer multiple times a week, and will also result in grouping orders within a single package, thus reducing packaging. Customers can choose their preferred day of the week to receive shipments (Weise, 2019). With a focus on sustainability, Amazon has pledged \$2 billion to companies developing clean energy technology through its Climate Pledge Fund. The Fund is part of Amazon's Climate Pledge, which aims to eliminate the company's net carbon emissions by 2040.

Amazon partners closely with its suppliers to drive continuous improvement in sourcing raw materials and component parts. Suppliers are assessed regularly to monitor continued compliance and improvement in regard to workplace safety and workers' treatment. Many sites are assessed multiple times a year, which includes follow-up assessments to address specific findings. Amazon even uses independent auditors to verify compliance, including confidential worker interviews, and/or industry association audits, anonymous worker surveys, and other mechanisms to verify information.

Amazon has a history of acquiring successful start-ups and companies. The most prominent acquisition is arguably the purchase of Whole Foods Market for \$13.4 billion in 2018. The American supermarket chain, which exclusively sells products free from artificial colors, flavors, preservatives, sweeteners and hydrogenated fats, is the only USDA Certified Organic grocer in the United States. The chain has almost 500 stores in North America and the United Kingdom and is widely known for its organic selections. The Whole Foods purchase would give Amazon direct access to sustainability-oriented consumers and their information, as they shop in

stores for their foods. Amazon is known for using the data they collect to better serve their customers. Studying such a unique demographic should allow Amazon to make a major inroad to selling to green market segments. The technology giant was able to leverage such information and access to develop a number of grocery delivery programs over the past two years. The versatility and reach of these programs provide Amazon with a lead in the online grocery market. Online grocery sales are expected to exceed \$100 billion by 2025, and Amazon is already ahead in the online grocery battle with 100-plus million Prime customers.

H&M or Hennes & Mauritz AB is a Swedish multinational clothing-retail company known for its fast-fashion clothing for men, women, teenagers and children. H&M and its associated companies operate in 62 countries with over 4,500 stores. The fashion apparel retail industry is one of largest in the world and is also one of the most polluting, second to the oil industry. One of the reasons why the fashion industry is so polluting is due to the extensive supply chain involved in making a clothing item. There are many steps necessary to bring a product to market and all of them have significant impacts: production, raw material, textile manufacture, clothing construction, shipping, retail, use, and ultimately disposal of the garment. The carbon footprint in this industry is awfully big. In order to get one item of clothing to the consumer in a developed country, it usually travels thousands of miles since a lot of the manufacturing is performed far from the stores where the products are sold in. In addition to carbon emissions, process steps are quite polluting. For example, the pesticides used for cotton, wastewater, toxic dyes, and emissions from manufacturing synthetic textiles, and at the end of life of a garment, clothing that needs to be disposed of. The popularity of fast fashion and excessive consumption have led to increased sustainability issues for this industry.

H&M has a very extensive sustainability program, as evidenced by their 130- page sustainability report. Setting a high bar for other apparel companies, they have programs covering all aspects of sustainability including environmental objectives, supply chain, and ethical issues. As with other companies, setting company-wide goals is a critical part of propelling a company to develop greener products. The company has set ambitious 2025 goals that cover product manufacturing, recovery, and employee efforts. Their plans are to make manufacturing greener through the use of 100% certified organic cotton or recycled cotton, eliminate the use of solvent-based glues in footwear and accessories production, use water-based polyurethane for shoe orders, use 100% man-made cellulosic fibers to decrease deforestation, and use certified sources for wool. All H&M store locations are obligated to set up garment collecting services; they plan to set industry standards for the measurement of product sustainability, and engage employees by requiring sustainability training for H&M's colleagues, and lastly, engage employees and consumers in sustainability work. Operations are to focus on green power through renewable electricity and reduce their carbon emissions. In 2015 the company used an impressive 78% of all their energy globally from renewable electricity. They also decreased their total carbon dioxide emissions by 56% since 2012 (H&M, 2018).

Proctor & Gamble (P&G) is the world's largest consumer goods company. They have been in business for over 170 years and own iconic global brands, such as Tide laundry

detergent, Luvs disposable diapers, Gillette razors, Olay beauty products, and Duracell batteries. Being a large multinational company with over \$66 billion in sales (2018), it is interesting to see how they have made their sustainability programs and initiatives very public and an obvious enhancement to the company's equity. A big part of their sustainability initiative is their product greening efforts. P&G has established new, broad-reaching goals for 2030. The new goals, titled "Ambition 2030," aim to enable and inspire positive impact on the environment and society while creating value for the Company and consumers. P&G's "Ambition 2030" goals include:

- *Brands: P&G's 20 leadership brands including Always, Ariel, Dawn, Fairy, Febreze, Head & Shoulders, Pantene, Pampers, and Tide will enable and inspire responsible consumption through packaging that is 100% recyclable or reusable, launching more sustainable innovations, and building trust through transparency and sharing our safety science.*
- *Supply Chain: P&G manufacturing sites will cut greenhouse gas emissions in half, and will purchase enough renewable electricity to power 100% of our plants. The Company will also source at least 5 billion liters of water from circular sources.*
- *Society: P&G will continue to create transformative partnerships that enable people, the planet and our business to thrive, including those that stem the flow of plastic into the world's ocean, protect and enhance forests, expand recycling solutions for absorbent hygiene products, and protect water in priority basins around the world.*
- *Employees: P&G will engage, equip and reward employees for building sustainability thinking and practices into their everyday work.*

Seventh Generation is an American company that manufactures cleaning and personal care products. Established in 1988, the Burlington, Vermont based company distributes products to natural food stores, supermarkets, mass merchants, and online retailers. Although Unilever acquired the company in 2016, sustainability is still in the heart of operations. The company attributes the name "Seventh Generation" to the "Great Law of the Iroquois". Per the company, the document states, "in our every deliberation, we must consider the impact of our decisions on the next seven generations." In their mission, they state an Iroquois Indian law, which shaped the name of the company, that they must consider the impact of their decisions on the next seven generations. Seventh Generation makes various home use products such as botanical disinfectants, dishwashing detergents and soaps, hand soap, laundry detergents, surface cleaners, household paper and supplies, baby diapers and wipes, baby laundry, organic tampons and pads. Their product developers, while focusing on effectiveness, are to take into account economic, environmental, and health aspects. A product scorecard is used to assist in developing greener products. The goal is to reduce impacts like greenhouse gas emissions and increase the use of plant-derived ingredients. One unique approach is that they have set an internal price on carbon at \$6/ton. They hope this will encourage customers to buy materials that have lower carbon associated with it. In July 2021, Alison Whritenour became Seventh Generation's first female Chief Executive Officer.

One of the most visible aspects of a consumer product companies' sustainability is packaging. Realizing this, Seventh Generation has made a conscience effort to place greener packaging on store shelves. Significant progress was made on the eco-friendliness of the type of material used and use of recycled content. An analysis of the category of packaging used resulted

in a switch from polyethylene terephthalate (PET) to a high-density polyethylene (HDPE) because it takes less energy to make. Besides, a move to incorporate more post-consumer recycled content (PCR) into each package was made. Also, since HDPE is used in the common milk jug, Seventh Generation is using recycled milk containers to manufacture their dishwashing liquid bottles. The company diligently works with suppliers to ensure that the hand dishwashing liquid, fabric softener, and bleach containers use 90% PCR. They have also increased the recyclability of their packaging by 20 metric tons. The materials that are used for plastic packaging follow this hierarchy: post-consumer recycled plastic, virgin plant-based plastic, and virgin petroleum-based plastic. Seventh Generation's 100 oz. 2x liquid laundry detergents, for instance, use 80% postconsumer recycled plastic and 20% virgin plastic. The virgin plastic used in the laundry detergent bottles was altered from petroleum-based plastic to plant-based plastic made from sugarcane and is also 100% recyclable.

Having a natural products line requires a greater focus on the ingredients that go into the manufacturing process. For example, the company has removed an undesirable ingredient that was part of surfactant 1, 4-dioxane, a possible human carcinogen. Future directions for greening products are guided by Seventh Generation's new sustainability goals:

- *All products and packaging create zero waste;*
- *All ingredients and materials are bio-based or recyclable.*

Starbucks is an American coffee company and coffeehouse chain. Starbucks was founded in Seattle, Washington in 1971. As of early 2019, the company operates over 30,000 locations worldwide. In 2018, Starbucks announced plans to have 10,000 "Greener Stores" — all powered by 100 percent renewable energy — by 2025. Starbucks, working with SCS Global Services and World Wildlife Fund (WWF), will develop an accredited program for designing, building and operating stores to set a "new standard for green retail." Stores in North America will be audited against the criteria, culminating in 10,000 "Greener Stores" by 2025. Building on the chain's past efforts around LEED certification program, the framework will be open-sourced to support other retailers' efforts. Announced on-stage at The Global Climate Action Summit in San Francisco in 2019, the "Starbucks Greener Stores" framework is anticipated to save the company an incremental \$50 million in utilities over the next 10 years. This builds on Starbucks ten-year legacy of utility cost savings attributable to Greener Store practices, which already equates to approximately \$30 million in saved annual operating costs. With this commitment, Starbucks will also further enable and empower its more than 330,000 partners globally to be informed and engaged in sustainability, adding to a burgeoning group of partner advocates through Partners for Sustainability and the Greener Apron voluntary certification program with Arizona State University.

Starbucks investment in a sustainable future continues with the announcement of a green building framework that exceeds construction and design to address long-term, eco-conscious operation. Built on a foundation of the LEED certification program and sustainable operations, the "Starbucks Greener Stores" framework will offer a comprehensive model and broad environmental scope that is universal in design, but most relevant to the retail industry. With

performance-based standards that incorporate design and extend throughout the life of a store, “Starbucks Greener Stores” will focus on:

- *Energy efficiency and water stewardship: Deploying technologies and practices that ultimately deliver 30 percent water savings and 25 percent avoided energy over historic store design practices.*
- *Renewable energy: Powering stores by 100 percent renewable energy through investments in country-specific solar and wind projects.*
- *Healthy environment: Designing and operating stores to create a comfortable experience that promotes wellness for partners and customers, including lighting, noise, air quality and temperature.*
- *Responsible materials: Ensuring materials and products for stores are responsibly and sustainably sourced.*
- *Water diversion: Designing and operating stores to reduce waste.*
- *Engagement: Inspiring a culture of sustainability and empowering partners to take action, be informed, and engage in sustainability issues and practices.*

Walmart is an American multinational retail corporation that operates a chain of discount department stores, super centers (hypermarkets), and membership clubs. The company was founded in 1962 by Sam Walton in Bentonville, Arkansas. Walmart (including Sam’s Club) is the largest company in the world, with revenues exceeding \$570 billion in 2021. For decades, Walmart was not known for selling groceries. However, the sheer size and power of the big box retailer made it a leader in that market. Since groceries make up more than half of Walmart’s annual sales, the company is the world’s number one grocer. Although Walmart has reigned as the largest retailer in the world since 2000, the company recognized the significance of groceries only a decade or so ago. In 2010, Walmart began adding an economy supermarket to existing stores and building supercenters across the country, (Walmart had 3700 supercenters by the end of 2021). By serving customers seeking “everyday low prices,” Walmart was able to dominate the grocery brick-and-mortar realm. As of January 31, 2022, Walmart had 10,566 stores and clubs in 27 countries. Walmart is the largest company (and hence retailer) in the world. For decades, Walmart focused on logistics efficiency and supply chain management as its core competencies. Walmart was not known for social responsibility, but the former CEO, Lee Scott, had aggressively pushed the company to be a sustainability leader. Today, Walmart’s traditional obsession with efficiency is no longer just a matter of saving money. Greening retail has become a true double entendre, with carbon and cash both vital to determining how to remove one billion tons of greenhouse gas emissions from the retailer’s extended supply chain by the end of the next decade. Walmart’s ambitious sustainability goals are highlighted on its corporate website. They are:

- *Operate with 100% renewable energy,*
- *Create zero waste, and*
- *Sell products that sustain our resources and the environment.*

Tackling these goals started over a decade ago when Walmart asked its suppliers for proposals for a 2008 Earth Day promotion. It aimed to specifically promote products that were sustainable. Suppliers responded with such a broad range of vague claims that Walmart managers could not figure out which products to include. Examples of traits that made a product

sustainable ranged from having reduced packaging material—though there was no gauge as to what it was reduced from—to the use of non-toxic ingredients or the product's overall recyclability. A subsequent promotion of Campbell's soup with a green Earth Day label (instead of its customary red one) generated massive criticism and accusations of greenwashing. Customers felt that sustainability at Walmart simply meant taking existing products and putting green labels on them. This led Walmart to pursue a process for determining what sustainable means for all its products—a massive scale given that the company had over 60,000 direct suppliers and an average store could sell about 142,000 different items. So, in 2009, the company spearheaded the establishment of the Sustainability Consortium, a collaboration of retailers, suppliers, universities, environmental groups, and others to create a data-driven index of sustainability. The consortium would eventually come up with a sustainability "toolkit" with key performance indicators (KPIs) and thresholds for achieving sustainability at the product category level whether these are laundry detergents, tires, toys, or yoghurt. Such KPIs could then be used by consortium members in communications with their suppliers, usually in a sustainability scorecard that the supplier would complete. Such measures were quick in minimizing greenwashing and boosting consumers' confidence in the company's ecological claims.

Sustainable products are often viewed as premium products that normally command a higher price compared to conventional products. This premise, obviously, posed a dilemma for the retail giant that has positioned itself on "everyday low prices." In fact, Walmart's mission statement is "to save people money so they can live better," which is synonymous with the company slogan: "Save money. Live better." This posed a paradox for Walmart since its margins were so thin and most of its customers shop there for the super low prices. How could they be persuaded to pay a bit more because something is tagged as sustainable? And what would be the best way to let them know a particular product was more sustainable than another? Company leaders believed, based on market research, that although its customers desired (or would in the future) more sustainable products, many did not have the means or desire to pay extra. Customers may prefer sustainable practices yet be unable to pay the premium, even when it's not much.

This led Walmart to focus less on consumers and more on suppliers. If it could just make sure its products were more sustainable or at least that it was able to offer more options—without a meaningful increase in price—it could go a long way toward achieving its goals. And consumers wouldn't even realize they're helping make the world a better place. Walmart's supply chain was cooperative. The sheer size of the retailer and its massive bargaining power did help! The supplier scorecards that started rolling in 2012 aided Walmart in identifying inefficiencies in its suppliers' own supply chains, just as the retailer had found in its own operations years earlier. Walmart used this data to push suppliers to seek out similar low-cost innovations in their operations—so Walmart could become more sustainable without altering product price tags. The company also associated five percent of its employees' performance goals with sustainability improvements, hence incentivizing buyers to seek sustainability-oriented metrics from suppliers. The end result was selling low-cost sustainable products to millions of price-conscious shoppers, hence mainstreaming green products that would have been sold in specialty stores just a few years back.

Walmart is also the world's largest grocer, so addressing food loss and waste throughout the supply chain was a priority. According to Walmart's director of sustainability, Katherine Neebe, one out of every three food calories doesn't make it to consumption throughout the supply chain, suggesting an opportunity to address food loss and waste in a way that addresses some fundamental challenges in the world, such as hunger (Atamlam, 2017). The company has been exceptionally successful on several levels. By the end of 2015, Walmart had eliminated 28.2 million metric tons of greenhouse gasses from its supply chain, doubled the fuel efficiency of its transportation fleet from a 2005 baseline, increased its electricity supplied by renewable energy to 26%, and, in 2014, diverted 82.4% of its waste from landfills (Makower, 2015). The retail mammoth is fired up and is upping its game with a new set of goals for 2025 (Makower, 2016):

- *Achieve zero waste to landfill in Canada, Japan, the UK, and the USA;*
- *Be powered by 50% renewable energy sources under a plan designed to achieve science-based targets;*
- *Double sales of locally grown products;*
- *Expand sustainable sourcing to cover 20 key commodities, including bananas, grapes, coffee, and tea;*
- *Use 100% recyclable packaging for all private-label brands; and*
- *Expand sourcing of commodities produced with zero net deforestation.*

CONCLUSION

At present, concepts such as green, sustainable or organic marketing are becoming more widely used, reflecting the growing interest of society in the impact of growing consumption on the environment. Society is expecting businesses to be aware of current environmental and resource issues, and hold themselves accountable for the impact of their practices. Companies also need to begin looking beyond the surface, as the impact of their product offerings stretches deep into the supply chain. This includes trees harvested in a tropical rain forest, minerals mined from countries plagued with civil war and strife, factories polluting rivers and lakes, child labor and sweat shops, etc. In addition to partnering with suppliers, companies can focus on renewable energy, packaging, green buildings, and giving back to the community. It is refreshing to see that the 7 examples listed in this paper are successful and profitable. They are also doing well in terms of brand equity and valuation (Interbrand, 2020).

The financial of the seven companies discussed in the paper are summarized in Table 1.

Table 1: Revenues and Profits (2021)

Company	Headquarters	Revenues (Million)	Profits (Million)
Aldi	Germany	133,900	3,527
Amazon	USA	\$469,822	33,364
H&M	Sweden	13,182	1,326
P&G	USA	76,118	14,306
Seventh Gen	USA	3,620	570
Starbucks	USA	\$29,060	4,119
Walmart	USA	572,574	13,673

Source: Fortune (2022)

Companies (even smaller ones) have to play many roles in moving us toward a more sustainable society. They can educate customers about the value of more sustainable products. Businesses serve millions of consumers every single day. These consumers are gathering information forming opinions, besides making purchases. Consumers generally have the perception that green products are more expensive than their less sustainable counterparts, which is probably the case. Through merchandising efforts, companies can help shoppers to more fully comprehend and appreciate the extra value associated with buying and living sustainably. Consumers normally pay more for products that deliver more value. Through proper communication, corporations can stress greater value in a number of ways. For example, they can emphasize the long-term savings provided by products that use less energy (such as CFLs or energy efficient appliances), or are higher in quality (lasts longer), or they can stress benefits to human health such as pesticide-free produce, hormone-free milk, or nontoxic house paints.

The largest company in the world is a retailer (Walmart). Retailers interact with both their suppliers and customers; and hence play a vital role in influencing their behaviors. Demanding sustainability from manufacturers and meanwhile educating customers about the benefits of green products has revolutionized the retail landscape. The two retail leaders: Amazon and Walmart are pushing sustainability across the board: renewable energy, waste management, green buildings and products, and supply chain efficiency. Other companies in different industries are doing the same. It's safe to say that things will never be the same.

REFERENCES

- Atamlam, Luna (2017, December 18). Why is Walmart a sustainability leader? Huffington Post. Retrieved from https://www.huffingtonpost.com/entry/why-is-walmart-a-sustainability-leader_us_5a329da5e4b00caf3d59eae8
- Breyer, Melissa (2019, April 4). ALDI says all packaging will be reusable, recyclable, or compostable by 2025. Retrieved from <https://www.treehugger.com/corporate-responsibility/aldi-says-all-packaging-including-plastics-will-be-reusable-recyclable-or-compostable-2025.html>
- Friedman, Milton (1970, September 13). The social responsibility of business is to increase its profits. *New York Times*. Retrieved from <https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html>
- H&M Group (2018). Annual Report. Retrieved from <https://about.hm.com/content/dam/hmgroup/groupsite/documents/masterlanguage/Annual%20Report/Annual%20Report%202018.pdf>
- H&M Group (2018). Sustainability Report. Retrieved from https://about.hm.com/content/dam/hmgroup/groupsite/documents/masterlanguage/CSR/reports/2018_Sustainability_report/HM_Group_SustainabilityReport_2018_%20FullReport.pdf
- Hornak, Leo (2016, February 15). Will there be more fish or plastic in the sea in 2050? Retrieved from <https://www.bbc.com/news/magazine-35562253>
- Iannuzzi, A. (2018). Greener Products. Boca Raton: CRC Press, <https://doi-org.libpdb.d.umn.edu/2443/10.1201/9781315229188>
- Interbrand (2020). Best Global Brands 2020 Rankings. Retrieved from <https://www.interbrand.com/best-brands/best-global-brands/2020/ranking/>
- Makower, Joel (2015, November 16). Walmart Sustainability at 10: The Birth of a Notion. GreenBiz. Retrieved from <https://www.greenbiz.com/article/walmart-sustainability-10-birth-notion>
- Makower, Joel (2016, November 4). Inside Walmart's 2025 sustainability goals. GreenBiz. Retrieved from <https://www.greenbiz.com/article/inside-walmarts-2025-sustainability-goals>

- McKinsey and Company (2014). Sustainability's Strategic Worth: McKinsey Global Survey Results. Retrieved from <https://www.mckinsey.com/>
- Mintzberg, H. (1983). The case for corporate social responsibility, *Journal of Business Strategy*, 4(2), 3-15.
- Nyquist, Scott, Matt Rogers, and Jonathan Woetzel (2016). The Future Is Now: How to Win the Resource Revolution. *McKinsey Quarterly*, 4: 100–117.
- Patton, Leslie (2019, April 2). Aldi Sets Sustainability Goals as Consumers Call for Less Waste. Bloomberg. Retrieved from <https://www.bloomberg.com/news/articles/2019-04-02/aldi-sets-sustainability-goals-as-consumers-call-for-less-waste>
- P&G (2018, April 16). P&G Announces New Environmental Sustainability Goals Focused on Enabling and Inspiring Positive Impact in the World. Retrieved from <https://news.pg.com/press-release/pg-announces-new-environmental-sustainability-goals-focused-enabling-and-inspiring-pos>
- Starbucks (2017). Global Social Impact Annual Report. Retrieved from <https://www.starbucks.com/responsibility/global-report>
- Seventh Generation (2018). Annual Report. Retrieved from https://www.seventhgeneration.com/sites/default/files/2018-07/SVG_CC-Report_LOWRES-PREVIEW.pdf
- United Nations (2017, June 21). World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100. Retrieved from <https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html>
- United Nations Brundtland Report (1987). Report of the World Commission on Environment and Development: Our Common Future. Retrieved from <http://www.un-documents.net/our-common-future.pdf>
- United Nations Department of Economic and Social Affairs (2022). World Population Prospects 2022. Retrieved from https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf
- Weise, Elizabeth (2019, February 28). Now you can get all your Amazon Prime packages delivered on the same day. USA Today. Retrieved from <https://www.usatoday.com/story/news/2019/02/28/program-lets-you-choose-which-day-week-your-amazon-packages-come/3019224002/>
- WorldWatch Institute (2019). Wal-Mart Scrutinizes Supply-Chain Sustainability. Retrieved from <http://www.worldwatch.org/node/6200>

A MECHANISM FOR THE CONFIGURATION PROCESS OF COMMERCIAL OFF-THE-SHELF SOFTWARE: AN INTERPRETIVE CASE STUDY

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ABSTRACT

Proper configuration of commercial off-the-shelf (COTS) packaged software plays an essential role in consequent successful functioning of the software. The question now would be: how do groups that are in charge of the configuration of the software approach this process? Other questions follow: Is there a strict guideline to follow? Do all configurations of the same packaged software across organizations result in the same outcome? Are all configurations successful? What does define how the resulting software functions?

In this paper, the process of configuration of COTS has been examined through the interactions of people who are in charge of the configuration with the software and with each other. We conducted an interpretive case study of a work order management system at a public organization to examine the abovementioned questions. We observed that, contrary to traditional ways of grouping relevant groups, people tend to group based on how they interpret various functionalities of the software. These groupings tend to happen when controversies occur. We used Social Construction of Technology (SCOT) as our guiding framework. We add to the theory by developing a mechanism of the configuration process of COTS. We do so by also introducing a holistic approach to applying SCOT to studying information systems.

INTRODUCTION

Commercial off-the-shelf software (COTS) was originated in the late 1960s but developing theories about it is a constant motivation for the research community. This is due to the ever changing nature of COTS and the ever increasing inclination of organizations to adopt already-made software rather than develop their own from scratch or from using expensive Enterprise Resource Systems (Mullins & Cronan 2021; Xulu & Suknunan 2020). One of the topics related to COTS which is critical albeit under-researched and under-theorized is the process of configuration of COTS. Almost all software applications need a level of configuration in order to become workable (Bazan & Estevez, 2022; Katuu, 2020; Drago, Marrone, et al., 2019; Mousavidin, & Silva, L, 2009). This configuration process is of varying degrees which can range from simply setting up the parameters to completely restructuring the organizational processes (Niederman 2021; Li, Yue, et al. 2019).

The configuration process of COTS can involve technical as well as social and organizational adaptations (Bazan & Estevez, 2022; Davidson & Chiasson, 2005). Some typical

examples of technical, organizational, and social adaptations in the configuration process include activities such as specifying formatting for reports, modifying business processes, and changing culture (Niederman, 2021; Yeow & Sia, 2008; Light & Sawyer, 2007). The process of configuration of COTS usually involves representatives from various relevant groups with different interpretations of the software. Therefore, the process of forming software that fits a specific organizational context can turn into a challenging process (Niederman, 2021; Badewi, Shehab, et al., 2018; Yeow & Sia, 2008) with complex socio-technical interactions among people and the software.

In order to understand the process of configuration of COTS and its technical and organizational dynamics, an interpretive case study was conducted at a large public organization, Pub Org. The Social Construction of Technology (SCOT) was the theoretical lens adopted to conduct this study. This lens was deemed appropriate for such a study since it is a theory about technological developments through the influence of relevant social groups that are involved in the process. SCOT is a theory of socio-technical change, which takes a sociological approach to studying technological developments (La Fors, Custers, & Keymolen., 2019). SCOT's emphasis on developing a thick description (Geertz, 1973) of the technological artifacts and the contexts surrounding them makes it a well-rounded theoretical lens. One of the main premises of SCOT is that technology is interpreted differently by various social groups that are relevant to the technology. In other words, this process is considered to be an interpretive one. This was in line with the objective of this paper to understand interpretation of various groups that are involved in the process of packaged software configuration. We aimed at investigating how these interpretations influence the process of configuration and the final configured workable software.

In this paper, we first elaborate on the configuration process of COTS and the underlying questions about it. We then discuss the theoretical lens of SCOT which was the guiding theory of our study. Next, we expand on our cases study by providing background information about the case, our research method, data collection and data analysis. We then explain how we developed a theoretical mechanism for interpreting how the configuration process of COTS occur. Finally, we discuss the areas of future research on this topic and the limitations of our study.

THE CONFIGURATION PROCESS OF COTS

In this paper we focus on modifiable COTS as described below:

“standalone application software that is pre-built, and sold, licensed, leased, borrowed, or given away free of charge in many copies and in different forms (e.g. on CD ROM or on the web). This type of software often supports different roles across the organization so it can affect numerous functional areas within particular business processes. Examples of this type of software are workflow or scheduling suites that operate throughout different functions of the organization.” (Mousavidin, & Silva ,2009, p. 887).

End users are not directly involved in the process of development of this type of software and thus they often need to be configured substantially to take a workable form. Examples of configuration include setting up the parameters to modify user interfaces and databases. These

configurations are enabled as setting up the various options that the software provides rather than changing the source code (Drago, Marrone, et al., 2019).

The type of configuration addressed in this paper refers to the set of social, organizational, and technical activities that are taken by various relevant groups to bring the packaged software to a workable form applicable to the organization. Some researchers refer to the same activities as integration or implementation. We adopt the term configuration because this term conveys, more than others, that the final workable software can be different in various organizations (Li, Yue, et al., 2019; Seiger, Huber, et al., 2019; Lohrmann & Reichert 2016).

The configuration process of COTS often entails a degree of change in organizational business processes, which can result in disagreements among relevant social groups involved in the process. If users are forced to conform to the standard processes of the software, sometimes they find workarounds outside the system (Drago, Marrone, et al., 2019). They give an example of users of a system that generated PDF reports through an MS Word add-in. The users would convert the PDF report to a Word format and add further information to the report, which was needed but not provided by the system.

The discrepancies between the functionalities of software and business processes can be addressed in different ways. If the software is configurable and the policies and rules allow, it is usually configured to reflect the way the processes are handled in the organization. If the software requires the business processes to be standard, the processes are modified to fit the software. In this latter case, sometimes, the compromise that occurs as a result of the change in a process can be compensated by supplementary organizational/group/individual initiatives (similar to Trauth and Cole's (1992) concept of organizational interface). In this paper, we consider initiatives of this kind as a part of configuration because they are a part of the process by which the software takes a workable form.

Noticeably none of the abovementioned ways of addressing discrepancies between the software and the organizational processes is devoid of challenges. There is no systematic way to guide organizations how to configure their software to address their organizational needs (Etame, & Atsa, 2018; De Toni, et al. 2015). The configuration process normally involves various relevant groups of people. These groups usually have different understandings, perceptions and thus expectations of the software and its configuration. A solution suggested by one group might not necessarily be recognized as the best answer by other groups. Manifestation of different understandings presents some advantages and challenges. The advantage is that each group's interpretation offers an understanding of the system that other groups may not have been able to perceive based on their own interpretations. The challenge though is that the differences in understanding of the system could at the same time create resistance in accepting one another's points of view.

In this paper, we set out to provide a mechanism that can be used in interpreting the configuration of COTS. We aim at contributing to the theorization of this process as well as provide a tool for practitioners who are involved in such processes. In the next section, we discuss the theoretical lens that guided us throughout this study.

THEORETICAL LENS OF SOCIAL CONSTRUCT OF TECHNOLOGY (SCOT)

Social construction of technology (SCOT) is sociological approach to investigating design and development of technological artifacts. According to SCOT, a technological development is as a result of a social process rather than an isolated process pursued by an individual. According to this theory, different relevant groups are involved in development of a technology. In addition, ‘working’ and ‘nonworking’ attributes of a technology are also socially constructed rather than being inherent to a technology (Bijker 1995). Different elements of SCOT are best understood in pairs: *Relevant social groups and Interpretive flexibility*; *Technological frames and Inclusion*; and *Stabilization and Closure*.

According to SCOT different groups of people, *relevant social groups*, involved in the process of development of a technology can be grouped based on the shared meaning they assign to the software. According to SCOT, since different relevant social groups interpret a technological artifact differently by assigning different meanings to it, a technological artifact is said to have *interpretive flexibility*. In other words, a technological artifact which is still in its development process and has not reached a relatively stable form means various things to various people (Bijker 1995).

Technological frame of every relevant social group refers to the way the group interprets a technological artifact. The frame guides the way the individuals interact within the group or with other groups. A technological frame is based on the approaches the group takes to solve the problems around a technological artifact. In order to understand technological frame of a group, the analyst would pay close attention to ways the group tackles the controversies. People differ in their degree of *inclusion* in a specific technological frame. Each individual might belong (i.e. *included*) to more than one technological frame at any point in time (Bijker 1995).

Two other elements of SCOT are *stabilization* and *closure*. According to these notions, interpretive flexibility of a technological artifact is not everlasting. Eventually, the artifact reaches “stabilization” and “closure” in a way that some forms of the artifact appear to be less controversial and increasingly become the dominant form of the technology (Bijker 1995). The concepts of stabilization and closure show that development of a technical artifact is a continuous process (Iofrida et al. 2018), which does not occur at equal rates at every point in time. The focus of stabilization (which is a matter of degree) is on the artifact itself and the closure focuses on its interpretive flexibility. In short, “a simplified way to distinguish between closure and stabilization is that closure is about people and stabilization is about the artifact” (Humphreys, 2005, p. 249).

SCOT is highly relevant in the context of configuration of COTS. Various relevant groups are often involved in the process of configuration. Perceptions and expectations of these different groups of the packaged software and its functionalities can be critical as it can guide the process through which the software is configured to a workable form. Taking a SCOT approach to study the configuration process of COTS, we looked to identify the controversies around the software. Identification of these conflicts or problems allowed us to closely examine how they are approached and addressed. The process of configuration can be studied as a series of

technical, social and organizational activities. Furthermore, the emphasis of SCOT on the technological artifact (in this case, COTS) and providing a thick description of its evolvement and the social and organizational issues around it makes SCOT an insightful lens. In the next section, we discuss our interpretive case study in the light of the theoretical lens of SCOT.

MAKING SENSE OF THE CONFIGURATION PROCESS OF COTS THROUGH SCOT

In this section we discuss the background of the case, data collection process, and our data analysis.

CASE BACKGROUND

We conducted an interpretive case study at a large public organization with over 20,000 employees. The real name of the organization is kept anonymous and it is referred to as Pub Org in this study. At the time, PubOrg was in the process of configuration of a newly acquired work management system, which was used to control work order processes for reactive as well as periodic preventive maintenance. This initiative was in response to internal concerns over the reactive nature of maintenance efforts at the organization. The goal of the project was to improve efficiency by creating a balance between planned and unplanned work.

Management felt the need for changing the maintenance work to more proactive and preventive rather than reactive efforts. The ultimate goal was to improve efficiency and equipment availability, reduce cost, reduce asset failure risk, and achieve performance goals. This gave way to upgrading the existing work management system MP5 to a newer version called Datastream 7i by the same vendor. Datastream 7i is web-based work management software; this is a major difference between Datastream 7i and MP5. The upgrade from MP5 to 7i enabled a large number of concurrent users access to the system, as well as reduces the number of configurations (i.e. configuring the system on the application server versus each individual computer). The software was purchased already-packaged which meant it did not allow for customization. The software, however, needed to be configured to reflect business processes of PubOrg. IT personnel mainly used FlexSQL and PL/SQL when configuring and maintaining the system.

PubOrg. 7i application software had been purchased as an off-the-shelf package and the organization was in the process of its configuration. During the time period that we conducted our study at PubOrg, the implementation group was working on the configuration of a module called, work order management system.

We were interested to investigate the technical details of the software as well as the social dynamics of the interactions of various relevant groups. For these reasons, there was a need to review technical documents as well as observe the interactions of various groups. Conducting a case study would provide this opportunity. Since the goal from this study was to contribute to theory, the insights from the case study would allow for drawing theoretical generalizations (Walsham 1995). Therefore, the case study approach was chosen to empirically investigate the process of configuration of software. Different methods of data collection were adopted a

discussion of which follows, separately in the context of each case study. All along, our research questions which corresponded to our theoretical lens of SCOT, guided our inquiry. Sample questions are as follows:

1) Technological artifact:

What are the features of the software?

What are some of the controversial features (in terms of configuration) of the software?

2) Relevant social groups & Interpretive flexibility

What problems does each group believe the software is solving for them?

What problems does each group believe the software has created for them?

3) Technological frames & Inclusion

How do different groups approach their software-related problems?

How has each group tackled the problems related to the software?

4) Stabilization & Closure

How does the software stabilize to a workable form?

How are various closure mechanisms formed?

These questions needed to be investigated in their real-life context so that the natural course of the configuration process could be followed over time without external interference (Pettigrew 1985; Gummesson 1991) and our interpretive case study approach allowed for such an approach.

DATA COLLECTION AND ANALYSIS

Data were collected from different sources, which are listed in Table 1. Extensive technical documentation and other relevant organizational material were obtained. Digital copies of these documents were provided to the researcher. Review of documents, archival records, and organizational charts were beneficial because data about policies and norms, services, and organizational hierarchies besides the technical characteristics of the application could be collected.

Table 1 Sources of Data		
Data collection method	Quantity	Output
Neutral Observations and short informal interviews	20 simulation sessions (5 hours each) Informal interviews during the breaks	105 pages of text
WMSTF Meetings	20 meetings	55 pages of text
IT Training Meetings	18 meetings	40 pages of text
Semi-structured interviews	7 meetings	20 pages of text
Organizational Documents	10+ documents	500+ pages of text
Email correspondences	Over 100 emails	200+ pages of text

The process of data collection was guided by the theoretical lens of SCOT. Using a hermeneutic approach, this lens was also used in analyzing the data from different sources. Multiple methods of data collection were used for the purpose of triangulation (Yin 1993). Using various data sources -observation, interviews, and documentation- enriched the understanding of the phenomenon (i.e. the configuration process of COTS), and helped in validating the findings. This way we attempted to address the issue of the validity (Klein and Myers 1999; Yin 2002). Yin (2002) suggests following a chain of evidence.

QSR NVivo was used for analyzing the qualitative data of this study. In order to code the data, five nodes were defined initially: *Chronology*, *Work order*, *Features*, *Interpretive flexibility*, and *Technological Frames*. These were initial high level nodes derived from the theory, SCOT. The first two nodes were defined in an effort to find the data that described the narrative of the case and process of work orders. The other three corresponded to the technological artifacts, interpretive flexibility, and technological frames elements from SCOT. By creating *Features* node, we aimed at finding data related to technical configuration problems that arose when configuring each feature. Through this node, the text (i.e. data) was scanned to look for various technical features of the system. These data were also related to the closure and stabilization elements of SCOT. The Interpretive flexibility node was created to look for the data that described the prevalence of various interpretations for each problem.

In the initial stages of coding, three more detailed nodes for *Interpretive flexibility* were created. These sub-nodes included: *Disagreements*; *Philosophies*; and *Activities of individuals*. *Disagreements* was used as a node to identify situations wherein explicit disagreements over issues existed. The goal was to find data related to discrepancies of interpretations around issues related to the configuration, especially the setting up of various features. This was in line with Bijker's (1995) approach for finding different interpretive flexibilities, and consequently various groups; i.e. based on existing problems.

We adopted a hermeneutics approach to analyze the data since the goal was to find meanings in the textual data. We intended to draw insights from the text which revealed how the subjects of the study interpreted the information systems they were dealing with and how these interpretations influenced the actions they took towards them. This approach seemed appropriate because the main purpose was to investigate the interpretation and sense making, which are highly contextual (Sengupta et al. 2020; Yin 2002; Miles, M. & A. Huberman, 1994). In understanding the social action through hermeneutics, Butler (1998) describes the process as follows:

"Social action, like a text, is a meaningful entity that must be construed as a 'whole'; however, an understanding of the 'whole' begins with an interpretive examination of its constituent 'parts' this again introduces the concept of the circle of understanding" (Davenport 1998, p. 291).

Throughout a hermeneutic process, the pieces of text that make sense to the researcher eventually evolve to a meaningful whole. Therefore, the researcher goes back and forth between the data and the theory. Data analysis was carried out in two sets. The first set of data analysis corresponds to the technical features of the system. This analysis revealed some controversies around various technical features of the system. For each feature various problems and

interpretations were identified. The second set of data analysis is related to the themes that emerged during the first set of data analysis.

In each set of data analysis the completion of the data analysis occurred when a theoretical saturation was reached [Yin 2002; Yin 2005). At the point of saturation, the researcher was unable to find new themes and further readings of the data were merely reiterating the same concepts. The goal of first data analysis was to write a narrative about the process of configuration from the time the software was purchased to when it was functional (i.e. roll out stage). This narrative was written based on the Chronology node.

Next, we queried (and conducted a search on) the data and wrote about the processing of work orders before and during implementation of the 7i system. This analysis enabled us to compare the two and identify how business processes as well as features changed during the process of configuration. Finally, the data on various features of the system was extracted. The focus here was on the more controversial features since the objective of the research was not on finding themes related to the configuration of every single feature. Instead, the goal was to investigate how various problems are approached and resolved in the process of configuration paying particular attention to the technological artifact (in this case by looking at various technical features of the system).

Work orders (WOs) are requests made to address maintenance needs at PubOrg. A work order process involves completing a maintenance job from initiation to completion. We observed that since the processes had changed significantly due to implementation of 7i, team members seemed to be confused about them. In the initial observations and interviews people appeared to have a clearer understanding of the whole work order process. Some team members mentioned that one reason for this confusion was that 7i is designed for more streamlined process:

“On a smaller scale this would have worked perfectly... It’s a very good system it just doesn’t work for [us]”.

“We don’t have the chain of commands necessary for such a process... it is really frustrating... For example, Maintenance crew work for OAs in one facility but they actually report to schedulers in another facility... so there is no accountability [referring to the fact that the line of authority is not as straightforward; thus, it is not easy to hold employees accountable]... and it is all because we are so spread out and our processes are not as streamlined and straightforward... if things were more central and if there was a leadership on the top and more accountability this system would work perfectly”.

“We need a hierarchy in place otherwise this system needs to be configured for each facility separately... in that case, it could also be implemented perfectly but as it is not”.

It was only in the configuration process that the team realized that the real-life business processes were not as straightforward as they appeared when developing To-Be business processes. What followed was a series of disagreements and conflicts around the configuration of certain features of 7i that were more challenging to configure. These features were prevalent when the notes from simulation sessions, meetings, and interviews were reviewed at the time of data analysis. For the sake of the scope of this paper, we explain one example below.

Configuration of a feature called Reject and Cancel work orders presented an interesting observation. These are two features intended to allow an operational authority to deny and halt a work order before it had started. The two features presented an interesting case since some team members were not familiar with them. In addition, most of the members who expressed some familiarity with them did not show consistency in their interpretations.

A discussion about the Reject and Cancel features was started by a team member who was not able to distinguish between these two features. Other team members were also divided over their interpretations of these two features. Overall, there was an agreement that one of these features was used for deleting duplicate work orders and the other was used for canceling unnecessary work orders. Those work orders that were rejected would automatically disappear from the system without leaving a record. However, in the discussion about this issue some members used the term Cancel and some used Reject to refer to the act of denying a work order by an operation authority (OA); i.e. there was confusion over the meaning of these two features. Therefore, the first problem was to establish the definition of each of these features. The second concern was that even in the case of Reject there needed to be an audit trail left after the command was executed.

The discussion about the configuration of the Cancel and Reject features spanned four sessions. The team came to the consensus that the Cancel and Reject features were both required; Reject to be used for denying duplicate work orders by an OA; Cancel to be used to eliminate an unnecessary work order by the person who issues it and by an OA; and Reject command needs to leave an audit trail for tracking purposes.

In sum, interpretation of one of the groups stemmed from a conservative point of view: the ability to track work orders. This group defended the idea of having an audit trail for the Reject feature. Another group had a more liberal interpretation. This group stressed the freedom of users. The idea behind this interpretation was to allow users to create work orders when deemed necessary and cancel them once they realized they were unnecessarily issued. There was also a group of people who took more of a middle position. This group was initially under the impression that they had understood the features but acknowledged that they really did not once these features were explicitly explained. This group accepted the final solution without any resistance. Finally, there was a fourth group who were indifferent about both of these features. This group in essence did not have a specific interpretation of the features. Members with this interpretation either did not pay particular attention to the discussion or they followed it with confusion and in the end accepted the dominant interpretation.

Similar processes of interpretations and back and forth discussions occurred for other technical features as well as organizational constraints (e.g. training, use of flowcharts). In each case, the situation, in line with SCOT approach, was followed from the initiation until the closure of the problem. The first step in analyzing each situation was to identify various interpretations around the issue at hand (e.g. Priority feature, or Business processes). Then the ways that the controversies were addressed based on interpretive flexibility of the issue were investigated.

This analysis was presented in two sets. The first set focused on the analysis of the technical features of the system and their configuration. The second set examined the controversial organizational issues which influenced the process of configuration. These

organizational dimensions were identified while the first set of data was being analyzed. These were not issues that, from the onset, the researcher had anticipated observing based on the theory and attributes of software configuration. They emerged when the configurations of the technical features were being examined. When studied more closely (in the second set of data analysis), their influence on the configuration process was indeed clear.

In the next section, the implications of the findings of our data analysis are discussed. Based on the insights gained about the configuration process, a mechanism for the configuration process is developed which aims at analytical generalization of the themes that emerged during the data analysis.

DISCUSSION

The insights from this study were summarized as theoretical generalizations offered in the form a working definition for the configuration process as well as a mechanism that depicts this definition and the dynamics around the configuration process.

Mayntz (2004) defines mechanisms as “*recurrent processes generating a specific kind of outcome*” (p. 237). In this regard mechanisms represent theoretical propositions and depict the ontology of a phenomenon. In other words a mechanism depicts the objects of a phenomenon as well as the process through which these objects are intertwined and interact with each other to reach a specific outcome (Dowell et al. 2019). Since the configuration is a process (i.e. it starts with a goal and ends in an outcome), a mechanism would be an appropriate way to represent it.

Based on the review of the literature, we synthesized a mechanism for the configuration processes. This mechanism is shown in Figure 1.

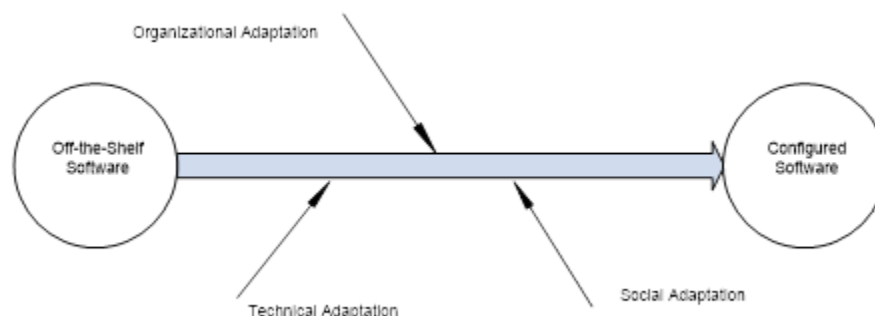


Figure 1: A mechanism of the configuration process based on the literature

This mechanism does not reflect the dynamics of each dimension of the configuration process. Specifically, the roles of people involved in the process are not clear. Based on the mechanism derived from the literature and our data analysis, we developed a more encompassing mechanism of the configuration process. Our analysis revealed that configuration is made up of a micro and a macro mechanism, each of which has a trigger, a process and an output.

In the case of the macro mechanism of the configuration process (Figure 2), the mechanism is triggered by the need for configuration of the packaged software, the process is the one through which the software is configured. This process is surrounded by problems and controversies around the technical and organizational features of the software. The output of this mechanism consists of the configured software as used in the organization.

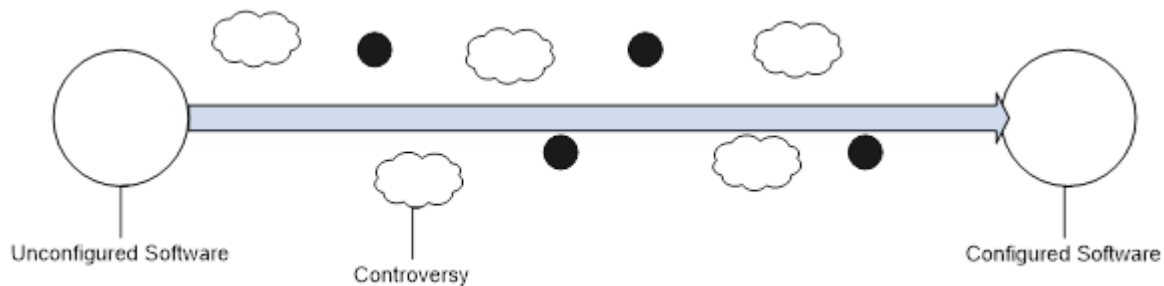


Figure 2: Macro mechanism of the configuration process

The macro mechanism portrays the entire configuration itself, which comprises: the unconfigured packaged software, setting up features, and the configured software. The setting up of the features is represented by a path, which is covered by dots and clouds, each of which represents a specific feature. Clouds refer to the controversial, and dots to the uncontroversial features. Within each cloud there is a micro mechanism, which illustrates how the controversies around a feature are resolved. This micro mechanism is shown in Figure 3.

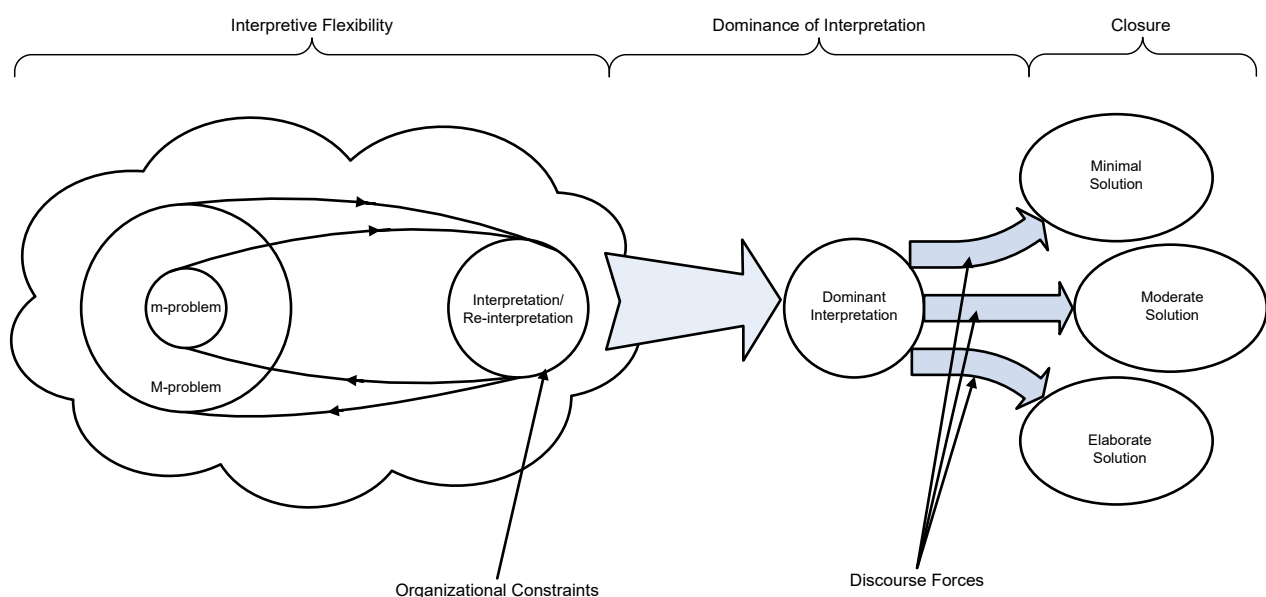


Figure 3: Micro mechanism of the configuration process

The micro mechanism is triggered when a configuration problem arises. In the case of PubOrg, this situation usually occurred when an individual would bring a problem to the attention of the entire team. As the process developed (i.e. the interpretation and re-interpretation of the problem occurred) individuals took stances towards the problem. Finally, the output was the closure mechanism for the problem. This is the stage where the technical feature was set up (or configured). In order to develop the micro mechanism, each controversy was re-read and compared to the other controversies. This process was an iterative one. In other words, we went back and forth between the model and the narratives of the controversies. The analytical generalization of this process is illustrated in the model shown in Figure 3. The macro problem (M-problem, shown on Figure 3) refers to each controversy. As shown in this model, around each M-problem there is an interpretive flexibility. The circular representation of M-problems, m-problems, and Interpretation is meant to depict the dynamic nature of these elements of the model. The process of interpretation and re-interpretation of M-problems and m-problems is also represented by circles.

CONCLUSION

The findings of this paper help with addressing some of the gaps that appear in the configuration literature. We aimed at understanding the configuration process of COTS from a holistic view, which shed light on some of the puzzles of the configuration process. The choice of SCOT warranted this holistic view. A fundamental difference between SCOT and other views is the emphasis on ‘thick description’ (Geertz 1973). In this type of study, a detailed description of the technological artifact itself and its surrounding context is provided. This rich description allowed us to develop a mechanism that can be used to interpret the configuration process of COTS.

The mechanism accompanied by the discussion of its development could assist the management with understanding the process of configuration. This understanding could result in being better informed about the options available for the configuration. In addition, by knowing the dynamics of each stage in the process of configuration, managers could provide the kind of support that would accelerate each stage. For example, managers, due to a better understanding of what could influence the configuration process, could support the type of discourse forces that would result in more fitting solutions. Without input from others using the COTS, managers may perceive those employees are satisfied with the COTS and are all using it as intended (Taylor & Brice, 2012).

LIMITATIONS AND FUTURE RESEARCH

Remaining faithful to the epistemological stance of this study, we acknowledge that the findings of this research relate to analytical, rather than statistical, generalization. The purpose of this study is to contribute to theory on the configuration of packaged software. Pub Org offered an exemplary case to study such a topic. The interpretive approach of this study and the

hermeneutic technique of data analysis allowed for studying the phenomenon (i.e. the configuration process) holistically, the result of which are the macro and micro mechanisms developed. As acknowledged previously, this mechanism is to be treated as a stepping stone for further theorizing. Future research would greatly add to the endeavors of this study by building on the concepts of macro and micro mechanisms in a variety of ways.

First, each of the elements of the mechanisms could be further refined and/redeveloped. For example, by studying various organizational contexts, researchers could identify other organizational forces. In addition, such studies could add to better understanding of the role of organizational constraints of the configuration process. Discourse forces as well as the technological dimensions of the configuration process could receive the same treatment. In this regard, studying other types of software (besides the one studied in this paper) could greatly contribute to understanding of complexities of the technological dimension. Moreover, other team dynamics could shed more light on the discourse forces that influence the configuration process.

Additionally, it would be of great value to fine-tune the definitions of various elements of the models. Providing further empirical support for the models would enhance this understanding. For example, a future study could aim at defining various closure mechanisms in further detail. There would also be of value in the refining the relationship among M-problems, m-problems, and the interpretation/re-interpretation process.

REFERENCES

- Badewi, A., Shehab, E., Zeng, J., & Mohamad, M. (2018). Erp benefits capability framework: orchestration theory perspective. *Business Process Management Journal*, 24(1), 266–294.
- Bazan, P., & Estevez, E. (2022). Industry 4.0 and business process management: state of the art and new challenges. *Business Process Management Journal*, 28(1), 62–80.
- Bijker, W. E. (1995). *Of Bicycles, Bakelites and Bulbs: Toward a theory of sociotechnical change*. MIT Press: Cambridge, MA.
- Butler, T. (1998). Towards a hermeneutic method for interpretive research in information systems. *Journal of Information Technology* 13 (4), 285–300.
- Davenport, T.H. (1998). Putting the Enterprise into the Enterprise System. *Harvard Business Review*, 121–131.
- Davidson, E.J. & M. Chiasson (2005). Contextual influences on technology use mediation: a comparative analysis of electronic medical record systems. *European Journal of Information Systems*, 14, 6–18.
- De Toni, A. F., Fornasier, A., & Nonino, F. (2015). The impact of implementation process on the perception of enterprise resource planning success. *Business Process Management Journal*, 21(2), 332–352.
- Dowell, N. M. M., Nixon, T. M., & Graesser, A. C. (2019). Group communication analysis: a computational linguistics approach for detecting sociocognitive roles in multiparty interactions. *Behavior Research Methods*, 51(3), 1007–1041.
- Drago, A., Marrone, S., Mazzocca, N., Nardone, R., Tedesco, A., & Vittorini, V. (2019). A model-driven approach for vulnerability evaluation of modern physical protection systems. *Software & Systems Modeling*, 18(1), 523–556.
- Etame, F., & Atsa, R. (2018). Survey on erp's customization-driven requirements engineering. *Applied Informatics*, 5(1), 1–9.
- Geertz, C. (1973). *The interpretation of cultures*. Basic Books: NY.
- Gummesson, E. (1991). *Qualitative methods in management research*. Sage: London.
- Humphreys, L. (2005). Reframing social groups, closure, and stabilization in the social construction of technology. *Social Epistemology*, 19(2-3), 231–253.

- Iofrida, N., De Luca, A. I., Strano, A., & Gulisano, G. (2018). Can social research paradigms justify the diversity of approaches to social life cycle assessment? *The International Journal of Life Cycle Assessment*, 23(3), 464–480.
- Katuu, S. (2020). Enterprise resource planning: past, present, and future. *New Review of Information Networking*, 25(1).
- Klein, H. K., and Myers, M. D. (1999). A Set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly* 23(1), 67–94.
- La Fors, K., Custers, B., & Keymolen, E. (2019). Reassessing values for emerging big data technologies: integrating design-based and application-based approaches. *Ethics and Information Technology*, 21(3), 209–226.
- Light, B. & S. Sawyer (2007), Locating packaged software in information systems research, *European Journal of Information Systems*, 16, 527–530.
- Li, Y., Yue, T., Ali, S., & Zhang, L. (2019). Enabling automated requirements reuse and configuration. *Software & Systems Modeling*, 18(3), 2177–2211.
- Lohrmann, M., & Reichert, M. (2016). Effective application of process improvement patterns to business processes. *Software & Systems Modeling*, 15(2), 353–375.
- Mayntz R. (2004). Mechanisms in the Analysis of Social Macro-Phenomena. *Philosophy of the Social Sciences*, 34, 237–59.
- Mousavidin, E. & Silva, L. (2009). Packaged software configuration through the lens of social construction of technology. *Proceedings of the 42nd Hawaii Int. Conf. on System Sciences*, 1–8.
- Mullins, J. K., & Cronan, T. P. (2021). Enterprise systems knowledge, beliefs, and attitude: a model of informed technology acceptance. *International Journal of Information Management*, 59.
- Niederman, F. (2021). Project management: openings for disruption from ai and advanced analytics. *Information Technology & People*, 34(6), 1570–1599.
- Pettigrew, A.M. (1985). Contextualist research: a natural way to link theory and practice. In Lawler, E.E., Mohrman, A.M., Mohrman, S.A., Ledford, G.E. and Cummings, T.G. (Eds.), *Doing research that is useful in theory and practice*, Jossey-Bass: San Francisco, CA.
- Sengupta, A., Mittal, S., & Sanchita, K. (2020). How do mid-level managers experience data science disruptions? an in-depth inquiry through interpretative phenomenological analysis (ipa). *Management Decision*, 60(2), 320–343.
- Seiger, R., Huber, S., Heisig, P., & Aßmann, U. (2019). Toward a framework for self-adaptive workflows in cyber-physical systems. *Software & Systems Modeling*, 18(2), 1117–1134.
- Taylor, R.G. & J. Brice, Jr. (2012). Fact or Fiction? A Study of Managerial Perceptions Applied to an Analysis of Organizational Security Risks. *Journal of Organizational Culture, Communications and Conflict* 16(1), 1–23.
- Trauth, E. & E. Cole (1992). The organizational interface: A method for supporting end users of packaged software. *Management Information Systems Quarterly*, 16(1), 35–53.
- Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4(2), 74–81.
- Xulu, V. C., & Suknunan, S. (2020). Enterprise resource planning (erp) systems success: impact of employees' perceptions and satisfaction on expected benefits in a manufacturing setting. *Problems and Perspectives in Management*, 18(2), 466–475.
- Yeow, A. & S. K. Sia (2008), Negotiating 'best practices' in package software implementation, *Information and Organization*, 18, 1–28.
- Yin R.K. (1993). *Applications of Case Study Research*, Sage: Thousand Oaks, CA.
- Yin, R.K. (2002). *Case Study Research, Design and Method*, 3rd ed. Sage Publications: Newbury Park.

DETERMINANTS OF GENDER DIVERSITY ON BOARDS: EVIDENCE FROM TURKEY

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ABSTRACT

This study investigated the relationship between women's representation on the boards of non-financial companies listed on Borsa Istanbul between 2011 and 2020, and the variables at the firm level. The Tobit model was preferred because of the censored nature of the dependent variable. The results do not support the agency theory and the institutional theory. Women's representation on boards increased in small-size firms with a couple of board members during the research term. It was observed that the effect of the communiqués issued by the Capital Markets Board (CMB) on gender diversity on boards of publicly-traded companies was limited. The results were compatible with the robustness tests. This is the first study to consider the impact of voluntary-based legal regulations on gender diversity on boards. It is also the first study to examine the determinants of women's representation on corporate boards in the Turkey sample.

Keywords: corporate governance, gender diversity, limited dependent variable, tobit model, official regulations

INTRODUCTION

Increase in the importance of businesses for the economy of a country after the 1970s has made businesses the most powerful institutions around the world, which has led to their activities being monitored carefully. For the last 30 years, corporate governance has become a subject discussed by many organizations. Countries, businesses and many other organizations have started to seek the ideal government. Corporate governance comprises the set of relationships among a company's management, its boards, shareholders and other interest groups. The legal, regulatory and institutional factors determine the content of corporate governance (OECD, 2004). The focus of corporate governance is the board, and it is responsible for monitoring management in the name of shareholders and stakeholders. In other words, the board must represent all interest groups, not just the controlling shareholders (Darman et al., 2021)

The framework of the board is one of the most closely monitored subjects, especially in terms of gender diversity. Governments have made arrangements regarding the women's representation on the boards of businesses whose stocks are traded in the stock exchange for the last years. Norway, for example, was the first country to legislate a certain quota for women on boards. In 2003, Norway made a regulation which obliged 40% of the board of directors members must be women till 2008 (Ahmet et al., 2016). Following Norway, many European countries such as Sweden and France made similar arrangements. For instance, in Sweden, the

representation of female on the boards of listed companies was 23% in 2011. In France, a law was adopted that requires 40% of the female members on the boards by 2017 (Amin et al., 2022). In addition, important reforms regarding gender equality were made in emerging markets. Saudi Arabia and the United Arab Emirates (UAE), for example, have made important reforms among the Gulf countries to include women on company boards. Listed companies in the UAE are now obliged to appoint female members to their boards of directors. Saudi Arabia has announced plans to increase women's labor market participation from 22% to 30% by 2030 (Hamdan et al., 2022). Similar arrangements were made in Turkey. The Capital Markets Board (CMB) through the regulation¹ publishing asked listed companies to place at least one female board member in 2012. In 2014², this target was increased to 25% of board members. However, both regulations have been made based on the 'comply or explain' principle, unlike Norway.

Studies about the women's representation on the boards can be classified into two groups; the first group studies focus on the relationship between the women on the boards and the financial or nonfinancial performance of the business; Elmagrhi et al. (2019) and Gyapong et al. (2021). The second group studies focus on the determinants of women's representation on the boards; (Ahmed et al., 2016) and (Saeed et al., 2019). Interestingly, studies dealing with women's representation on boards in the literature focus on results rather than determinants. For example, Yurt (2020), Taşkın and Mandacı (2017) used Return on Asset (ROA) and Return on Equity (ROE) as financial performance criteria. It can be criticized for two reasons. First of all, the value of any asset, for example a company, is calculated by discounting the expected cash flows on that asset at a rate that reflects asset's risk. This means that increasing the amount of cash flows of that asset and reducing the risk of cash flows will increase the value of the asset. In addition, profit is calculated according to the fundamental principles of accounting, such as the accrual basis and the matching principle. Thus, the business profit cannot be a measure of financial performance in itself, because it is more important to realize the profit in 'cash' (Damodaran, 2015). Secondly, suppose there is a "negative" and significant relationship between the representation of women on the board of directors and the financial performance of the company. How shall this result be interpreted? Therefore, if we want to see gender diversity on boards, we must focus on determinants rather than results.

In this study, it was estimated the determinants of gender diversity on the boards of non-financial companies listed on Borsa Istanbul with firm-level variables for the period 2011-2020. Tobit model was used because the dependent variable was censored at zero (Tobin, 1958). Two different dependent variables were used, the rate of women on boards (WIBD %) and the number of women on board of directors (NWIB). Explanatory variables are the size of the business (measured as the logarithm of the total assets-Log(Assets)), the age of the business (measured as the logarithm of the number of years since the establishment of the business-Log(Age)), and the number of board members of the business (measured as the logarithm of the number of board

¹ 2012 Serial: IV, No: 57 Communiqué on the Amendment of the Communiqué on the Determination and Implementation of Corporate Governance Principles, Article 4.3.10.

² 2014 Communiqué on Corporate Governance (II-17.1), Article, 4.3.9.

members-Log(BD). It was stated that two different arrangements were made regarding women's representation on the board of directors in 2011 and 2014. The research period covers ten years. To measure the effectiveness of these regulations and because of the dummy variable trap, it was added nine dummy variables to the models.

To the best of our knowledge, no study considers the effects of corporate governance regulations on the representation of women on boards. Moreover, studies conducted in the sample of Turkey; Yurt (2020), Doğanalp and Ortakarpuz (2021), and Taşkın and Mandacı (2017) were not preferred limited dependent variable models. These studies used regression analysis and the logit-probit model. Similarly, they focused on the results of women's representation on the boards. Consequently, the current paper seeks to make the following contributions to the existing literature. First, this is the first paper to consider the impact of voluntary-based legal regulations on gender diversity on boards. Second, this is also the first study in the Turkey sample to analyse the determinants of women's representation on boards and take into account the censored nature of the dependent variable.

Section 2 discusses the theoretical framework regarding women's representation on the boards. Section 3 presents the existing literature. Section 4 explains the research sample, hypotheses and research method. Section 5 provides the results of the Tobit model and robustness tests. In the last section, concluding remarks are made.

THEORETICAL FRAMEWORK

Since there is no well-defined theoretical basis to explain the effect of women's representation on boards, multi-theoretical approaches need to be used. A few of those theories such as Agency Theory, Resource Dependency Theory, Human Capital Theory, Stakeholder Theory and Institutional Theory were explained in this study.

Agency theory focuses on the control and monitoring duties of the boards. The aim is to preserve the interests of shareholders and minimize conflicts of interest and agency problems (Fama and Jensen, 1983). The basic assumption is that this control and monitoring duty is fulfilled more efficiently if certain features, including the independence of the directors, are present (Forbes and Milliken, 1999). This theory focuses on the relationship between diversity on boards and the independence of directors. This is a feature that improves the board's control and monitoring function (Francoeur, Labelle and Sinclair-Desgagné, 2008). Independence means that the directors have no interest in the decisions they make and is related to the 'autonomy' of the directors. If a business has a recruitment and promotion process without gender bias and based on just skills and competencies, directors would be subject to less influence from controlling shareholders.

Resource dependency theory states the diversity of the board to ensure access to critical resources for the business. Today, firms are faced with rapidly changing customer demands. The heterogeneity of the board, in other words, gender diversity would facilitate the access of the business to the critical resources that it would need to meet different customer demands (Pfeffer, 1972). Moreover, the gender diversity of an enterprise's boards would pave the way for possible

future recruitment of qualified personnel by choosing directors without bias (Cabrera-Fernández, Martínez-Jiménez and Hernández-Ortiz, 2016).

The human capital theory focuses on the use of human capital, defined as the education, knowledge, skills and experience of a person, for the benefit of the business. Different and subsidiary abilities of directors are a resource that competitors cannot imitate, which makes the firm a competitive advantage. Human capital theory suggests that board performance would be influenced by the diversity of its members due to the different and unique human capital that each director brings. However, the effect of women's representation on the boards on financial performance could be positive or negative (Carter, Simkins, and Simpson, 2010).

Stakeholder theory argues that gender diversity on the board could be a sign of the firm's stakeholder orientation. Gender diversity on the boards could be evaluated as a substantial indicator of a firm's sensitivity to gender equality (Oakley, 2000). Studies show that gender diversity on the boards is more observed in companies that reconcile work and family life without gender bias (Dallas, 2002). On the contrary, companies with homogeneous boards could suffer not only financial losses but also loss of reputation (Roberson and Park, 2007).

The institutional theory explains women's participation on boards with organizational level determinants. It is assumed that women's representation on the boards would give companies symbolic 'legitimacy' and thus the company's reputation would increase. (Blum, Fields and Goodman, 1994). The representation of women on the board of directors, where strategic decisions are taken, could show how committed a company is to women's promotion (Daily and Dalton, 2003). In addition, the presence of qualified women at all levels provides a competitive advantage to the company. Thus, these symbolic processes would help companies gain legitimacy by including women on their boards (Cabrera-Fernández, Martínez-Jiménez and Hernández-Ortiz, 2016).

LITERATURE REVIEW

In literature, the ratio of women on the boards (Saeed et al., 2019; Ahmed et al., 2016; Saeed, Belghitarb and Yousaf, 2016; Smith and Parrotta, 2018) and the probability of representing at least one woman on the boards (Hillman, Shropshire and Cannella, 2007) were used as a dependent variable. Explanatory variables are mostly firm-level variables (Blum, Fields and Goodman, 1994; Ahmed et al., 2016; Saeed, Belghitarb and Yousaf, 2016; Saeed et al., 2019).

Blum, Fields, and Goodman (1994) is the first study to examine firm-level determinants of women's representation in management positions. The research sample was 279 workplaces in the state of Georgia. The results support resource dependency and institutional theories. In other words, businesses that would like to benefit more from external resources to meet increasing customer demands and consider the public's reaction, give more place to women in managerial positions.

In their groundbreaking study of determining gender diversity on corporate boards, Hillman, Shropshire, and Cannella (2007) deal with resource dependency theory. The research sample is the 1,000 largest US firms by sales between 1990 and 2003. The binary dependent

variable (1, if a company has at least one woman on the boards and 0 or else) was preferred in the study. They reported that firm size, the industry in which the firm operates, company diversification strategy and board network significantly affect the likelihood of women's representation on corporate boards.

Ahmed et al. (2016) analyzed the determinants of gender diversity on the boards in a sample of 404 companies traded on the Australian Stock Exchange (ASX) between 2011 and 2014 with the Tobit model. Explanatory variables are firm size, BIG4 auditors, women as chairs of boards, corporate governance index (CGI), financial leverage, shareholder density, corporate global reporting initiative (GRI) signatory, average board age, the existence of board member external directorships, CEO tenure. According to the results, women as chair of the board, CGI, GRI, financial leverage, average board age, BIG4 auditors, CEO tenure and shareholder density are significant determinants of women's representation on boards.

Saeed, Belghitarb, and Yousaf (2016) analysed the role of the institutional environment in determining gender diversity on the boards of Russian, Chinese, Brazilian and Indian companies and compare the results with the US and UK control samples. The research method is the Generalized Method of Moments (GMM). Explanatory variables are firm size, government ownership, corporate risk and family ownership. According to the results, there were some resemblances between developed and emerging markets on the determinants of gender diversity on boards. Especially, gender diversity on boards was positively associated with the firm size, and it was negatively associated with corporate risk in both developed and emerging markets. Moreover, board gender diversity was positively related to family control in China, India, the United States and the United Kingdom. Unlike developed countries, state ownership affected negatively board gender diversity in Russia and India.

Smith and Parrotta (2018) analyzed gender diversity on the boards in a sample of listed Danish companies with at least 50 workers between 1998 and 2010. The focal point of the study was non-employee-elected directors. Three different hypotheses were tested in the study: the female-led hypothesis, the tokenism hypothesis, and the pipeline hypothesis, in turn. According to the results, the female-led hypothesis was rejected. Firms with a women chairperson on the board are less likely to have a non-employee-elected women board member. Moreover, evidence was found to support the tokenism hypothesis. If one, two, or more women exist on the board, the possibility of increasing the rate of non-employee-elected women board members is significantly lesser. Results partially confirmed the pipeline hypothesis. The relationship between qualified manager candidates and women managers is weaker than the similar relationship for men.

Saeed et al. (2019) investigated the firm-level determinants of the women's representation on the board using the Tobit model in a sample of 294 companies listed on the Bombay Stock Exchange (BSE) between 2004 and 2014. Explanatory variables were family ownership, government ownership, firm size and presence in the high-tech sector. According to the results, women's representation on boards was positively related to connection with the high-tech sector, family ownership and firm size. No significant effect of state ownership on the ratio of women on boards was reported.

Hamdan et al. (2022) investigated the representation of women on the boards of 125 publicly traded industry companies in Gulf Cooperation Council (GCC) countries. Dependent variables; the percentage of female on the board of directors, the number of female members on the board and companies with 1, 2 and 3 or more female members on the board of directors, respectively. Explanatory variables are board size, institutional ownership, ownership concentration, board independence, Tobins' Q ratio, firm size, firm leverage. They state that the presence of women on the board is positively associated with institutional ownership and board independence and negatively associated with board size. They also report that the presence of female board members is positively correlated with Tobins' Q ratio and negatively correlated with firm leverage.

Adamu, Abubakar and Yunusa (2022) analyzed how the age and size of companies listed on the Nigerian Stock Exchange between 2012 and 2016 affected the presence of women on boards. They divided the research period into two; before and after mandatory periods of the Securities and Exchange Commission code. Research findings show that company age is positively related to female representation on the board. While size of firm is negatively related to female representation in the pre-mandatory period, size of company is positively related to female directors in the post-mandatory period.

METHODOLOGY

Sample, Data set

It was obtained the information on the board composition and firm features from the Public Disclosure Platform (PDP) and the activity reports of the board of director. If the board members' gender could not be determined, the data of the board members were checked on the Public Disclosure Platform. Firms without information about firm features and board of directors are excluded from the sample. Each firm is also necessary to have at least one year information. After these explanations, the sample of the research was determined as follows: Corporate governance policies of financial institutions are also subject to the regulations of other institutions such as the Banking Regulation and Supervision Agency (BRSA). Therefore the research sample is non-financial companies listed continuously on Borsa Istanbul between 2011 and 2020. According to the CMB data, the number of non-financial firms whose stocks are traded on Borsa Istanbul was 247 at the end of 2011. 4 sports clubs were eliminated from the sample because their balance sheet dates were different. Firms whose data could not be accessed despite being on the exchange list and firms that were delisted during the research period were also eliminated from the sample. After excluding financial firms and firms with missing data, the final sample contains 141 non-financial firms. Table 1 shows the stock codes of the sample companies.

Table 1: Sample firms

YAPRK	COLA	HATEK	PARSN	AKSEN	CLEBİ
ALMAD	CELHA	HEKTS	PENG D	AYEN	RYSAS
ADEL	CEMAS	HURGZ	PETKM	UTPYA	TCELL
AFYON	CEMTS	IHEVA	PETUN	ZOREN	THYAO
AKCNS	CMENT	IHGZT	PNSUT	ANELE	TTKOM
ATEKS	DAGI	IZMDC	SAMAT	EDIP	ARENA
AKSA	DARDL	KARSN	SARKY	ENKAI	ARMDA
ALCAR	DESA	KRTEK	SASA	YYAPI	ASELS
ALKIM	DITAS	KARTN	SILVR	AYCES	DGATE
AEFES	DOBUR	KATMR	SKTAS	AVTUR	DESPC
ASUZU	DYOBY	KERV T	TATGD	BIMAS	ESCOM
ARCLK	EGEEN	KLMSN	TUKAS	BIZIM	INDES
AVOD	EGGUB	KONYA	TUPRS	CRFSA	KAREL
AYGAZ	EGSER	KRSTL	PRKAB	DOAS	KRONT
BAGFS	EMKEL	KUTPO	TTRAK	INTEM	LINK
BAKAB	EMNIS	MRS HL	TBORG	MAALT	LOGO
BANVT	ERBOS	MNDRS	USAK	MEPET	NETAS
BTCIM	EREGL	MERKO	ULKER	MGROS	PKART
BRKSN	FMIZP	OLMK	VANGD	MIPAZ	ADESE
BLCYT	FROTO	TIRE	VESBE	PKENT	IHLGM
BRSAN	FRIGO	NIBAS	VKING	SANKO	SONME
BFREN	GENTS	NUHCM	YATAS	SELEC	
BOSSA	GOLTS	OTKAR	YUNSA	VAKKO	
BRISA	GUBRF	OZBAL	AKENR	BEYAZ	

Variables and Hypotheses

Dependent Variable

As stated before, this study investigated the relationship between gender diversity on boards of directors and firm-level variables. Therefore, two different dependent variables were used, the rate of women on boards (WIBD %) and the number of women on the board of directors (NWIB). These measures are consistent with the prior literature, (Saeed et al., 2019; Hamdan et al., 2022; Adamu, Abubakar and Yunusa, 2022).

Independent variables and Hypotheses

Firm-level variables such as firm size, firm age, and firm board size were considered to develop research hypotheses. The hypotheses of the research are as follows:

Firm Size

Institutional theory suggests that firms could behave to fit certain norms to avoid pressure from public opinion. Gender diversity is part of social expectations stated on a global scale. Therefore, large firms could feel more pressure to abide by societal expectations in the context of gender diversity because of their size (Goodstein, 1994). Different parameters have been used to represent firm sizes such as annual turnover (Hillman, Shropshire and Cannella, 2007), market value (Geiger and Marlin, 2012), the book value of equity (Kasznik and McNichols, 2002), and total assets (Saeed, Belghitarb and Yousaf, 2016). In empirical studies, it was found a positive relationship (Saeed, Belghitarb and Yousaf, 2016; Saeed et al., 2019), and a nonsignificant relationship (Geiger and Marlin, 2012) between firm size and women's representation on boards. In addition, some studies found a negative relationship between the probability of promotion of women and firm size (Abor, 2017; Khidmat et al., 2022; Hamdan et al., 2022). Following (Hamdan et al., 2022; Adamu, Abubakar and Yunusa, 2022), total assets were preferred as a proxy of firm size. In developing countries like Turkey, inflation is a chronic problem. Variables that express monetary amounts, such as total assets, are required to be deflated for inflation for a research period of ten years. Therefore, the following equation was used:

$$\text{Value at Fixed Prices}_t = (\text{Current Price Value}_t / \text{Consumer Price Index}_t) * 100$$

The logarithm of the amount of the total asset deflated by the price index of the relevant year was added to the model. The research hypothesis regarding firm size is as follows:

***Hypothesis 1:** There is a positive relationship between firm size and gender diversity on the boards.*

Age

Some studies show that a firm's propensity to resist institutional pressures for change would increase the longer it stays in business life (Kelly and Amburgey, 1991; Meyer and Brown, 1977). Existing managers who would like to protect their interests and maintain the status quo could react to changes that may benefit a firm, such as a skilled female director (Kelly and Amburgey, 1991). For example, Baron, Mittman, and Newman (1991) found that older organizations were more resistant to change and less willing to hire or promote women. And, Kyereboah-Coleman and Biekpe (2007) report that age and gender diversity on boards of firms listed on the Ghana Stock Exchange were negatively correlated. However, there are studies in which mature companies are related to increased women's representation in management (Skaggs, Stainback and Duncan, 2012; Adamu, Abubakar and Yunusa, 2022; Khidmat et al., 2022). Although there are two contradictory empirical findings, a positive relationship was expected between firm age and gender diversity on the board of directors. Because large companies in Borsa Istanbul are also more mature. The age of the firm was measured by subtracting the foundation year from the year of the firm's annual report (Abor, 2017; Adamu, Abubakar and Yunusa, 2022). After taking the logarithm of the calculated amount, it was added to the model. The research hypothesis of firm age variable:

***Hypothesis 2:** There is a positive relationship between firm age and gender diversity on the boards.*

Board size

Board size is one of the important dimensions of board composition. A larger board is expected to provide greater opportunities for women's representation on the board of directors (Carrasco et al., 2012). Geiger and Marlin (2012) found a significant relationship between board size and women's representation on boards. Another view that supports this argument is the resource dependency theory. It argues that when uncertainty occurs, a large and diverse board would bring new resources and capabilities to the firm (Sahin et al., 2018). However, recent empirical findings (Adamu, Abubakar and Yunusa, 2022; Hamdan et al., 2022) report a negative relationship between board size and female representation on the board. The board size was measured by taking the logarithm of the number of board members (Khidmat et al., 2022; Khaw and Liao, 2018). In this context, the research hypothesis for the variable of the board of directors is:

***Hypothesis 3:** There is a positive and significant relationship between the size of the boards and gender diversity on the boards.*

Control Variable

In the past years, some countries have put pressure (voluntary or mandatory) on listed companies by implementing a "quota" system to ensure gender diversity on their boards. The literature considers the effects of these quotas on the firm. There is evidence both for and against quotas (Hamplova, Vaclav and Lefley, 2022). It was stated that the communiqués of the CMB in Turkey were based on the 'comply or explain' principle. In this study, it was measured the effect of these voluntary-based regulations on gender diversity on boards. The research period covers ten years. Nine dummy variables were added because of measuring the effectiveness of these communiqués on women's representation on the boards and because of the dummy variable trap.

RESULTS

Descriptive statistics

Table 2 shows the descriptive statistics of the parameters used in the study. The mean percentage of female board members of the sample firms is quite low (12%). It is seen that the mean age of the sample companies is 42 and the mean number of board members is 7. During the research period, the highest number of female board members is 4, while the mean percentage of female board members is 60%. Finally, when the evolution of gender diversity of the sample firms is analyzed over the years, it increased from 12% in 2011 to 15% in 2020. This increase (3%) should be considered together with the 25% target rate recommended by the CMB.

Table 2: Descriptive statistics

Year	2011	2012	2013	2014	2015
WIBD%	0.12	0.10	0.10	0.11	0.12
NWIB	0.77	0.75	0.75	0.80	0.87
Year	2016	2017	2018	2019	2020
WIBD%	0.12	0.12	0.14	0.14	0.15
NWIB	0.90	0.92	1.03	1.03	1.09
Variables	N	Min	Max	Mean	Std.Dev
WIBD%	1410	0	0.60	0.1256	0.13402
NWIB	1410	0	4	0.8936	0.929
Assets	1410	620182	1.874E+11	2.47E+09	9435992419
Age	1410	4	105	42.1	15.8496
BD	1410	3	15	7.45	2.196

NOTE: WIBD% represents the ratio of women on the boards; NWIB represents the number of women on the board of directors; Assets represents the total assets of the firm; Age represents the age of the firm calculated according to the foundation year; BD represents the number of board members.

Unit Root Test

Stationary; It is defined as the time series approaching a certain value or fluctuating around its expected value (mean) in a certain period. In time series data analysis, it is necessary to test whether the data are stationary (presence of unit root). If the stationarity of the data are not tested, it will cause coefficient bias and spurious regression (a high R^2 value), which affects the validity of the model. Augmented Dickey-Fuller (ADF) test was applied to test whether the stationarity assumption was valid in this study. Table 3 shows that the data are stationary.

Table 3: Stationarity test

	t-Statistics	Prob.		t-Statistics	Prob.
WIBD%	-13.0585	0.0000	Log(Asset)	-8.5544	0.0000
1%	-3.43		1%	-3.43	
5%	-2.86		5%	-2.86	
10%	-2.57		10%	-2.57	
	t-Statistics	Prob.		t-Statistics	Prob.
Log(Age)	-8.4632	0.0000	Log(BD)	-10.7729	0.0000
1%	-3.43		1%	-3.43	
5%	-2.86		5%	-2.86	
10%	-2.57		10%	-2.57	
	t-Statistics	Prob.		t-Statistics	Prob.
NWIB	-13.0529	0.0000			
1%	-3.43				
5%	-2.86				
10%	-2.57				

Note: WIBD% represents the ratio of women on the boards; NWIB represents the number of women on the board of directors; Log(Assets) represents the logarithm of the firm's total assets; Log(Age) represents the logarithm of the age of the firm according to the foundation year; Log(BD) represents the logarithm of the number of board members.

Correlation Analysis

The correlation analysis was run to see the size of co-movements between explanatory variables. Table 4 shows the Correlation analysis results. According to the results, there is no high correlation between the explanatory variables. All three variables are positively related to each other. In other words, firm size, firm age, and board size increase and decrease together. It also appears that the maximum correlation is between the Log(BD) variable and the Log(Assets) variable (0.2202).

Table 4: Correlation matrix

	Log(Assets)	Log(Age)	Log(BD)
Log(Assets)	1		
Log(Age)	0.1224	1	
Log(BD)	0.2202	0.2025	1

Note: Log(Assets) represents the logarithm of the firm's total assets; Log(Age) represents the logarithm of the age of the firm according to the foundation year; Log(BD) represents the logarithm of the number of board members.

Tobit model results

When the descriptive statistics of the variables are examined, it is seen that the minimum value of the WIBD% and NWIB variables is zero. It is interpreted as the data of the dependent variable being censored at zero (Tobin, 1958). The parameters of OLS regression analysis are often biased in research problems where the dependent variable is censored around a specific value. If the research problem is a one-stage process, the Tobit model is recommended to overcome this problem (Saeed et al., 2019). To measure the effects of corporate governance communiqués by years, 4 different models were established with two separate dependent variables (WIBD%, NWIB).

$$\text{Gender Diversity} = f(\text{size of firm; the age of firm; board size of firm; controls; error})$$

Table 5 shows the results of the Tobit model. First, all four models are significant at the 1% level. Of the 1410 observations, 577 were left-censored. Contrary to our expectations, the Log(Assets) variable was negative and significant in all four models. These results are consistent with research suggesting that women have more promotion opportunities in small firms (Abor, 2017; Khidmat et al., 2022; Hamdan et al., 2022). The reason for this finding might be related to agency costs. Agency costs in large firms are generally higher than in smaller firms. There are some findings that the presence of women on boards reduces agency costs (Amin et al., 2022). The better monitoring ability of a heterogeneous board leads men to place on the boards of large firms (De Jonge, 2014). The Log(Age) variable was negative, but its coefficient was not significant. This result contradicts previous literature (Skaggs, Stainback and Duncan, 2012; Adamu, Abubakar and Yunusa, 2022; Khidmat et al., 2022). The reason for this result may be that the age and size of the sample firms are positively correlated (See Table 4). An interesting result was seen in the Log(BD) variable. The coefficients of Log(BD) differ in models where the dependent variable is %WIBD (Columns 1 and 2) and NWIB (Columns 3 and 4). In other words, as the number of board members increases, more women are represented on the boards, but women's representation was not at a level that could increase the women's rate on the board of directors. These results are in line with recent empirical findings (Adamu, Abubakar and Yunusa, 2022; Hamdan et al., 2022), which found a negative relationship between board size and gender diversity. There are three possible answers to this result. First, women's presence on boards might be perceived as a 'token' (Smith and Parrotta, 2018). In other words, the presence of a woman on the boards may reduce the probability of second and third female directors being appointed. The second answer may be related to critical mass theory. Konrad, Kramer, and Erkut (2008) argue that when a certain threshold (three female directors) is exceeded on boards, the positive effect of board size is sighted. Third, a small board can make it easier to understand that women have the potential to carry the responsibilities of board members (Carrasco et al., 2012). The coefficients of the dummy variables are positive after 2014, but significant for the period after 2018. It seems that 'voluntary-based' regulations have had no significant effect on gender diversity on boards.

Table 5: Tobit model results

WIBD%			NWIB		
Variables	(1)	(2)	Variables	(3)	(4)
Log(Assets)	-0.02170*** (0.00724)	-0.023527*** (0.074250)	Log(Assets)	-0.14292*** (0.05031)	-0.156339*** (0.049937)
Log(Age)	-0.002413 (0.031179)	-0.027201 (0.031418)	Log(Age)	0.09637 (0.21748)	-0.079612 (0.218992)
Log(BD)	-0.101857** (0.049627)	-0.097574* (0.049874)	Log(BD)	1.45633*** (0.34611)	1.502361*** (0.347369)
D2012		-0.007694 (0.026356)	D2012		-0.090873 (0.183721)
D2013		-0.008130 (0.026353)	D2013		-0.081272 (0.183712)
D2014		0.004109 (0.026311)	D2014		-0.009696 (0.183440)
D2015		0.020962 (0.026224)	D2015		0.103543 (0.182896)
D2016		0.025375 (0.026187)	D2016		0.157811 (0.182619)
D2017		0.028825 (0.026225)	D2017		0.174042 (0.182900)
D2018		0.053226** (0.026082)	D2018		0.360620** (0.181873)
D2019		0.053079** (0.026112)	D2019		0.358910** (0.182141)
D2020		0.073254*** (0.027229)	D2020		0.485839*** (0.181569)
Constant	0.334809*** (0.073865)	0.361126*** (0.074250)	Constant	0.25294 (0.51462)	0.457356 (0.517077)
N	1410	1410	N	1410	1410
Left-censored	577	577	Left-censored	577	577
Uncensored	833	833	Uncensored	833	833
Log-likelihood	-335.4571	-324.9972	Log-likelihood	-1951.683	-1940.75
Wald Chi-square (3-12)	5.6995***	3.196***	Wald Chi-square (3-12)	7.6327***	3.7441
p-value(LR Statistic)	0.0007	0.0001	p-value(LR Statistic)	0.0000	0.0000

Note1: WIBD% represents the ratio of women on the boards; NWIB represents the number of women on the board of directors; Log(Assets) represents the logarithm of the firm's total assets; Log(Age) represents the logarithm of the age of the firm according to the foundation year; Log(BD) represents the logarithm of the number of board members.

Note2: The numbers in parentheses show the standard error value of the relevant variable. The coefficients show the significance of the variable. (***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$

Robustness test

It was established two separate models with alternative dependent variables and estimation techniques to check the robustness of the findings in the Tobit model. First, it was analysed the possibility of representation of women on the board of directors. The dependent variable in the logistic regression model was a binary variable taking value one if there were at least one women member on the board of directors and zero otherwise. The results of the logistic regression model are shown in Table 6. The logistic model was significant at the 5% level. The results are consistent with the model constructed with the NWIB dependent variable. The probability of women's representation on the board of directors increased in firms that are small size and have more board members.

Table 6: Logistic regression results

Variables	Coefficient	Std. Error	Prob.
Log(Assets)	-0.16119	0.06886	0.0192
Log(Age)	-0.19553	0.29763	0.5112
Log(BD)	1.37132	0.47817	0.0041
D2012	0.02061	0.24223	0.9322
D2013	0.05499	0.24237	0.8205
D2014	0.11220	0.24304	0.6443
D2015	0.20972	0.24388	0.3898
D2016	0.27784	0.24451	0.2558
D2017	0.22652	0.24403	0.3532
D2018	0.44413	0.24701	0.0721
D2019	0.39652	0.24603	0.1070
D2020	0.65966	0.25121	0.0086
Constant	0.57993	0.70211	0.40881
Log-likelihood	-941.984		
p-Value(LR Statistic)			0.0205

Note: Log(Assets) represents the logarithm of the firm's total assets; Log(Age) represents the logarithm of the age of the firm according to the foundation year; Log(BD) represents the logarithm of the number of board members.

The OLS regression was used for the second model. Two separate dependent variables were used in the OLS model. Table 7 shows the results of OLS regressions. Both models were significant at the 1% level. OLS regression's results were similar to the results of the Tobit models. The coefficient of Log(BD) was negative in the model of WIBD% and positive in the model of NWIB, respectively. Similarly, dummy variables were positive and significant for the term after 2018.

Table 7: OLS regression results

WIBD%				NWIB			
Variables	Coefficient	Std. Error	Prob.	Variables	Coefficient	Std. Error	Prob.
Log(Assets)	-0.0148431	0.0043394	0.0006	Log(Assets)	-0.09838	0.03018	0.0011
Log(Age)	-0.0182153	0.0191448	0.3415	Log(Age)	-0.02021	0.13316	0.8794
Log(BD)	-0.129078	0.0302422	0.0000	Log(BD)	1.00378	0.21034	0.0000
D2012	-0.0070569	0.0158222	0.6556	D2012	-0.09175	0.11005	0.4046
D2013	-0.0087872	0.0158234	0.5787	D2013	-0.08986	0.11006	0.41438
D2014	-0.0003309	0.0158408	0.9833	D2014	-0.04274	0.11018	0.69811
D2015	0.0107291	0.0158446	0.4984	D2015	0.03269	0.11020	0.76682
D2016	0.012315	0.0158433	0.4371	D2016	0.06582	0.11020	0.5504
D2017	0.0170878	0.0158554	0.2813	D2017	0.09092	0.11028	0.4098
D2018	0.0317288	0.0158628	0.0456	D2018	0.20758	0.11033	0.06013
D2019	0.0329762	0.0158615	0.0377	D2019	0.21627	0.11032	0.05015
D2020	0.0434372	0.0158842	0.0063	D2020	0.27835	0.11048	0.01186
Constant	0.3719845	0.0451077	0.0000	Constant	0.79909	0.31374	0.0109
p-value			0.0000	p-value			0.0000

Note: WIBD% represents the ratio of women on the boards; NWIB represents the number of women on the board of directors; Log(Assets) represents the logarithm of the firm's total assets; Log(Age) represents the logarithm of the age of the firm according to the foundation year; Log(BD) represents the logarithm of the number of board members.

CONCLUSION

Firm-level determinants of gender diversity on the boards of non-financial firms listed on Borsa Istanbul between 2011 and 2020 were analyzed using the Tobit model. In 2011 and 2014, the CMB published communiqués for gender diversity on the boards of firms whose stocks are traded on Borsa Istanbul. It was added nine dummy variables to the model was to elicit the effect of these communiqués. Results showed that women's representation on the boards increased in small-size firms with smaller boards. The findings are coherent with the studies finding a negative correlation between firm size and women's representation on the boards (Abor, 2017; Khidmat et al., 2022; Hamdan et al., 2022). However, it was observed that the dependent variable of NWID was positively related to the number of board members. It was also reported that the dummies for 2018, 2019 and 2020 were positive and significant. Robustness tests confirm the findings.

The empirical findings of this paper do not support theoretical approaches to women's representation on boards. The agency theory emphasizes the importance of gender diversity for the independence of the board (Francoeur, Labelle and Sinclair-Desgagné, 2008). The number of publicly traded companies whose shares traded on the Borsa Istanbul was only 394 at the end of 2020. The free float rate of companies in the BIST-100 index was 33% (TUYID, 2020: 5). In addition, it is known that companies listed on Borsa Istanbul are generally family-owned

enterprises, and they have a high market share in their sector together with sub-companies. It has been faced with some problems related to corporate governance, such as the outside director principle (Ararat and Yurtoğlu, 2011). Therefore, the paper's findings do not sympathize with the assumption that there is a relationship between gender diversity and board independence suggested by the agency theory. Topçu and Arslantaş (2018) classified the companies listed on Borsa Istanbul according to their market values and reported the number of women on the boards of these companies. The number of women on the boards of Group 1, Group 2 and Group 3 companies was 32, 40 and 222, respectively. In short, the number of women on the boards of directors of small companies was higher.

The institutional theory assumes that the representation of women on the boards of directors would give companies symbolic 'legitimacy' and thus increase the company's reputation (Blum, Fields and Goodman, 1994). It is also assumed that larger firms would feel more constrained to fit social expectations in the context of gender diversity. The empirical findings, especially the negative coefficient of the Log(Assets) variable in all models, do not support the assumptions of the institutional theory.

I do not think that setting legal quotas would not work in every market to overcome gender inequality, which is a problem for the whole world. It is known that the mandatory quota application in Norway gave positive results. However, quotas could have negative consequences in some markets. Piscopo and Muntean (2018), for example, report that when the quota of female directors was added to agenda in Germany, large companies intimidated the government with taking their investments out of the country. In addition, if the presence of women on boards is a result of legal obligations, it could cause greater problems in the firm in the long run. The justification of those who support this view is that women are on the boards not because of their qualifications, but because of external pressures (Cabrera-Fernández, Martínez-Jiménez and Hernández-Ortiz, 2016). It is called tokenism, women are not considered to be board members with the same competency as other board members. For this reason, only one female sits on the board, and the second female is less likely to be on the board than the first woman (Smith and Parrotta, 2018). This argument is used to suggest that quotas should not be considered the best answer to the problem of gender inequality (Nekhili and Gatfaoui, 2013). For instance, Solimene, Coluccia and Fontana (2017) report that the quota system increased the number of female directors on boards in Italy, but did not increase the number of female directors in critical decision-making positions.

There is a limitation of this study. It is related to sample selection. Corporate governance regulations are only for companies whose shares are traded on the stock exchange. In bank-oriented markets such as Turkey, there are a low number of publicly traded companies. Therefore, the findings cannot be generalized. Given the recent studies that have found a negative relationship between firm size-board size and gender diversity (Adamu, Abubakar and Yunusa, 2022; Khidmat et al., 2022; Hamdan et al., 2022), it would be interesting to explore the effect of tokenism on boards in markets with weak corporate governance practices in future studies.

REFERENCES

- Abor, A. Patience (2017), "Examining gender diversity on hospital boards in Ghana", *International Journal of Health Governance*, 22(4): 269-282. <https://doi.org/10.1108/IJHG-04-2017-0016>
- Adamu, A. Idris; Abubakar, A. Usman and Yunusa, Abdulateef (2022), "Do age and size of companies affect female directors on boardrooms?", *The Journal of Management Theory and Practice*, 3(2): 33-38.
- Ahmed, Ammad; Higgs, Helen; Ng, Chew and Anne Delaney, Deborah (2016), "Determinants of women representation on corporate boards: evidence from Australia", *Accounting Research Journal*, 31(3): 326-342.
- Amin, Ali; Ur Rehman, Ramiz; Ali, Rizwan and Ntim, G. Collins (2022), "Does gender diversity on the board reduce agency cost? Evidence from Pakistan", *Gender in Management*, 37(2): 164-181. <https://doi.org/10.1108/GM-10-2020-0303>
- Ararat, Melsa and Yurtoğlu, B. Burçin (2011), "An assessment of the recent legal reforms concerning "corporate governance" introduced by the capital market boards of Turkey", Working Paper Series, Corporate Governance Forum of Turkey, Sabancı Üniversitesi.
- Baron, N. James; Mittman, S. Brian and Newman, E. Andrew (1991), "Targets of opportunity: Organizational and environmental determinants of gender integration within the California civil service, 1979-1985", *American Journal of Sociology*, 96: 1362-1401.
- Blum, C. Terry; Fields, L. Dail and Goodman, S. Jodi (1994), "Organization-level determinants of women in management", *Academy of Management Journal*, 37(2): 241-268.
- Damodaran, Aswath (2014), *Applied Corporate Finance*, (Singapore: John Wiley & Sons Singapore Pte. Ltd.)
- Darman, G. Manisalı; Taştan, Burhan; Seçkin S. Selim and Kır, Ceyhun (2021), *Kurumsal Yönetim*, (Ankara: Sermaye Piyasası Lisanslama Sicil ve Eğitim Kuruluşu).
- Cabrera-Fernández A. Isabel; Martínez-Jiménez, Rocio and Hernández-Ortiz, J. Maria (2016), "Women's participation on boards of directors: a review of the literature", *International Journal of Gender and Entrepreneurship*, 8(1): 69-89.
- Carrasco, Amalia; Francoeur, Claude; Labelle, Real; Laffarga, Joaquina and Ruiz-Barbadillo, Emiliano (2012), "Cultural differences and board gender diversity", *Comptabilités et innovation*, May 2012, Grenoble, France.
- Carter, A. David; D'Souza, Frank; Simkins, J. Betty and Simpson, W. Gary (2010), "The gender and ethnic diversity of US boards and board committees and firm financial performance", *Corporate Governance: An International Review*, 18(5): 396-414.
- Daily, M. Catherine and Dalton, Dan (2003), "Women in the boardroom: a business imperative", *Journal of Business Strategy*, 24(5): 8-9.
- Dallas, Lynne (2002), "The new managerialism and diversity on corporate boards of directors", Working Paper 38, University of San Diego, School of Law.
- De Jonge, Alice (2014), "The glass ceiling that refuses to break: women directors on the boards of listed firms in China and India", *Women's Studies International Forum*, 47: 326-338. <https://doi.org/10.1016/j.wsif.2014.01.008>
- Doğanalp, Burcu and Ortakarpuz, Meral (2021), "Kadın çalışanların ve yönetim kurulunda kadın temsilinin işletme performansına etkisi: Bist 50'de yer alan işletmeler üzerine bir araştırma", *Nevşehir Hacı Bektaş Veli Üniversitesi SBE Dergisi*, 11(3): 1243-1259.
- Elmagrhi, H. Mohamed; Ntim, G. Collins (2019), "A study of environmental policies and regulations, governance structures and environmental performance: the role of female directors", *Business Strategy and the Environment*, 28(1): 206-220.
- Fama, F. Eugene and Jensen, C. Michael (1983), "Separation of ownership and control", *Journal of Law and Economics*, 26(2): 301-325.
- Forbes, P. Daniel and Milliken, J. Frances (1999), "Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups", *Academy of Management Review*, 24(3): 489-505.
- Sinclair-Desgagné, Bernard; Francoeur, Claude and Labelle, Real (2008), "Gender diversity in corporate governance and top management", *Journal of Business Ethics*, 81(1): 83-95.
- Geiger, W. Scott and Marlin, Dan (2012), "The relationship between organisational/board characteristics and the extent of female representation on corporate boards". *Journal of Business & Economics Research (JBER)*, 10(3): 157-172.

- Goodstein, D. Jerry (1994), “Institutional pressures and strategic responsiveness: employer involvement in work-family issues”, *Academy of Management Journal*, 37: 350–382.
- Hamplova, Eva; Janecek, Vaclav and Lefley, Frank (2022), “Board gender diversity and women in leadership positions – are quotas the solution?”, *Corporate Communications: An International Journal*, 27(4): 742-759. <https://doi.org/10.1108/CCIJ-02-2022-0022>
- Hillman, J. Amy; Shropshire, Christine and Cannella, A. Albert (2007), “Organisational predictors of women on corporate boards”, *Academy of Management Journal*, 50(4): 941-952.
- Kasznik, Ron and McNichols, F. Maureen (2002), “Does meeting earnings expectations matter? Evidence from analyst forecast revisions and share price”, *Journal of Accounting Research*, 40(3): 727-759.
- Kelly, Dawn and Amburgey, L. Terry (1991), “Organizational inertia and momentum: A dynamic model of strategic change”, *Academy of Management Journal*, 34: 591-612.
- Khaw, L.H. Kareen and Liao, Jing (2018), “Board gender diversity and its risk monitoring role: Is it significant?”, *Asian Academy of Management Journal of Accounting and Finance*, 14(1): 83–106. <https://doi.org/10.21315/aamjaf2018.14.1.4>
- Khidmat, Waqas; Habib, Muhammed Danish; Awan, Sadia and Raza, Kashif (2022), “Female directors on corporate boards and their impact on corporate social responsibility (CSR): evidence from China”, *Management Research Review*, 45(4): 563–595. <https://doi.org/10.1108/MRR-09-2020-0560>
- Konrad, M. Alison; Kramer, Vicki and Erkut, Sumru (2008), “The impact of three or more women on corporate boards”, *Organizational Dynamics*, 37(2): 145–164.
- Kurumsal Yönetim İlkelerinin Belirlenmesine ve Uygulanmasına İlişkin Tebliğ’de Değişiklik Yapılmasına Dair Tebliğ (2012). <https://www.spk.gov.tr/Duyuru/Goster/20130222/0> (10. 11. 2021).
- Kurumsal Yönetim Tebliği (2014). <https://www.spk.gov.tr/Duyuru/Goster/20140103/3> (10. 11. 2021).
- Kyereboah-Coleman, Anthony and Biekpe, Nicholas (2007), “On the determinants of board size and its composition: additional evidence from Ghana”, *Journal of Accounting & Organizational Change*, 3(1): 68-77.
- Meyer, W. Marshall and Brown, M. Craig (1977), “The process of bureaucratization”, *American Journal of Sociology*, 83: 364-385.
- Nekhili, Mehdi and Gatfaoui, Hayette (2013), “Are demographic attributes and firm characteristics drivers of gender diversity? Investigating women’s positions on French boards of directors”, *Journal of Business Ethics*, 118(2): 227-249.
- Oakley, Judith (2000), “Gender-based barriers to senior management positions: Understanding the scarcity of female CEOs”, *Journal of Business Ethics*, 27(4): 321-334.
- OECD, (2004). *Principles of Corporate Governance*, Draft For Public Comment, Paris.
- Pfeffer, Jeffrey (1972), “Size and composition of corporate boards of directors: the organization and its environment”, *Administrative Science Quarterly*, 17(2): 218-228.
- Piscopo, M. Jennifer and Muntean, Susan Clark (2018), “Corporate quotas and symbolic politics in advanced democracies”, *Journal of Women, Politics and Policy*, 39(3): 285-309. <https://doi.org/10.1080/1554477X.2018.1477396>
- Reem Hamdan; Nohade Nasrallah; Rim El Khoury; Allam Hamdan and Bahaeddin Alareeni (2022), “Presence of women on boards in industrial firms: evidence from GCC countries financial markets”, *International Journal of Management Science and Engineering Management*, 17(1): 37-48. DOI:10.1080/17509653.2021.1985644
- Roberson, M. Quinetta and Park, J Hyeon (2007), “Examining the link between diversity and firm performance: the effects of diversity reputation and leader racial diversity”, *Group and Organization Management*, 32(5): 548-568.
- Saaed, Abubakr; Belghitar, Yacine and Yousaf, Amna (2016), “Firm-level determinants of gender diversity in the boardrooms: Evidence from some emerging markets”, *International Business Review*, 25: 1076-1088. <http://dx.doi.org/10.1016/j.ibusrev.2016.01.002>
- Saaed Abubakr; Sameer, Muhammad; Raziq, M. Muhammad; Salman, Aneel and Hammoudeh, Shawkat (2019), “Board Gender Diversity and Organizational Determinants: Empirical Evidence from a Major Developing Country”, *Emerging Markets Finance & Trade*, 55: 1803-1820. <https://doi.org/10.1080/1540496X.2018.1496421>
- Skaggs, Sherly; Stainback, Kevin and Duncan, Phyllis (2012), “Shaking things up or business as usual? The influence of female corporate executives and board of directors on women’s managerial representation”, *Social Science Research*, 41: 936–948.

- Smith, Nina and Parrotta, Pierpaolo (2018), “Why so Few Women on Boards of Directors? Empirical Evidence from Danish Companies in 1998–2010”, *Journal of Business Ethics*, 147: 445–467. <https://doi.org/10.1007/s10551-015-2974-9>
- Solimene, Silvia; Coluccia, Daniela and Fontana, Stefano (2017), “Gender diversity on corporate boards: an empirical investigation of Italian listed companies”, *Palgrave Communications*, 3(16109) <https://doi.org/10.1057/palcomms.2016.109>
- Şahin, Kader; Eser, Burçin; Kaplan, Tuğba and Özdündar, Gamze (2018), “Yönetim kurullarında kadın yönetici temsili: Türkiye’de yönetim kurulları yapısının cinsiyet bağlamında incelenmesi”, *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 14(4): 1147-1166. <http://dx.doi.org/10.17130/ijmeb.2018445674>
- Taşkın, F. Dilvin and Mandacı, P. Evrim (2017), “Şirket yönetim kurulundaki kadın üyelerin firma performansına etkisi”, *İşletme Fakültesi Dergisi*, 18(1): 29-45.
- Tobin, James (1958), “Estimation of relationships for limited dependent variables”, *Econometrica*, 26(1): 24-36.
- TUYID (2020), *Borsa Trendleri Raporu Ocak-Aralık 2020*. Report, Central Registry Agency-Investor Relations Association, Turkey, <https://www.mkk.com.tr/sites/default/files/2021-12/Borsa-Trendleri-Raporu-Ocak-Aral%C4%B1k-2020.pdf> (10.11.2021).
- Topçu, Gölçe and Arslantaş, C. Cüneyt (2018), “Grup 1, Grup 2 ve Grup 3 şirketleri yönetim kurullarında görev yapan kadın üyelere yönelik bir araştırma”, *İstanbul Üniversitesi İşletme Fakültesi İşletme İktisadi Enstitüsü Yönetim Dergisi*, 27(81): 82-135.
- Yurt, Nihan (2020), “Borsa İstanbul’da işlem gören firmaların yönetim kurullarındaki kadın üye varlığı ile firma kârlılığı arasındaki ilişkinin incelenmesi”, *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 29(1): 163-177.

THE EVOLUTION OF SOCIAL MEDIA AND TECHNOLOGY USE POLICIES: A FRAMEWORK FOR EVALUATING ONLINE ERGONOMIC AND HUMAN FACTORS ENGINEERING POLICIES

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ABSTRACT

This paper is a literature review on evolving so called “Ergonomics” and/or “Human Factors Engineering” (E/HFE) in the workplace as it relates to online policies and practices. Typically, these online E/HFE policies and practices include but are not limited to Social Media, Phishing, Telework, Dark Web and AI hiring algorithms. Many of these policies were created piecemeal in order to address a problem or trend that arose at a certain time. Increases in people and organizations using and relying on networked technologies has also accelerated the types of employer issues related to their use. The novel COVID 19 virus is a perfect example of how exogenous shock changed and accelerated Telework. Applications such as TikTok (which is banned in several countries) create potential security and privacy concerns firms should address.

The contribution from this paper to the literature is a strategic process framework for organizations to use to identify key changes to laws and technologies to determine if they require updating to the existing the E/HFE policies and practices mentioned above. Finally, suggestions are made to consider consolidating some of these ad hoc policies into a master E/HFE policy and expanding its scope beyond what is found in typical templates which are readily available. The goal is to better coordinate and manage what it means to be a networked employee and networked employer consistent with where technology and globalization have evolved and will continue to change.

INTRODUCTION

If you don't have a social media policy, you need to create one. If you already have one, kudos, and you mostly likely need to update it. Social media policies protect both the organization and its employees by defining what behavior is acceptable online. So why do you need to update it? Three reasons. First, because social media is used for business which means the Federal Trade Commission (FTC) has passed laws that impact what brand employees are allowed to do with respect to other brands online. Second, because brands have tried to control employee use of social media which has, in some instances, led to employees being disciplined. This, in turn, has made the National Labor Relations Board (NLRB) scrutinize what is fair and proper conduct by employers with regard to social media policies. And the jurisprudence of what

is fair and proper conduct varies from country to country. Third, because the social media landscape changes rapidly. As new technologies, and usage scenarios emerge, regulatory agencies change laws, and brands need to revise their policies to make sure they are effective, and legal. (Carver, 2015)

While Carver's statements alone should get any Human Resources or Regulatory Compliance Departments attention this only addresses domestic issues and does not consider international issues and the expanded use of technology in the workplace in a post COVID world. If your company has employees in other countries and you don't have a *legal* policy for these countries, you may be violating these employees' privacy rights.

Also as stated above as new technologies, and usage scenarios emerge these technologies need to be included in your policy, and in many cases defunct or obsolete ones should be removed. Does your company have operations in China? If so are the following social media platforms in your policy QQ, WeChat, Baidu Tieba, or Sina Weibo? TikTok is still legal in the USA. Are your employees using it on a company phone? This could be a security problem even if it is legal. Government policies directed to specific social media platforms (TikTok) or infrastructure technologies (5G in the case of HUAWEI) usually relate to so called "technonationalism" in the name of national security. Outside China how about Rakuten Viber available in 30 languages, Taringa in Latin America (losing market share of late) or VK in Russia?

Orkut closed in September of 2014, Path stopped operations in September of 2018, and Google+ closed in April of 2019. Social media platforms come and go and so does what employees do on them. In addition to domestic USA laws changing with the NLRB or FTC, international privacy laws vary from country to country and must be considered in any comprehensive policy, particularly if your firm has made any recent international acquisitions.

Do you allow your employees to use the dark web with your equipment or infrastructure? Do you have employee training for Phishing? If your employees do detect phishing is there a clear escalation process? Do you even have a Telework Policy and if so, what is in it? Do you allow Alexa in offices? She may be listening. Are you using AI for hiring or promoting existing employees? These are all Human Factors Engineering issues that organizations should consider as a whole. They all have a common link which is the internet (network) and people. Traditional social media platforms such as Facebook, Instagram and Twitter are still important but the lines are blurring on how people use the internet. Whatever the technology of the day is, certainly it is a social behavior guiding the motivation to use it, whether for business or pleasure. Organizations need to stay on top of this social behavior for their protection. They also need to do so to enhance productivity, innovation, employee satisfaction, and to reduce risks and costs.

This paper is a literature review on the constantly evolving networked technology and E/HFE policy environment in the workplace, and the types of issues that impact it which have developed in recent years. In most cases it is imperative for a company to have a social media policy. In many cases once it is done the company does not refresh it often enough or keep up with new domestic laws, the international landscape and different ways employees are using social media technologies. The contribution from this paper to the literature is a framework for firms to use to identify and research key changes to laws and technologies and determine if they

require updating the existing policy. It also suggests consolidation of other ad-hoc E/HFE policies (if they exist and they should) into a master technology policy which ideally will be updated periodically. It does not consider how to disseminate the elements of the policy. This will be considered in future research.

METHODS

The literature will be searched on Google, Google Scholar, Sage and other academic portals. The criterion for searching will be the following phrases.

“Ergonomics”
“Human Engineering”
“Human Factors Engineering”
“International Data Privacy Laws”
“Social Media Policy”
“Phishing Policy”
“Dark Web Policy”
“Teleworking Policy”
“Telecommuting Policy”
“Saas Security Blind Spots”
“IoT”
“IoT Policy”
“AI Hiring Discrimination”
“AI Hiring Ethic Bias”
“Employee Participation in Social Media Policy”

LITERATIVE REVIEW

The world is changing in rapid, unprecedented ways, but one thing remains certain: as businesses look to embed lessons learned in recent months and to build enterprise resilience for the future, they are due for even more transformation. As such, most organizations are voraciously evaluating existing and future technologies to see if they'll be able to deliver the innovation at scale that they'll need to survive and thrive. However, technology should not be central to these transformation efforts; people should. (Bianzino & Higgins, 2020)

This quote from a recent publication from top executive at Ernst and Young sets the tone and context for this paper in a post COVID world.

HUMAN ENGINEERING FOR NETWORKED EMPLOYEES AND EMPLOYERS

In case you are not familiar with so called ergonomics and human factors engineering (E/HFE) James Intriligator's of Tuft's University succinctly summarizes the evolution of Human Factors Engineering (HFE).

In the Human Factors 1.0 framework, one standard technique or method was behavioral task analysis (BTA). To do a BTA the practitioner would look at a complex task (e.g. performing maintenance on a washing machine) and would analyze all the steps/tasks involved — breaking

everything down to a fine-grained level that could inform the question at hand. A BTA could be used to help create training programs, identify opportunities for improvement, and a wide range of other design goals. The cognitive revolution spurred the mutation of BTA into cognitive task analysis (CTA). No longer were the practitioners of Human Factors 2.0 satisfied with a behavioral task analysis — now they began to map-out the cognitive aspects of task performance. Such cognitive task analysis could uncover a whole new class of cognitive design constraints: decision points, dependencies, categorizations, and information needs. Both BTA and CTA are essential tools in the HFE toolkit. As we move into Human Factors 3.0, I here introduce the method of Emotional Task Analysis (ETA). When designing a system, Human Factors 3.0 practitioners must perform: a behavioral task analysis (to understand physical limitations), a cognitive task analysis (to understand cognitive limitations), and an emotional task analysis (to understand emotional limitations/aspirations). It's not rocket science: it is just another way of thinking about any compound task.

To perform an emotional task analysis, you break down the task into steps (as small as required) and then you identify any emotions that might be evoked during (or before/after) each step. For example, for a software app to onboard a new user, there will be several steps where the user might feel uncertain, or confused, or untrusting, or happily surprised. Once these emotions are understood (and explicitly mapped) the designer can then begin to design around them. (Intriligator, 2020)

Intriligator illustrates the core issue so clearly. Articulated in practical terms, you have employees and managers in different generational cohorts (Gen X, Gen Y, Millennials, Gen Z, Baby Boomers) and those from diverse ethnic backgrounds. They all perceive and actually do think and also “*feel*” differently. That being said technology and particularly “being a user of technology” is such an integral part of the aforesaid demographic groups psyche. The older cohorts know they need to use technology to survive well, but for many it is not something they “*feel*” they need all the time. After all the baby boomer's childhood socialization could have been before the PC, and Gen X before the mobile phone. Also the younger cohorts born after the mobile phone cannot comprehend what I call an analog or not connected society. People from diverse ethnic backgrounds share the generational cohort perspective, however they have the additional issue of AI hiring and promotion decisions being against them by structural bias in the algorithms used for selection of candidates.

This literature review paper tries to shed light on how to adapt to generational cohort differences, international, cultural and legal differences from a strategic management process standpoint. Most importantly, it posits a framework to help companies to keep their organization of employees from different social/technological/generational/cultural socialization working in a functional, risk adverse and productive mode.

Although social media engagement is an explicit aspect of some employees' job responsibilities, most organizations will find that — whether intentional or not — a larger swath of employees represent their brands online. With no more than a quick Google or LinkedIn search, employees can be traced back to your organization, and employees' shared content and personal views have the potential to reflect poorly on your brand when in conflict with your organization's core values and principles. (Small, 2018)

Based on Small's observations it is clear that in a networked world tied together with social media and so called "big data", that every employee is at least indirectly a brand advocate. The question is as follows. Do your employees realize they are brand advocates? A historical incident that comes to my mind is when world famous Olympic swimmer Michael Phelps friend posted pictures of him smoking pot on social media.

The Olympic swimming sensation Michael Phelps, who was photographed inhaling from a marijuana pipe, has lost a major sponsorship deal and has been suspended from competition for three months.... As it stands, Phelps's actions have put a dent into his sponsorship spoils, which some marketing experts say could reach \$100 million in his lifetime. (Macur, 2009)

The implications of poor social media use by employees (which are essentially have agency of the company in which they work) should be obvious from Small's statement's and Michael Phelps's experience. Can your firm minimize brand and/or public relations risk by human factors engineering?

One common problem on social media web sites is over-sharing whereby people disclose too much information which in the long run might have unintended consequences. With social media people are now sharing information about their exact location, but sharing location-based information just means there is another layer of personal information exposed which may not always be really necessary. If you allow messages between different social networks, what you intended to be private can become public. (Tayouri, 2015)

Tayouri makes a great point related to oversharing. The truth is that the sharing or "oversharing" of data is not transparent or obvious to the average social media user. Few people really read click through contracts. According to Pew Research *about one-in-five Americans say they always or often read privacy policies before agreeing to them and even less when one accounts for how many read them all the way through at a low 22%.* (Pew, 2019). Even, if you did read them you still would not know where your information is being shared. Pew goes on to state that, *"67% of the people they interviewed in 2019 feel that companies use users' personal data in ways they are either not too or not at all comfortable with."* (Pew, 2019)

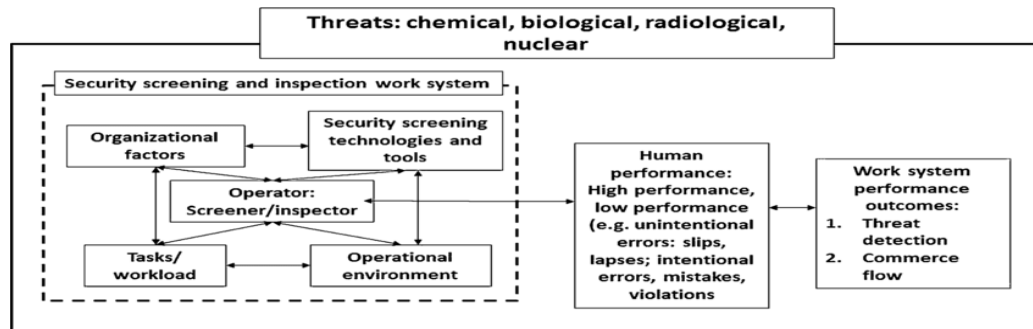
This means your employees could be disseminating information that is intended to be private but becomes public. The internet and the platforms employees are using on it are far too complex to eliminate sharing risk, however human factors engineering offers promise to minimize risk if properly implemented.

It is no longer appropriate to consider the person and the technology/system as two separate elements, with inputs and outputs between them; instead it can be more fruitful to consider how people work in partnership with technology as a 'joint cognitive system' (this approach also has synergies with concepts of distributed cognition (Hutchins, 1995) and concepts such as computational offloading (Scaife & Rogers, 1996). (Wilson & Sharples, 2015)

Clearly the study of E/HFE is well established. The challenge is the acceleration of the use of technology and the inherent complexities can be overwhelming for most people. As a species we usually adapt to change but it takes time. In many disciplines outside technology such as sports or music it is often the case that counterintuitive techniques work better. E/HFE properly implemented holds promise in facilitating adaptation in a constructive way.

Macro-ergonomic theoretical/conceptual frameworks have been known in the literature for some time (Kraemer et al. 2009) (Saikayasit et al. 2013). Frameworks in security and complex systems as opposed to production best suit human use of newer online technology in the workplace. An example of a macro-ergonomic framework is shown Diagram 1 below.

Diagram 1 - Macro-ergonomic Conceptual Framework for SSI Systems



Saikayasit R., Stedmon A., Lawson G. (2013, October).

This conceptual/theoretical framework applies to security both in counter terrorism and complex systems such as power facilities. It highlights the challenges, risks and macro-ergonomic tasks environments these types of organizations face. It is clear with the proliferation of technology firms, and employees use today, there is much generalized applicability to organizations for models such as these, whose employees are operating in the technological and geopolitical world facing many of the issues outlined below. Therefore, it would be beneficial that an applied framework would follow to help firms assess organizations strengths, weaknesses and exposures to the macro-ergonomic realities of today's world.

INTERNATIONAL PRIVACY LAWS

Privacy is a tricky subject in today's digital world for many reasons. These reasons include but are not limited to different generational cohort's willingness or lack thereof to acquiesce privacy for access to information, but also and more importantly international legal interpretations of privacy. This section will focus on the latter. Below is a recent example of international laws which impact different countries interpretation of privacy as it relates to online activity. The point is that the interpretation of data privacy on a global basis is dynamic, evolving and not necessarily consistent with North American standards.

The EU's General Data Protection Regulation (GDPR) has created a domino effect across the world as its biggest trade partners rushed to align their existing data protection legislations to its strict requirements or passed new laws based on its example, in hopes of ensuring business operations with tEuropean block will continue to run smoothly. The push for legislation came in the aftermath of a number of high profile data breaches that brought data privacy into the limelight. In Latin America, most countries enacted data protection laws prior to the emergence of the GDPR and were generally tailored after its predecessor, the European

Data Protection Directive of 1995. This means that, much like the Directive itself, they no longer address present day data protection concerns and must be updated both for the sake of Latin American data subjects and the facilitation of cross-border data transfers to and from the EU. (Coos, 2019)

As you can see in the following passage the EU has a more pro individual then the USA in terms of personal privacy whether or not the person is an employee of a company or an individual actor. This argument is further reinforced in the following passage.

The protection of natural persons in relation to the processing of personal data is a fundamental right. Article 8(1) of the Charter of Fundamental Rights of the European Union (the 'Charter') and Article 16(1) of the Treaty on the Functioning of the European Union (TFEU) provide that everyone has the right to the protection of personal data concerning him or her. (GDPR, 2020)

The principles of, and rules on the protection of natural persons with regard to the processing of their personal data should, whatever their nationality or residence, respect their fundamental rights and freedoms, in particular their right to the protection of personal data. This Regulation is intended to contribute to the accomplishment of an area of freedom, security and justice and of an economic union, to economic and social progress, to the strengthening and the convergence of the economies within the internal market, and to the well-being of natural persons. (GDPR, 2020)

Therefore, multi-national companies (MNC's) and multi-national enterprises (MNE's) however you define them, need to make sure their policies relating to Social Media usage and other online activities are consistent with the laws of the counties where some of their employees may reside. If your organization has recently acquired companies or employees in another country, it is important to keep your policies up to date and legal with respect to the new country you operate.

SOCIAL MEDIA POLICY

Per Carvers statements in the introduction of this paper you need a social media policy. A basic template for a SM policy is easily obtainable online from a variety of sources such as The Society for Human Resource Managers (SHRM). The real issue is not having the policy, but what is in it and how, and where, you implement it. Also it is prudent to ask whether your firms SM policy is really enough?

Whether a workforce is unionized or not, many employers use social media policies to curb co-worker conflicts, prevent reputational damage to the company, protect proprietary information and ensure that employee comments are not mistaken for official company statements. But policies that are too broad or too restrictive might interfere with workers' right to complain about their employer and discuss their terms and conditions of employment with each other.

The NLRB general counsel's office added to the growing body of guidance employers can use to craft legally sound social media policies with a recent advice memo on a national pharmacy chain's policy.

The general counsel's office and administrative law judges have weighed in on individual companies' rules for workers' social media use, providing direction before the National Labor Relations Board hands down a decision creating a precedential road map.

CVS Health's rule restricting workers from disclosing "employee information" on their social media accounts violates federal labor law, the GC's office said in an advice memo made public this month. But the company could legally forbid workers from posting more specifically defined "personal information," the memo said.

A prior NLRB standard placed limits on employer handbook policies that could be "reasonably construed" by workers to limit their right to engage in protected concerted activity. Many policies—such as confidentiality, civility and social media policies—that weren't meant to limit employees' rights under Section 7 were still deemed unlawful even if an employer had a legitimate justification for the rule.

In December 2017, however, the NLRB replaced the "reasonably construe" standard with a new balancing test that considers the following factors with regard to a "facially neutral" handbook policy (i.e., a policy that is not worded to intentionally interfere with workers' Section 7 rights): (Society for Human Resource Managers [SHRM], 2021)

A social media policy is important and can be frustrating. The reasons why it can be frustrating are as follows. The first is obtaining employee buy-in. If you don't have that then your organization is potentially already in trouble. The second issue is legality. Is the policy legal in the jurisdictions where your firm wants it to apply? The next challenge is whether your policy current? What is meant by being current is does it cover relevant technological and human factor changes? They are happening fast. Finally, and most importantly is the policy disseminated properly? Otherwise it is just another aforementioned click-thru contract? This may be the hardest issue of all.

WHALING, PHISHING SPAM AND MALWARE

Most of you probably have heard the term phishing before, but what about whaling? Whaling can be more damaging to a firm than phishing. This is because whaling is specifically aimed at high level employees in the C-Level also known as whales. The criminals who orchestrate attacks on top executives are called whalers.

Whaling is a highly targeted phishing attack - aimed at senior executives - masquerading as a legitimate email. Whaling is digitally enabled fraud through social engineering, designed to encourage victims to perform a secondary action, such as initiating a wire transfer of funds.

Whaling does not require extensive technical knowledge yet can deliver huge returns. As such, it is one of the biggest risks facing businesses. Financial institutions and payment services are the most targeted organisations, however cloud storage and file hosting sites, online services and e-commerce sites are receiving a larger share of attacks.

Whaling emails are more sophisticated than generic phishing emails as they often target chief ('c-level') executives and usually: contain personalised information about the targeted organisation or individual and convey a sense of urgency and are crafted with a solid understanding of business language and tone. (NCSC UK, 2016)

So every responsible organization is doing something to minimize the security risk from phishing but what about the whales? This is clearly a delicate subject as whales typically have high self-esteem and may think they are above being taken advantage of however the data shows a different picture. It is also not that easy to protect the whales because it is clearly an E/HFE challenge.

On 10 September 2019, the FBI updated these numbers of business email compromise (BEC) scams showing total reported incidents of 166,349 and exposed dollar losses of \$26.2 billion USD from October 2013 to July 2019. Given these losses, it is surprising that security firms, especially those that specialize in protecting high-value targets, have not done more to secure their whales. Perhaps the reason is that it's not all that clear how they can protect whales from whaling attacks. (Pienta et al., 2020)

It could be reasonably concluded from the statement and others made by Pienta et al. in the Journal of Information Technology that whaling problem cannot be handled by technology alone, and therefore should fall into the area of E/HFE. All the authors of this excellent publication are prominent and from technology disciplines. In this recent piece of research as technological as this group is, they suggest non-technical solutions. This should be very interesting to the C-suite and top ranking HR executives.

Phishing is a type of attack carried out to steal usernames, passwords, credit card information, Social Security numbers, and/or other sensitive data. Phishing is most often seen in the form of malicious emails pretending to be from credible sources like people, departments, or organizations related to the university. Attackers can use this information to: Steal money from victims (modify direct deposit information, drain bank accounts). Perform identity theft (run up charges on credit cards, open new accounts and send spam from compromised email accounts).

Attackers can also use your public information and relationship with the spoofed "sender" to get you to: Purchase gift cards, connect to an insecure site (http://) or get you to click on a malicious link and install malware on your device.

1. *Protect yourself by reviewing our Phish Tank to see if this is a known malicious email.*
2. *Learn ways to identify phish with our "Fight the Phish" educational materials and*
3. *If you think you've received a phish, report it!*

(UC Berkeley Information Security Office, 2021)

For purposes of this paper and the ultimate E/HFE process it is posited that the reader focus on items 2 and 3. Item 2 is education. Firms must consider doing a better job of educating their employees (and whales) on the identification of phishing/whaling activity. It should be different for whales because they have more key data that can be lost. The education should be more engaged than just posting materials. Online tests are good and they are starting to gain traction. Probably even more neglected is item 3 which means in this authors opinion, is to develop and communicate a proper reporting protocol and enable training on the protocol. Additionally, having the company authorities in charge whether IT or HR communicate back to the employees the acknowledgment of the threat and the actions being taken. This plays into the

concept of developing an organizational culture with employee buy-in and reinforcement of good performance.

DARK WEB (AKA DSWN)

Though it constitutes a relatively new criminal economy, cybercrime is already generating at least \$1.5 trillion in revenues every year, according to my research. This is a conservative estimate, based only data drawn from only five of the highest profile, most lucrative varieties of revenue-generating cybercrimes. See Diagram 2 below.

Diagram 2

Crime	Annual Revenues*
Illicit, illegal online markets	\$860 billion
Trade secret, IP theft	\$500 billion
Data trading**	\$160 billion
Crimeware, CaaS (Cybercrime-as-a-Service)	\$1.6 billion
Ransomware***	\$1 billion
*totals are approximate **Revenues derived from trading in stolen data, such as: credit and debit card information banking log-in details, loyalty schemes and so on ***Revenues derived from extortions based on encrypting data and demanding payments	

(McGuire, 2018)

Dr. McGuire whom has a prolific career outside the University of Surrey as a consultant and guest speaker on cybercrime and author of the *Into the Web of Profit* series goes on to specifically name the DWSN as a threat.

We use social media for many reasons. Keeping up with our friends, finding out the latest news or posting photos and videos. But in the latest chapter of Into the Web of Profit, I discovered a whole new aspect of social media that's hidden in plain sight. Cybercriminals, just like businesses, are using social media platforms to promote and sell their tools and services. Simply going on Instagram, Twitter or Facebook and conducting a few searches led me deep into the rabbit hole of the cybercrime world. I was shocked to see the extent to which social media is being exploited by cybercriminals, not just as a tool to spread malware, but as a shopping destination for their expertise and their products. (McGuire, 2019)

You may have cybercriminals or their clients on your payroll using your company assets to go on the dark web. Although this is not likely, it can happen. You also may have top executives looking for a competitive edge using the dark web for a specific goal on a one-time basis on or off your firm's assets. Although the odds are not high for these situations, when your firm finds out if it is happening it is probably too late. As unlikely as these scenarios are, they could have major implications to your firm. The implications could range from a minor PR

embarrassment such as line level dark web employee being caught doing something unethical, to a strategic loss of confidence in your firm due to executive misbehavior using the dark web. Although the dark web is anonymous there are plenty of law enforcement (sting) operations using the DWSN to catch bad actors. Therefore, it is prudent for companies to have clearly stated policies for both legal and PR reasons should some impropriety occur at any level.

The DWSN offers another channel for actors that may want to emulate WikiLeaks founder Julian Assange or Ed Snowden or possibly former GM executive John Delorean. Assuage is famous for releasing confidential government information before the existence of the DWSN. Ed Snowden is another example of a subject of controversy, Snowden has been variously called a traitor, a hero, a whistleblower, and a dissident. Regardless of what you feel he certainly leaked sensitive information about the United States. Delorean is an example of a popular and corrupt executive although never convicted, potentially doing illegal activity for the benefit of his company DMC after leaving GM. Although these are not DWSN examples in the “pure sense”, as they predate the DWSN, these incidents demonstrate the damage improper use of a privileged position can have on any organization. It should be easy to see how the DWSN could be a great channel for the dissemination of confidential organizational information or misuse in other ways by a ranking executive.

I see the DWSN as an experiment with power and freedom through anonymity and infrastructure, an experiment of going beyond historically imposed limits. In terms of social networking, the anonymous elements of the DWSN are a far cry from what we now would recognize as mainstream social media, which involves real-world identities increasingly linked to consumer preferences and no political control. (Gehl, 2016)

Gehl makes some provocative assertions related to freedom and anonymity. So the question any organization has to contemplate is what are the privacy rights for employees (particularly in their jurisdiction)? The DWSN creates a real challenge for companies because the DWSN it is designed to protect the privacy of the user however; these users may have “agency” or at least some level of “fiduciary responsibility” as an employee of the company. This issue is a conundrum not to be solved in this paper but it is a real issue to be managed both legally and organizationally as far as a culture.

The above reference demonstrates just how strong the anonymity of the dark web really is and how it differs from traditional social media. Although there can be legitimate uses for this platform which include but are not limited to intelligence work, law enforcement, security and defense there is really almost no justification for employees of most for profit or not for profit firm using the dark web. Firms that do not do intelligence work should address this issue and include it in their social media E/HFE policy.

The default encrypted connections used by some major social media and content hosting platforms [has effectively downgraded the filtering tools](#) used by nation-states, that traditionally relied on URL analysis to intercept unwanted connections. In these cases, nation-state authorities can no longer selectively block individual accounts, web pages, and stories. Governments are interested in blocking individual users perceived to be “problematic”. (Khiristal, 2020)

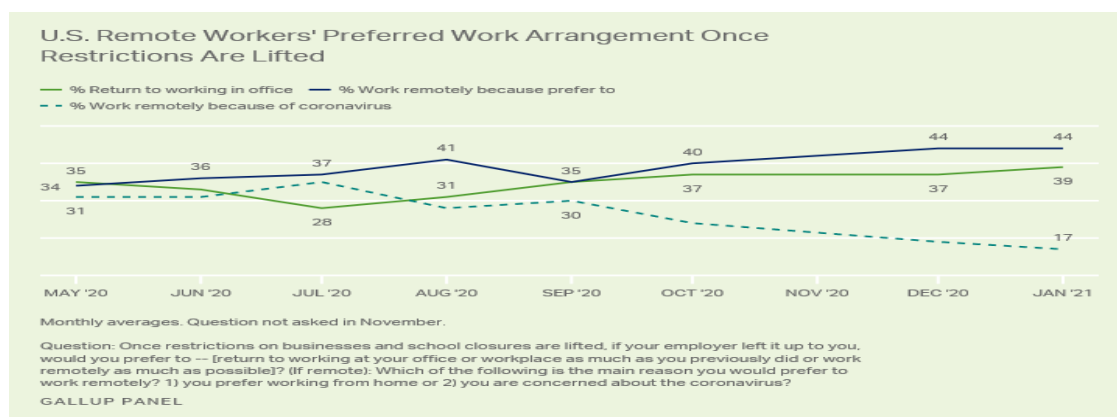
If governments with focused resources dedicated to filtering and blocking access of problematic sites or content cannot stop people from access anymore can your firm? Probably not, however you can take precautions related to employee use of and possible attacks by the DWSN with a myriad of monitoring services and a policy in place. Cooper provides a present day example of the 10 Best Dark Web Monitoring Tools for Network Admins. (Cooper, 2020)

Whatever services you select they should be administered by the IT department. However, policy and HR should be influenced by Human Resources and Executive Management. You can also include in any policy rules for employees whom use the DWSN on their own assets for nefarious goals. These measures can help should a PR issue arise related to DWSN activity from an employee.

TELEWORKING

Working remotely is the future of work at least if you ask the employees. Additionally, the employer can save money on office space in a more work at home environment. The Diagram 3 below demonstrates a strong percentage of employees prefer working at home.

Diagram 3 – US Remote Workers' Preferred Work Arrangement After Restrictions



(Gallup, 2021)

The benefits of telecommuting can be provocative for employers as well as employees as reported by the Society of Human Resource Managers (SHRM).

95 percent of employers say telework has a high impact on employee retention.

46 percent of organizations that permit telework say it reduces attrition.

37 percent of 1,500 technology professionals said they would take a pay cut of 10 percent to telecommute.

Teleworkers typically return to work faster following medical issues or surgery.

Compaq, American Express and other companies have said that telecommuting employees are more productive than their in-office counterparts. (Wright, 2015)

However, without a solid telecommuting policy what seems like a good thing can become problematic.

Without a telecommuting policy, though, companies can flounder. Working from anywhere, whether at an office or at home, provides room for distraction. By spelling out your work-from-home policy, you can define exactly what's expected of employees. (D'Angelo, 2020)

Teleworking as a workplace norm was on the rise before COVID, albeit at a relatively slower rate. The main drivers were office space costs, travel efficiencies and millennial technology predispositions. However, COVID-19 acted as a catalyst to accelerate this trend by many years for apriori reasons. The velocity of change and the need of most firms to “just survive” during the pandemic caused a situation where companies now had a high percentage of their staff teleworking with no clear or at least well thought out telework policy. Just like other E/HFE policies there are certain tools and best practices which should be articulated for success.

Areas for consideration include video conference decorum and monitoring tools for time management and productivity. Being a professor during COVID I have seen a student on a zoom from their smartphone go the toilet and forget they are on video. I have also seen others with signs in the background that show profane words. Even working professionals have been known to push the boundaries in terms of what they wear on camera in a professional call. It is important to remember some of these video sessions may be recorded.

Besides laying the groundwork for telecommuting decorum, productivity in a remote or at home work situation is an issue to be addressed.

Make sure you're using productivity applications and software that give you an at-a-glance view of your whole team. Nail down where your team is succeeding and where productivity could be increased. Determining the success of your telecommuting policy means thinking critically about all areas of your business's productivity.

Another way to determine the success of your policy is to regularly check in with your team and assess how the policy is being received. Oftentimes, remote employees can feel isolated from the rest of the company. Engage with these workers and managers. Ask questions about the policy and productivity. These are all ways to start assessing your telecommuting policy and determine whether it needs to be adjusted. (D'Angelo, 2020)

In addition to basic video etiquette and productivity the above citation demonstrates how employee buy-in and governance are fundamental considerations in any E/HFE policy. They will also vary to the nature of the work, possibly employee level, and degree of isolation. This subject will be addressed later in the paper.

THE INTERNET OF THINGS (IOT)

Managing and controlling a high dynamic ad hoc IoT things/devices network is a tough task with the traditional networks architecture, Software Defined Networking (SDN) provides the agile dynamic solution that can cope with the special requirements of the diversity of innovative IoT applications. (Sadek, 2018)

The above citation demonstrates that computer science community is keenly aware of the challenges of IoT to organizations. The next citation, although addressing the automation aspect of the IoT, also mentions user inputs. This is where E/HFE comes in to play. This theme will be picked up further down in this section.

IoT systems are typically controlled by event-driven smart apps that take as input either sensed data, user inputs, or other external triggers (from the Internet) and command one or more actuators towards providing different forms of automation. (Nguyen et al, 2018)

So what is IoT as it applies to organizations in simple terms? Typical actuators firms utilize are smart locks and smart power outlets. Many organizations use sensors such as contact sensors for door entry and motion detectors for security. Control platforms on which third-party developers can build apps that connect wirelessly with these devices include Apple's HomeKit, and Amazon's (familiar and innocent) Alexa. A problem specific to IoT systems is that buggy apps, unforeseen bad app interactions, or device/communication failures, can cause unsafe and dangerous physical states, e.g., "unlock the entrance door when no one is at the office". Possibly privacy as well. There have been many instances where Alexa has demonstrated she is listening to you in unintended ways.

AI AND HIRING DISCRIMINATION (BIAS)

Forms of automation such as artificial intelligence increasingly inform decisions about who gets hired, is arrested, or receives health care. Examples from around the world articulate that the technology can be used to exclude, control, or oppress people and reinforce historic systems of inequality that predate AI. (Johnson, 2021) One of the hottest topics of 2021 on E/HFE is ethnic hiring bias and discrimination by organizations using AI for candidate screening and selection. So much so that powerful organizations are speaking out about it and in many cases taking action to reduce and/or eventually eliminate this type of structural bias.

Examples include The Equal Employment Opportunity Commission which is a part of the federal government (EEOC)(Pedigo Hall, 2022) and The Society of Human Resource Managers (SHRM) (Lewis, 2018). Clearly there are risks using AI hiring algorithms, such as failing to comply with the looming watchdogs and regulators. There are also rewards for organizations that take the steps in AI hiring practices to minimize risks and maximize rewards. Brianna Lifshitz of Georgetown articulates the first steps well.

Just as AI offers advancements, there is also the potential for a bleak future – machines are prone to bias and racism. These machines learn by running training data through algorithms, each crafted by human handlers. Therefore, if the data inputted into the system is biased, the result will be biased too. This is dangerous and the threat needs to be addressed before biased AI systems become ubiquitous. Ultimately, AI systems have the potential to deepen existing systemic inequalities, particularly in industries like healthcare, employment, and criminal justice..... Bias in AI is a difficult problem to solve, but identifying it is an important step to eliminating discrimination. (Lifshitz, B, 2021)

In addition to warnings and initiatives by government industry professional groups such as SHRM and federal government agencies such as the EEOC regulation is in progress. This is demonstrated by New York City enacting new laws related to AI hiring. *With New York City's passage of one of the toughest U.S. laws regulating the use of artificial intelligence tools in the workplace, federal officials are signaling that they too want to scrutinize how that new*

technology is being used to sift through a growing job applicant pool without running afoul of civil rights laws and baking in discrimination. (Mulvaney, 2021)

In essence employers in New York City will be banned from using AI hiring tools to evaluate prospective employees until the AI hiring software has passed a discrimination audit conducted before the use of the tool. The law takes effect in 2023. Under the new law organizations are required to notify prospective employees if the tool was used to make job decisions. It may also be applied to promotion decisions. If there is a violation found a fine may be assessed up to \$1,500 per incident.

Standards are the answer and possibly the way to avoid over regulation or at least make regulation more consistent. Alex Engler of the Brookings Institute suggests this in his piece on algorithmic hiring audits.

Algorithmic hiring systems are proliferating, and while some present opportunities to reduce systemic biases, others create new modes of discrimination. Broadly, the use of algorithms can enable fairer employment processes, but this is not guaranteed to be the case without meaningful standards. Algorithmic audits have been proposed as one such way to ensure those standards, and early examples of audits of algorithmic hiring systems have been released to the public. (Engler, 2021)

There is hope for improvement in AI hiring discrimination. Is your organization aware of the pitfalls and potential liabilities of using AI to hire new employees? You will use AI hiring in the future as it saves time and money. Will your firm discriminate unknowingly? An example of an strong organization attempting to make AI hiring fair is the Data & Trust Alliance. The Data & Trust Alliance brings together leading businesses and institutions across multiple industries to learn, develop, and adopt responsible data and AI practices. Established in September 2020, it was founded as a not-for-profit consortium. It is made up of CEO's and other top executives from companies such as American Express, IBM and General Catalyst to name a few. The following New York Times article showcases some of the organizations partnering with the Data & Trust Alliance.

Artificial intelligence software is increasingly used by human resources departments to screen résumés, conduct video interviews and assess a job seeker's mental agility. Now, some of the largest corporations in America are joining an effort to prevent that technology from delivering biased results that could perpetuate or even worsen past discrimination. The Data & Trust Alliance, announced on Wednesday, has signed up major employers across a variety of industries, including CVS Health, Deloitte, General Motors, Humana, IBM, Mastercard, Meta (Facebook's parent company), Nike and Walmart. The corporate group is not a lobbying organization or a think tank. Instead, it has developed an evaluation and scoring system for artificial intelligence software. (Lorh, 2021)

In conclusion as far as E/HFE is concerned there are two important takeaways for AI and hiring. Firstly, executives must ensure their AI hiring is compliant with existing and emerging laws and standards. Secondly, the organization must have proper training for AI hiring data inputs or properly select firms that are compliant if this function is outsourced. Although not within the scope of this paper is also prudent to have proper non technology diversity training and best practices in place. Sources are readily available online.

EMPLOYEES PROVIDING FEEDBACK ABOUT POLICY

If your organization has done everything right related to the policy considerations stated above there is one large remaining challenge. This challenge is employee buy-in and adoption into your firms' culture. If this is not accomplished the policies amount to the aforesaid click-thru contracts referenced earlier in this study. In other words, ineffective. However, this problem has been dealt with by numerous forward thinking company's. Please find below some comments from Forbes Expert Panel of their Human Resources Council.

1. Encourage and Support the Right Behaviors - Most policies go unread, not paid attention to and often unenforced. Focus efforts on engaging your employees in the right behaviors. Make them ambassadors and get them involved. Create company hashtags, content for them to share and a positive social media training program that provides tips on how to improve their own social brand as well as covering required company do's and don'ts. - Bianca McCann, Trifacta Inc.

2. Extend Your Business Code of Conduct - Your business code of conduct should already communicate to employees that they need to protect confidential information and not respond to inquiries from press or analysts without express permission. Employee communications via social media should additionally make it clear that the person works for your organization and that the information he or she shares is his or her own opinion. - Joyce Maroney, Kronos Incorporated

3. Beware of Personal Freedom Rights - Social media is an ever-growing platform that leaves HR leaders in a tough spot. When crafting a social media policy, beware of how much personal freedom you take away from employees, especially when using their personal accounts. Organizations should give guidelines on how to represent the company in a positive light, but don't set so many rules that you impede on their freedom of speech. - Tiffany Jensen, Pure Grips.

4. Consult with a Lawyer to Ensure Compliance - Companies should enlist the help of an employment attorney to carefully define their social media policy, as relying on an overly broad policy may offer limited protection to both employers and employees. Also, companies should provide comprehensive training for brand ambassadors to ensure they are familiar with the social media policy and accurately represent the employer brand online. - John Feldmann, Insperity

5. Clarify Everyone's Roles - Remind employees that they are brand ambassadors. If you want them to interact with company content by sharing and commenting, let them know so they aren't worried about using company time to do it. Also, identify the one person at your company who is responsible for handling or responding to negative comments or controversial topics, encouraging other employees to alert this person when needed. - Michele Markey, SkillPath

6. Add to Your Existing Policies - Social media use can be a double-edged sword, so I'd suggest a policy that adds to standard work and internet use rules already in place. The policy should provide general guidelines of acceptable behaviors to manage expectations, and leaders should reserve taking action only for at-work offenses or when an employee's behavior places the company at legal risk. Overall, consistency in enforcement is key. - Dr. Timothy J. Giardino,

Cantata Health & Meta Healthcare IT Solutions - (Forbes Human Resources Council, Expert Panel, 2019)

This author suggests a program launch with company-wide training, and ongoing educational programs such as online phishing exams. Additionally, rank and file employees should be nominated to a council to oversee the evolution of the policies and weight in on violations by peers. This of course should be in partnership with executive management, IT or HR depending on the dimension of the policies requiring action.

ANALYSIS

In this section an applied framework titled Technology Ergonomics Review Framework (TERF) is presented as a distillation of the literature review provided in this study as a unique contribution to the literature. TERF owes its genesis to known Macro-ergonomic conceptual frameworks such as Figure 1 which calls for security screening and inspection of the functioning of organizational factors and the operational environment. Organizational factors may include the types of policies in place and the nature of the employees work. The operational environment may include work at home or employees working abroad. Inspection may include system/tools monitoring. Effective management of these types of elements theoretically lead to human performance, reducing errors, slips and or violations of company policy. Improvement in human performance theoretically leads to work system performance in terms of detections of threats and improved commerce flow.

TERF therefore should be viewed as an applied roadmap or checklist of all the network related E/HFE challenges from a non-IT perspective at the date of this writing. It is intended to be dynamic as newer technologies and human behaviors will emerge.

	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations	Executive	Human Resources	Information Technology	Employee Relations
Human Factors Engineering Process Matrix																												
Human Factors Engineering Key Performance Indicators (KPIs)					Whaling, Phishing Spam & Malware Policy				Dark Web Policy				Teleworking Policy				The Internet of Things (IoT) Policy				AI Hiring Compliance and Policy							
	Social Media Policy																											
Latest Policy Refresh	X	X			X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X					
Additional Non USA Citizen Employees Since Last Policy Refresh		X		X		X		X			X	X		X		X		X	X	X			X	X	X			
NLRB, EEOC and International Privacy Law Updates Since Last Policy Refresh		X												X									X					
Specific SM Platform Risk and Refresh Assessment	X	X					X							X														
PSM Escalation Protocol Established					X	X	X	X																				
WPSM Training Interval(s) Established					X	X	X	X																				
% of employees trained and tested on WPSM					X		X																					
DWSN Policy Defined									X	X	X	X																
.onion security scanning implemented/refreshed											X																	
Telework platform defined and consistent among all employees					X	X	X	X																				
Telework policy implemented						X		X																				
% of employees trained and tested on Telework Policy							X																					
The Internet of Things (IoT) Policy Defined					X	X	X	X								X	X				X	X						
IoT Test																X					X							
Employee Representation / Governance Audit	X	X	X	X																								
AI Hiring Not Deployed																								X				
AI Hiring Currently Deployed																								X				
AI Hiring Compliance Audit																							X	X	X			
AI Hiring Diversity Training																X							X	X				

Future research stemming from this framework will include best practices for each area identified in the leftmost column, current templates for each area, and a checklist of what to look for in each area. Additionally, a natural extension of this framework is to collect primary data in the form of a survey from companies likely to utilize this type of information. The primary data collection would be focused on which KPI's would be most important to them. It would also ask the firms if any KPI's are missing. Finally, it would query them as to KPI's they already have policies in place.

The posited process constitutes a framework for firms to navigate the complexities of developing an organizational culture and best practices that embraces human interaction with online technology in a constructive manner. It also provides a method to audit organizational policies and practices for deficiencies so they can be improved. Firms can pick and choose what categories (e.g. Phishing or Telework) they feel are most important to their needs and address them as they see fit. The audit and policy implementation and/or refresh can be incremental or

comprehensive. This author suggests a comprehensive audit and incremental approach to implementation. Once these key areas are implemented and the areas of exposure are current, the remaining areas to be addressed can be expanded based on the decision maker's needs. Periodic reviews are suggested.

The framework is envisioned to be dynamic because technology is continually evolving. Future extensions of this study will include an analysis of existing policies in each category where accessible to determine best practices for organizations to follow.

The term "social media policy" is becoming less important but still necessary, because there are so many other technology issues to consider that go far beyond the scope of a social media policy. The key link is humans whom are social beings interacting with networks all the time. E/HFE is the idea that their social (personal) interaction with networked technologies is something that can and should be influenced by organizations at the macro level. Possibly social media policies should evolve to an "Employee Network Use and Responsibility Policy" or something along those lines as a better way to think of it.

REFERENCES

- Bianzino, N. & Higgins, D. (2020, November 12). *Why successful digital transformations start with the human enterprise*. Ernst & Young. https://www.ey.com/en_in/technology/why-successful-digital-transformations-start-with-the-human-enterprise
- Cooper, S. (2020). *10 Best Dark Web Monitoring Tools for Network Admins*. <https://www.comparitech.com/net-admin/best-dark-web-monitoring-tools/>
- Coos, A. (2019). *Data Protection Regulations in Latin America*. Endpoint Protector Blog. <https://www.endpointprotector.com/blog/data-protection-regulations-in-latin-america/#:~:text=In%20Latin%20America%2C%20most%20countries,Data%20Protection%20Directive%20of%201995.&text=The%20LGPD%20replaced%20over%2040,personal%20data%20privacy%20in%20Brazil>
- D'Angelo, M. (2020). *5 Work-From-Home Issues Your Telecommuting Policy Should Address*. <https://www.businessnewsdaily.com/7749-create-telecommuting-policy.html>
- Engler, A. (2021) *Auditing employment algorithms for discrimination*. Brookings Institute, <https://www.brookings.edu/research/auditing-employment-algorithms-for-discrimination/>
- GDPR. E. (2020). Is a resource for organizations and individuals researching the General Data Protection Regulation. <https://gdpr.eu/Recital-1-Data-protection-as-a-fundamental-right>, <https://gdpr.eu/Recital-2-Respect-of-the-fundamental-rights-and-freedoms>
- Gehl, R. (2019). *Power/freedom on the dark web: A digital ethnography of the Dark Web Social Network*. New Media & Society, Vol. 18(7) 1219-1235.
- Hutchins, E. (1995, July). *How a Cockpit Remembers its Speeds*. Cognitive Science Volume 19, Issue 3 Pages: 265-405, ii-vi.
- Intriligator, J. (2020, January 3). *The Future of Human Factors Engineering*. <https://sites.tufts.edu/humanfactors/2020/01/03/the-future-of-human-factors-engineering/>
- Johnson K. (2021, December 21), *A Move for 'Algorithmic Reparation' Calls for Racial Justice in AI*. Wired Magazine
- Lifshitz B. (2021), *Racism is Systemic in Artificial Intelligence Systems, Too*, Georgetown Security Studies Review, https://georgetownsecuritystudiesreview.org/2021/05/06/racism-is-systemic-in-artificial-intelligence-systems-too/#_edn38
- Lohr s. (2021) *Group Backed by Top Companies Moves to Combat A.I. Bias in Hiring*, The New York Times. <https://www.nytimes.com/2021/12/08/technology/data-trust-alliance-ai-hiring-bias.html>

- Khiristal, T. (2020, March 6). *Is the Dark Web Going Commercial? Internet Censorship May Be Driving the Trend*. Georgetown Public Policy Review.
- Kraemer S., Carayon P., Sanquist T. (2009) Human and organizational factors in security screening and inspection systems: conceptual framework and key research needs. *Cog Tech Work* 11:29–41 Georgetown Security Studies Review
- McCann, B., Maroney, J., Jensen, T., Feldman, J., Markey, M., & Giardino, T.J. (2019, May 20). *Forbes Human Resources Council, Expert Panel, Six Ways To Craft A Social Media Policy That Fosters Employee Participation*. <https://www.forbes.com/sites/forbeshumanresourcescouncil/2019/05/20/six-ways-to-craft-a-social-media-policy-that-fosters-employee-participation/?sh=732b08bf456d>
- McGuire, M. (2018, April 21). *The Web of Profit: A look at the cybercrime economy*. University of Surrey. <https://venturebeat.com/2018/04/21/the-web-of-profit-a-look-at-the-cybercrime-economy/>
- McGuire, M. (2019, May 30). *Back Into The Web of Profit: Going Undercover in the Dark Net, Uncovering Threats to the Enterprise*. <https://securityboulevard.com/2019/05/back-into-the-web-of-profit-going-undercover-in-the-dark-net-uncovering-threats-to-the-enterprise/>
- Mulvaney, E. (2021, December 29), *Artificial Intelligence Hiring Bias Spurs Scrutiny and New Regs*, Bloomberg Law, <https://news.bloomberglaw.com/daily-labor-report/artificial-intelligence-hiring-bias-spurs-scrutiny-and-new-regs>
- Nagle-Piazza, L. (2019, August 28). *NLRB Memo Clarifies Rules for Workplace Social Media Policies*. SHRM. <https://www.shrm.org/resourcesandtools/legal-and-compliance/employment-law/pages/nlr-memo-clarifies-rules-for-workplace-social-media-policies.aspx>
- National Cyber Security Centre (NCSC). (NCSC UK, 2016). *Whaling: how it works, and what your organisation can do about it*. <https://www.ncsc.gov.uk/guidance/whaling-how-it-works-and-what-your-organisation-can-do-about-it>
- Nguyen, D.T., et al. (2018). *IoTSan: Fortifying the Safety of IoT Systems*. Proc. of the 14th International Conference on emerging Networking EXperiments and Technologies (CoNEXT '18).
- Pedigo Hall, J. (2022, February), *Brave New World: The EEOC's Artificial Intelligence Initiative*, The National Law Review, Volume XII, Number 44
- Pienta, D., Thatcher, J.B., & Johnston, A. (2020, June 3). *Protecting a whale in a sea of phish*. Journal of Information Technology. <https://journals.sagepub.com/doi/abs/10.1177/0268396220918594>
- Rogers, Y., & Scaife, M. (1998). *How can Interactive Multimedia Facilitate Learning?* Paper presented at the Proceedings of First International Workshop On Intelligence and Multimodality in Multimedia Interfaces.
- Saad, L., & Hickman, A. (2021, February 12). *Majority of U.S. Workers Continue to Punch In Virtually*. Gallup.com. <https://news.gallup.com/poll/329501/majority-workers-continue-punch-virtually.aspx>
- Saikayasit R., Stedmon A., Lawson G. (2013, October). *User Requirements Elicitation in Security and Counter-Terrorism: A Human Factors Approach*, Journal of Police and Criminal Psychology
- Small S. (2018, September 25). *The Human Factor in Social Media Risk*, Information Week. <https://www.darkreading.com/endpoint/the-human-factor-in-social-media-risk/a/d-id/1332862>
- Society for Human Resource Managers (SHRM). (2021).
- Sadek, R. (2018, May). *"An Agile Internet of Things (IoT) based Software Defined Network (SDN) Architecture"*. Egyptian Computer Science Journal. Vol. 42 No.2.
- Tayouri, D. (2015). *The human factor in the social media security –combining education and technology to reduce social engineering risks and damages*. Applied Human Factors and Ergonomics. <https://www.sciencedirect.com/science/article/pii/S2351978915001821>
- Wilson, J. & Sharples, S. (2015, April 16). *Evaluation of Human Work 4th Edition*. CRC Press; 4th edition.
- Wright, A. (2015). *Study: Teleworkers More Productive—Even When Sick* Society, for Human Resource Managers (SHRM). <https://www.shrm.org/resourcesandtools/hr-topics/technology/pages/teleworkers-more-productive-even-when-sick.aspx>
- UC Berkley Information Security Office. (2022). <https://security.berkeley.edu/education-awareness/phishing>