



Accounting for a
Sustainable Future™

E-COMMERCE

Research Brief

Sustainable Industry Classification System™ (SICS™) #CN0404
Research Briefing Prepared by the
Sustainability Accounting Standards Board®
September 2015

E-COMMERCE

Research Brief

SASB's Industry Brief provides evidence for the disclosure topics in the E-Commerce industry. The brief opens with a summary of the industry, including relevant legislative and regulatory trends and sustainability risks and opportunities. Following this, evidence for each disclosure topic (in the categories of Environment, Social Capital, Human Capital, Business Model and Innovation, and Leadership and Governance) is presented. SASB's Industry Brief can be used to understand the data underlying SASB Sustainability Accounting Standards. For accounting metrics and disclosure guidance, please see SASB's Sustainability Accounting Standards. For information about the legal basis for SASB and SASB's standards development process, please see the Conceptual Framework.

SASB identifies the minimum set of disclosure topics likely to constitute material information for companies within a given industry. However, the final determination of materiality is the onus of the company.

Related Documents

- [E-Commerce Sustainability Accounting Standards](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)

INDUSTRY LEAD

Nashat Moin

CONTRIBUTORS

Andrew Collins

Arturo Rodriguez

Henrik Cotran

Jean Rogers

Bryan Esterly

Evan Tylenda

Eric Kane

Quinn Underriner

Jerome Lavigne-Delville

Gabriella Vozza

Himani Phadke

SASB, Sustainability Accounting Standards Board, the SASB logo, SICs, Sustainable Industry Classification System, Accounting for a Sustainable Future, and Materiality Map are trademarks and service marks of the Sustainability Accounting Standards Board.

Table of Contents

- [Introduction](#) 1
- [Industry Summary](#) 2
- [Legislative and Regulatory Trends in the E-Commerce Industry](#) 4
- [Sustainability-Related Risks and Opportunities](#) 7
- [Environment](#) 8
 - [Energy & Water Footprint of Hardware Infrastructure](#) 9
 - [Logistics & Packaging Efficiency](#) 13
- [Social Capital](#) 16
 - [Data Security & Fraud Protection](#) 17
 - [Data Privacy](#) 21
- [Human Capital](#) 23
 - [Employee Recruitment, Inclusion, and Performance](#) 24
- [Appendix](#)
 - [Representative Companies : Appendix I](#) 29
 - [Evidence for Sustainability Disclosure Topics : Appendix IIA](#) 30
 - [Evidence of Financial Impact for Sustainability Disclosure : Appendix IIB](#) 31
 - [Sustainability Accounting Metrics : Appendix III](#) 32
 - [Analysis of SEC Disclosures : Appendix IV](#) 33
- [References](#)

SUSTAINABILITY DISCLOSURE TOPICS

ENVIRONMENT

- Energy & Water Footprint of Hardware Infrastructure
- Logistics & Packaging Efficiency

SOCIAL CAPITAL

- Data Security & Fraud Protection
- Data Privacy

HUMAN CAPITAL

- Employee Recruitment, Inclusion, and Performance

INTRODUCTION

E-Commerce, a relatively new and rapidly evolving industry, is playing an increasing role in society as consumers seek affordable and convenient access to both physical and digital goods and services. E-commerce companies have opened up access to physical goods and services and digital media that would have been hard for consumers to obtain through traditional retail channels.

As consumers are becoming increasingly busy, the presence of online shopping has grown. At the same time, technological innovations have improved the online shopping experience.

However, with the rapid growth of this industry have come social and environmental challenges that companies must address to improve financial performance and mitigate risks. Regulatory and societal trends suggest a rising concern over the treatment and security of consumer data obtained by e-commerce companies. Additionally, environmental externalities resulting from the growing presence of data centers and logistics operations may have an increased influence on

the industry's social license to operate, besides an impact on its costs.

While the industry is expanding, it is experiencing a shortage of talented and qualified workers, which presents operational challenges. A more diverse and inclusive workforce could help to influence companies' ability to attract and retain skilled workers, besides benefiting the companies in other ways.

The consumer-facing nature of the industry makes the management of key sustainability issues an important driver for long-term success.

Management (or mismanagement) of certain sustainability issues, therefore, has the potential to affect company valuation through impacts on profits, assets, liabilities, and the cost of capital.

Investors would obtain a more holistic and comparable view of performance with e-commerce companies reporting metrics on the material sustainability risks and opportunities that could affect value in the near and long term in their regulatory filings. This would include both positive and negative externalities, and the non-financial forms of capital that the industry relies on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the E-Commerce industry:

- Improving the energy and water footprint of hardware infrastructure;
- Managing logistics and packaging efficiency to reduce associated costs while mitigating related environmental externalities;
- Building customer trust and confidence through data security and fraud protection;

- Avoiding the misuse and sharing of consumer data by maintaining data privacy; and
- Managing the workforce effectively to improve recruitment, diversity, retention, and performance.

INDUSTRY SUMMARY

The E-Commerce industry is composed of firms that provide an online marketplace service for other firms or individuals to sell their goods and services, as well as retailers and wholesalers that provide an exclusively web-based platform for consumers to buy their goods.¹ Firms in this industry sell to consumers as well as to other businesses. There are also e-commerce firms, such as Netflix, that do not ship a physical good to consumers but rather give them access to a good or service—in this case, streaming videos online.

E-commerce firms have approximate global annual revenues of \$209 billion as of July 1, 2015, for the most recent fiscal years reported.¹ The largest firm by revenue, Amazon, holds an 18.9 percent domestic market share, with roughly seven times the revenue of its nearest competitor, eBay.² There are only 39 pure-play e-commerce firms publicly traded in the U.S. However, this is a highly fragmented industry, with roughly 176,000 firms in the U.S., including non-listed companies.³ Nearly three-quarters of all industry firms have fewer than five employees.⁴ The high number of companies is attributable to a relatively low barrier to entry, as the industry lacks the more prohibitive overhead costs of traditional retail, which include managing physical storefronts.

U.S. markets have had two large and well-publicized IPOs of Chinese e-commerce firms, JD.com and Alibaba, in May⁵ and September⁶ of

2014, respectively. These are two of the five largest firms by revenue in this industry. Neither of these firms currently has a significant presence in the U.S. retail market, although Alibaba has shown signs of interest in U.S. markets.⁷ The reverse trend is also true, with U.S. firms, which currently generate the majority of their revenue domestically, looking for ways to globalize their operations. As websites are accessible anywhere in the world, this expansion is largely dependent on a firm's ability to have a solid logistics framework to deliver products in a country, as well as on brand recognition and consumer trust.⁸

Domestically, the number of households with access to a computer has been rising steadily over the past decade, enlarging the E-Commerce industry's potential market.⁹ The U.S. e-retail space, which includes brick-and-mortar retailers' online sales, is expected to grow to \$414 billion by 2018, up from \$263 billion in 2013, representing a compound annual growth rate of 9.5 percent, according to Forrester Research.¹⁰ This trend is also occurring globally. A 2013 McKinsey report found that China's E-Commerce industry has experienced a 120 percent compound annual growth rate since 2003.¹¹

Revenue growth is closely tied to consumer confidence and levels of disposable income, as many goods purchased through e-commerce platforms are discretionary. Since the financial crisis of 2008, both consumer confidence and disposable income have trended upward, and they are predicted to continue to do so through 2019,¹² aiding in the expansion of this industry.¹³

The industry's largest cost segment is purchases, constituting an average of 61.1 percent of revenue. E-commerce firms have relatively low costs associated with wages, at 5.4 percent of

¹ Industry composition is based on the mapping of the Sustainable Industry Classification System (SICS™) to the Bloomberg Industry

Classification System (BICS). A list of representative companies appears in Appendix I.

revenue. This is roughly 62 percent of the costs that retail warehouse clubs and superstores incur for wages (8.7 percent of revenue),¹⁴ as e-commerce operations are less labor-intensive than traditional brick-and mortar retailers, which involve a large sales and cashier workforce.¹⁵ Additionally, outbound shipping costs can represent a significant portion of company revenue. For example, Amazon has net shipping costs that represent roughly 5 percent of sales.¹⁶

Key drivers that fuel the success of the E-Commerce industry are consumers trust in the security of their financial and personal data, the effectiveness of a firm's logistics network, and the ability to predict consumer trends in order to have stock on hand. This is also a rapidly changing industry, in which those firms that are first to integrate technological advances, such as new payment methods or better support for mobile purchases, stand to gain a significant competitive advantage. Firms in this industry also compete heavily on price, which places a downward pressure on e-commerce price points, as consumers can seamlessly compare prices between different e-commerce platforms.¹⁷ This generally leads to very low profit margins: the industry median net profit margin is 1.24 percent.¹⁸ Therefore, firms that have greater operational efficiency, especially in their logistics operations, can offer lower prices and gain market share.¹⁹

However, company-sustainability impacts may vary across the industry as there are some notable differences in business models. Firms such as eBay, which are providing a platform for others to sell goods, have inherently less control over the pricing of goods sold on their platform, as well as the logistics services used. It is also important to note that certain firms, such as Netflix, provide a substantial portion of their service entirely over the Internet, through streaming, which

Note on Industry Structure

In developing this brief and determining disclosure topics and accounting metrics for e-commerce companies, SASB used a "pure-play" definition of the industry. This definition does not directly address retail firms that also have an e-commerce component to their business. Most major firms in the Multiline and Specialty Retailers & Distributors industry (CN0403); the Apparel, Accessories, & Footwear industry (CN0501); the Food Retailers & Distributors industry (CN0400); and the Toys & Sporting Goods industry (CN0604) have, or are in the process of incorporating, e-commerce operations.

This brief does not directly address retail or consumer good manufacturing firms in these industries that also have an e-commerce business. This approach is necessary to ensure a coherent understanding of industry drivers and challenges. However, depending on the specific activities and operations of firms in the aforementioned industries, sustainability issues and accounting metrics associated with e-commerce may also be material.

significantly lowers their variable costs and the environmental impacts associated with shipping products.²⁰

The main external source of competition in this industry is traditional retailers that are integrating an e-commerce platform into their existing operations, creating what is called an "omni-channel" experience. These firms, such as Walmart, already have a nationwide network of storefronts, which allows them to integrate these physical stores into the shopping experience. For example, customers can order a good online and then pick it up at a store near their home, or they can make an exchange of an online purchase the same way. These firms can also serve customers

who do not have a means of making electronic payments, allowing them to select items online to pick up and pay cash for in-store.

To better compete with brick-and-mortar stores, e-commerce firms have been increasingly reducing or removing shipping costs, as well as focusing on logistics efficiencies to cut down on shipping time. Amazon has been experimenting in a few major cities with same-day shipping, which, if successful, could change future consumer perception about the e-commerce market and make it increasingly harder for smaller firms to compete.²¹ Similarly, firms in this industry have worked to make product returns as easy as possible so that they can compete with the customer experience in brick-and-mortar stores.²² Again, consumers are now more likely to expect to have this service provided for free,²³ which places pressure on the profit margins of many e-commerce firms.

E-commerce companies are analyzed and valued on typical financial metrics such as profitability, margin expansion, and top-line sales growth. Industry-specific metrics of interest include shipping costs, membership growth, and number of users of a company's services.²⁴

LEGISLATIVE AND REGULATORY TRENDS IN THE E-COMMERCE INDUSTRY

Regulations in the U.S. and abroad represent the formal boundaries of companies' operations, and are often designed to address the social and environmental externalities that businesses can create. Beyond formal regulation, industry practices and self-regulatory efforts act as quasi-regulation and also form part of the social

contract between business and society. In this section, SASB provides a brief summary of key regulations and legislative efforts related to this industry, focusing on social and environmental factors. SASB also describes self-regulatory efforts on the part of the industry, which could serve to pre-empt further regulation.¹¹ The primary legislative issues facing the E-Commerce industry involve data security and privacy, fraud prevention laws, the concept of net neutrality, and the collection of sales tax.

Companies in the E-Commerce industry have access to a vast array of consumer data, which can be a significant competitive advantage but can also create a potential liability if handled inappropriately. With the increasing use of data in the E-Commerce industry, as well as industries in the Technology & Communications sector, there is a growing regulatory interest in data privacy in the U.S. and the E.U., with specific implications for online advertising and mobile apps. In the U.S., data privacy and security are regulated by the Federal Trade Commission (FTC). The FTC's Bureau of Consumer Protection "stops unfair, deceptive or fraudulent practices in the marketplace" in areas such as advertising and marketing, as well as privacy and identity protection.²⁵

Furthermore, a working group comprising national data protection authorities of E.U. member states, called the Article 29 Working Party, recently adopted an opinion addressing data protection risks of mobile apps. The group highlighted that, on average, a smartphone user downloads 37 apps, which collect large quantities of personal information about the user, including location, contact details, and banking information. According to the group's chairman, "This often happens without the free and

¹¹ This section does not purport to contain a comprehensive review of all regulations related to this industry, but is intended to

highlight some ways in which regulatory trends are impacting the industry.

informed consent of users, resulting in a breach of European data protection law.” The opinion by the Article 29 Working Party places specific obligations on app developers and all other parties involved in the development and distribution of apps,²⁶ and it grants power to national authorities to take action against companies, including levying fines.²⁷

Several states have issued their own data privacy regulation, as there is a growing consumer concern over the privacy of sensitive data. In September 2013, California approved a law that requires retailers to clearly identify any policies that allow third parties to collect personally identifiable information and also inform consumers whether they honor web browsers’ “do not track” settings.²⁸

E.U. regulations on data use and privacy directly impact e-commerce companies with European operations or sales. Directive 2002/58/EC regulates data protection and privacy for electronic communications, with specific provisions related to spam and cookies (the latter are often used by companies in the E-Commerce industry to gather consumer data). The directive establishes the principle of obtaining consumers’ prior consent (“opt-in”) for such activities.²⁹ Under the current system, U.S. companies that want to store E.U. members’ data in the U.S. have had to abide by the U.S.-E.U. Safe Harbor Framework, requiring them to guarantee that the data of E.U. citizens moved to U.S. servers will follow E.U. privacy laws.³⁰ However, in light of Edward Snowden’s National Security Agency (NSA) controversy in 2013, there have been increasing demands from E.U. citizens and government officials for more transparency on the part of U.S. companies, as well as the ability to level harsher penalties against violators.³¹ The U.S. has since enacted the USA Freedom Act, which alters the way government agencies can conduct

surveillance and collect personal data. However, some say that the act does not go far enough in preventing government surveillance.³²

E-commerce companies must strike a difficult balance between protecting customers’ privacy and sharing customers’ information with governments in the U.S. and other countries for security and law enforcement reasons. The U.S. Department of Justice agreed in January 2014 to relax standards over company disclosures of government data requests. The decision came in response to changes to the government data-collection policy in the wake of the 2013 exposure of government surveillance programs conducted by the NSA since 2007. Technology firms welcomed the decision, as they are concerned that uncertainty over the degree of government surveillance could significantly affect their operations. Companies are now allowed to report the number of government data requests in broad ranges after a six-month waiting period.³³

In addition to data privacy regulations, companies are likely to be subject to emerging cybersecurity laws. Forty-seven U.S. states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam have enacted legislation requiring companies to notify their customers when security breaches of personal information occur.³⁴ Similarly, there is a proposed directive in the E.U., the European Commission’s Proposed Directive on Network and Information Security, which would require the disclosure of cyber breaches.³⁵ At the same time, U.S. intelligence officials’ warnings about the threat of electronic attacks are fueling attempts to reintroduce the Cyber Intelligence Sharing and Protection Act (CISPA) to provide immunity from lawsuits to companies when they share information voluntarily with one another and the government. The CISPA was passed by the House of Representatives but faced opposition

from the Senate, the White House, and activist groups due to concerns about inadequate privacy protections.³⁶ In 2013, President Barack Obama signed a cybersecurity executive order after multiple initial cybersecurity bills, including the CISPA, failed to pass through Congress. The executive order would allow for opportunities of information sharing with government agencies to help protect critical cyber infrastructure.³⁷

The U.S. retail industry is center stage for credit card fraud, since it primarily uses magnetic-strip credit and debit cards, which are the primary target of frauds, as they can be copied fairly easily.³⁸ To combat fraud, payment-processing giants Visa and MasterCard have delivered an ultimatum to traditional retailers: The retailers must either prepare their stores to accept the more secure “pin and chip” EuroPay, MasterCard, and Visa (EMV) standard by October 2015, or accept liability for fraudulent charges. Thus far, this liability had fallen on the payment-processing firms. This action will increase the difficulty of creating fraudulent credit cards and will likely move more fraud to e-commerce sites.³⁹ Currently, as online purchases are “card not present” sales, in which the customer does not have to physically sign for the purchase, the fraud liability often falls on e-commerce sites. If fraud is detected or a charge is disputed, the credit card company issues a chargeback, or a deduction of the payment from the firm’s account.⁴⁰

The concept of net neutrality, which holds that Internet service providers (ISPs) must treat all data equally, is a key element supporting the business models of e-commerce firms. Originally, in January 2014, a U.S. appeals court struck down a Federal Communications Commission (FCC) rule that required ISPs to adhere to net neutrality, which opened up the possibility of a tiered Internet where companies could be forced to pay more money to ISPs to have faster loading times

for their web pages.⁴¹ Large companies can already do this, to an extent, but this legislation would make the issue more profound.⁴² This would make it harder for smaller players to compete with industry leaders, as they may not be able to afford to pay for faster load times. However, after public and political scrutiny of the original net neutrality proposal, the FCC approved amendments that would protect a more open Internet and prevent ISPs from charging websites to send content to users.⁴³ This is important, as page load time is instrumental in the completion of online sales, which helps reduce operational barriers for e-commerce companies.⁴⁴

Initially, a key competitive advantage that e-commerce firms held over brick-and-mortar stores was that they had to collect sales tax on purchases only when the consumer lived in a state where the company had a physical presence. Otherwise, the consumer was responsible for reporting the purchase to the IRS and paying the appropriate “use tax.” However, the separate, consumer-led reporting of online purchases often did not occur, meaning consumers were not paying the required taxes associated with goods purchased online. This advantage helped the early growth of this industry.⁴⁵ However, in the face of budget deficits, 22 states, including California and New York, have implemented laws that require the collection of taxes for transactions made by residents of their state, regardless of the physical presence of the company.⁴⁶ Currently, many of these laws are complex and require significant investment to ensure compliance.⁴⁷ There have been increasing calls for a federal solution, as states still have been losing an estimated \$11 billion annually in tax revenue. The Marketplace Fairness Act of 2015 was introduced to mandate the collection of sales tax, and has currently been assigned to a congressional committee before it goes to the House or Senate.⁴⁸

As larger firms like Amazon expand their physical footprint nationwide, they are becoming less vocal about opposing this legislation, and many industry players have accepted it as inevitable.⁴⁹ The bill still faces opposition, because the cost associated with such a comprehensive reform would fall most heavily on medium- and small-size firms. These firms are less likely to have a physical presence in many states, so they are currently profiting from an outweighed tax benefit. If the new legislation passes, such firms, apart from having to collect a sales tax, which could impact revenues, would also be likely to incur higher administrative costs. This bill, or a similar law, would likely drive consolidation in the industry and increase the market share of larger firms.⁵⁰

SUSTAINABILITY-RELATED RISKS AND OPPORTUNITIES

Industry drivers and recent regulations suggest that traditional value drivers will continue to impact financial performance. However, intangible assets such as social, human, and environmental capitals, company leadership and governance, and the company's ability to innovate to address these issues are likely to increasingly contribute to financial and business value.

Broad industry trends and characteristics are driving the importance of sustainability performance in the E-Commerce industry:

- **Resource requirements of expanding information technology (IT) hardware infrastructure:** As the volume of e-commerce transactions increases, the need for energy- and water-intensive hardware storage and processing infrastructure is growing. This opens up companies to the risk of increased costs, as energy and water prices are expected

to rise, as well as to potential disruptions of their operations.

- **Externalities of logistics networks and packaging:** The E-Commerce industry is rapidly growing, leading to a growing number of shipments. These contribute to environmental externalities such as carbon emissions from transport fuel use and resource constraints due to increasing materials used for packaging. If internalized through regulations or customer demand, such impacts can increase operating costs. Therefore, to remain competitive, firms need to create logistical and packaging efficiencies, which can help them preserve their margins as well as reduce their environmental impact.
- **Data collection and increasing social expectations of privacy and security:** Firms in this industry handle a large amount of demographic and financial data acquired from their customers. To protect their license to operate in this manner, they need to both protect this data from criminals and be transparent about how they use customers' data for their own operations.
- **Diversity as an engine of innovation:** The contribution of a diverse workforce to innovation and customer empathy is increasingly being recognized, even as the industry faces challenges in increasing the proportion of women and minorities in the workforce and recruiting workers from the science, technology, engineering, and mathematics (STEM) disciplines.

As described above, the regulatory and legislative environment surrounding the E-Commerce industry emphasizes the importance of sustainability management and performance.

Specifically, recent trends suggest a regulatory emphasis on customer protection, which will serve to align the interests of society with those of investors.

The following section provides a brief description of each sustainability issue that is likely to have material financial implications for companies in the E-Commerce industry. This includes an explanation of how the issue could impact valuation and evidence of actual financial impact. Further information on the nature of the value impact, based on SASB's research and analysis, is provided in Appendix IIA and IIB.

Appendix IIA also provides a summary of the evidence of investor interest in the issues. This is based on a systematic analysis of companies' 10-K and 20-F filings, shareholder resolutions, and other public documents, which highlights the frequency with which each topic is discussed in these documents. The evidence of interest is also based on the results of consultation with experts participating in an industry working group (IWG) convened by SASB. The IWG results represent the perspective of a balanced group of stakeholders, including corporations, investors or market participants, and public interest intermediaries.

The industry-specific sustainability disclosure topics and metrics identified in this brief are the result of a year-long standards development process, which takes into account the aforementioned evidence of interest, evidence of financial impact discussed in detail in this brief, inputs from a 90-day public comment period, and additional inputs from conversations with industry or issue experts.

A summary of the recommended disclosure framework and accounting metrics appears in

ⁱⁱⁱ These are indirect contributions to GHG emissions, with the physical source of emissions being the electric utility from which energy is purchased.

Appendix III. The complete SASB standards for the industry, including technical protocols, can be downloaded from www.sasb.org. Finally, Appendix IV provides an analysis of the quality of current disclosure on these issues in SEC filings by the leading companies in the industry.

ENVIRONMENT

The environmental dimension of sustainability includes corporate impacts on the environment. This could be through the use of natural resources as inputs to the factors of production (e.g., water, minerals, ecosystems, and biodiversity) or environmental externalities and harmful releases in the environment, such as air and water pollution, waste disposal, and greenhouse gas (GHG) emissions.

Increasing volume of e-commerce activity will require an expansion of IT infrastructure, such as data centers, to process and store growing amounts of data. These systems require large amounts of electricity to operate, with associated costs that can be managed through technological innovation. Large consumers of electricity, including some of the major players in the E-Commerce industry, contribute to Scope 2 GHG emissions,ⁱⁱⁱ which can be mitigated through energy efficiency and the use of renewable energy. Furthermore, access to reliable, cheap supplies of water for cooling computing centers is increasingly a focus during the planning and operating of such facilities.

Companies in this industry also face obstacles in remaining profitable, especially when shipping costs rise as a result of higher fuel costs, and customers expect shorter shipping times. However, companies have opportunities to create

efficiencies in their logistics systems and packaging to mitigate these costs and reduce their environmental footprint.

Energy & Water Footprint of Hardware Infrastructure

A large part of the energy consumed by the industry is used to power critical hardware and IT infrastructure in data centers.^{IV} These data centers need to be powered continuously, and disruptions to energy supply can have a significant impact on operations, depending on the magnitude and timing of the disruption. Companies also face a tradeoff when it comes to energy and water consumption for their data centers' cooling needs: cooling data centers with water instead of chillers is a means of improving energy efficiency, but it can lead to dependence on local water resources.

Managing the energy and water footprint of the significant hardware infrastructure used in this industry is important for managing costs, obtaining reliable supplies of energy and water, and lowering reputational risks. With an increasing global focus on climate change, pressure from regulatory authorities and customers places greater emphasis on resource conservation. Energy-consuming industries seldom face direct GHG mitigation regulations if they do not have significant Scope 1 GHG emissions. However, if utilities face higher costs due to emissions reduction regulations imposed on them, they are likely to pass these costs on to their consumers. Nominal retail electricity prices have in the past increased because of sustainability factors such as investments by utilities in renewable energy generation, driven by regulatory mandates. Electricity consumers could

^{IV} Leading publicly listed companies in the industry that account for a significant proportion of industry revenues, such as Amazon and eBay, own several large data centers. Smaller e-commerce

face even more cost increases in the future as GHG regulations expand.

Innovations in energy efficiency and renewable energy provide new avenues for energy management. Through investments in energy-efficient technologies and changes in operations, e-commerce companies can reduce their energy intensity. As data-center operations expand to keep pace with the rising number of consumer transactions and use of data analytics, substantial reductions in energy intensity will be required to lower total energy consumption.

E-commerce companies can pursue various strategies to achieve energy efficiency, including purchasing more efficient hardware, optimizing data center locations, managing energy "hotspots" in data centers, cooling with outside air rather than using chillers or water, and implementing efficient software coding and server virtualization, which can reduce the need to install more physical servers.

End-users of electricity also have various incentives to lower their dependence on the grid and use distributed renewable energy, which can contribute to lower GHG emissions overall. Long-term power-purchase agreements with renewable energy providers or on-site generation based on fuel cells or other alternative energy sources can provide a hedge against rising energy prices, while potentially enhancing reputational and brand value. On-site renewable energy might better protect companies that rely on a continuous supply of power (such as those in the E-Commerce industry) against grid disruptions and therefore lower their operating risks. Disruptions to the grid may occur because of increasing extreme weather events associated with climate change in both developed and

companies may primarily utilize cloud services of other providers, such as Amazon, for their data storage and processing needs. Their environmental footprint may therefore not be significant.

developing countries. In developing countries, poor grid infrastructure is also responsible for an unreliable energy supply.

Furthermore, water is becoming a scarce resource around the world because of increased consumption due to population growth and rapid urbanization, as well as reduced supplies due to climate change. Many important river basins are already considered “stressed.”⁵¹ Water scarcity can result in higher supply costs, supply disruptions, and social tensions, all of which could impact companies with water-intensive operations, such as data centers. Managing water use, therefore, is emerging as an important area for planning and operating data centers.

Having efficient data centers will be important not just to the pure-play members of this industry but also to those retailers that wish to expand their e-commerce presence. For example, in its attempt to move a significant portion of its business to an e-commerce platform, TJX Companies, the parent company of discount retail firms such as T.J. Max, built new data centers to handle the transition.⁵² As more traditional retail firms make this switch to e-commerce or omni-channel retail, they will face greater data center resource costs and reputational risks.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Total energy consumed, percentage grid electricity, percentage renewable energy;
- Total water withdrawn and total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress; and
- Description of the integration of environmental considerations into strategic planning for data center needs.

Evidence

The combined cost of rent and utilities is, on average, 3.8 percent of revenue in this industry.⁵³ Data centers use between 10 to 20 times more energy than the average commercial building, according to the Electric Power Research Institute.⁵⁴ Although data centers are becoming more energy-efficient, overall data center energy consumption in the economy is increasing, as data centers expand in number and size. According to Jonathan Koomey of Stanford University, global data-center electricity use doubled from 2000 to 2005, while the rate of growth slowed between 2005 and 2010. Nevertheless, he estimates that during this latter period, global and U.S. data center electricity use increased by about 56 percent and 36 percent, respectively, to reach 1.3 percent of global electricity use and 2 percent of U.S. electricity use in 2010. He attributes the slower growth rate in electricity consumption during this period to the global economic crisis of 2008–2009, the increasing use of virtualization in data centers, and the data center industry’s efforts in improving energy efficiency since 2005, following discussions with the U.S. Environmental Protection Agency (EPA).⁵⁵

An estimated 2.5 billion people currently have Internet access, and this number is expected to expand over the next five years by nearly 60 percent.⁵⁶ This will be especially pronounced in China, which is predicted to be the largest e-commerce market by 2020.⁵⁷ This sheer increase in users will create a significant increase in the amount of consumer data that is generated and stored. This will necessitate the further growth of data centers, with their energy demand predicted to increase 81 percent between 2012 and 2020.⁵⁸

Expenditures on energy for data processing and hosting activities can have a significant impact on profit margins in the industry, particularly in light of rising energy costs. In the U.S., the average

retail price of electricity for the commercial end-use sector has increased by 34 percent, from 7.7 cents per kilowatt-hour (kWh) in 2001 to 10.3 cents per kWh in 2015, with wide regional variations.⁵⁹ While retail electricity price increases have historically been lower than the general rate of inflation in the U.S.,⁶⁰ this trend is expected to change; the long-term projections of the U.S. Energy Information Administration (EIA) show average end-use prices for electricity across sectors increasing by around 4.5 percent between 2013 and 2020, in 2013 cents per kWh, and by 12.5 percent between 2013 and 2035, in the reference case.⁶¹ In fact, compared to 2013 prices, real electricity prices are expected to increase across various scenarios, including low and high economic growth and low and high oil prices.⁶²

At the same time, as the impacts of climate change intensify, grid disturbances are likely to increase, impacting data center and, therefore, e-commerce operations. Significant weather-related grid disturbances have been steadily increasing in the U.S., from just over 20 incidents in 2003 to almost 140 incidents in 2011.⁶³

Shareholders are taking an interest in the energy management of data centers in this industry. Amazon received three shareholder resolutions in years 2011, 2012, and 2013 from Calvert Investment Management to provide information on the company's energy-efficiency measures. While the first two resolutions went to a vote and received roughly 20 percent support, Calvert withdrew the 2013 resolution when Amazon agreed to address how it was managing energy-efficiency issues.⁶⁴ Greenpeace gave Amazon a grade of F in a data-center energy-efficiency study because of the company's previous silence on this

issue, noting that Amazon was "the least transparent of any company we evaluated."⁶⁵ This opened the company up to reputational risk, as it received negative publicity in popular business journals.⁶⁶

Data centers account for 44 percent of eBay's energy use.⁶⁷ The company has created a system of strict tracking measures, called the Digital Service Efficiency Dashboard, to monitor data centers' energy and water usage. The implementation of this tracking system generated system efficiency that eliminated the need to update some servers, which saved the company about \$200 million.⁶⁸ Through its data-center efficiency initiatives, eBay has reduced the cost per active user by 6 percent.⁶⁹ The company was also able to track and improve its power usage effectiveness (PUE) score,^v a commonly used metric for data-center energy efficiency, from 1.62 in the first quarter of 2012 to 1.52 in the second quarter of 2013.^{vi} ⁷⁰ A survey by Digital Realty Trust found that the average data center PUE score was 2.9.⁷¹

In an effort to control power costs and reduce the amount of electricity sourced from coal plants in its Utah data center, eBay has implemented renewable energy—in the form of six megawatts of fuel cells—as the data center's main power source.⁷² At the same site, the company also signed a 20-year contract that ensures it has another renewable energy source: Ormat Technologies will recover the waste heat from eBay's data center and sell it back to them.⁷³ This could help lower eBay's long-term risk profile and help it protect its margins. In an effort to reduce energy costs, Alibaba has implemented innovative cooling techniques that allow it to use and recycle water from a nearby lake to cool its new data

^v The theoretically ideal PUE is 1.0, which would mean that all the energy supplied to a data center actually reached the IT system and was not used for cooling and other non-computing purposes.

^{vi} This is the most recently available data from eBay's Digital Service Efficiency Dashboard.

center in China, with warmed water being used to heat nearby buildings before being returned to the lake. The company states that the innovation will allow it to save up to 80 percent on energy costs.⁷⁴ This use of water to cool data centers can perpetuate further environmental issues.

In addition to energy consumption, data centers consume significant amounts of water for cooling. Although some of the water is continually reused, a significant amount is evaporated through a process similar to cooling towers in power plants. As a result, large computing facilities can place significant demands on local water infrastructure. If local water sources are stressed, or local municipalities do not have the capacity to provide adequate water supply, companies could face service interruptions and additional costs, with a significant effect on their operations and financial results. Furthermore, permitting for surface water supplies may be difficult in some areas, which can affect project timetables, especially if wastewater is to be returned to the environment.⁷⁵

California's nearly 800 data centers have come under scrutiny for their use of water, given pressing drought concerns. A midsize 15 megawatt data center utilizes as much water a year as 100 acres of almond trees, or about 150 million gallons. Companies operating data centers in the state are feeling pressure to reduce their footprint and are worried about potential disruptions from a lack of water. As the number of data centers in California is expected to grow, further pressure is being placed on the state's tech industry to reduce its water footprint.⁷⁶

China, the home of Alibaba and JD.com and their vast data centers, is facing an even more extreme water shortage than the U.S. is. If the Chinese government institutes a system to allow market forces to dictate water prices, as it pledged in 2013, prices would likely go up, as would the cost

of operating data centers.⁷⁷ To secure a consistent source of water, some data centers have built their own wells and storage tanks in case municipal sources dry up.⁷⁸ Other organizations are utilizing natural cooling methods in their data centers in targeted regions of the world to help reduce energy usage.⁷⁹

Value Impact

Improving water and energy efficiency at data centers can reduce operating costs through lower utility bills, directly affecting profit margins. Such improvements may lead to both short-term cost savings through individual efficiency initiatives and a lower long-term cost structure through ongoing efficiency strategies that leverage technological and financial innovation.

Companies could face one-off effects on cash flows through capital expenditures for energy-related projects. However, besides benefiting the cost structure, energy efficiency and the use of renewable energy can increase energy independence and mitigate operational risks related to energy availability and reliability as well as price increases. Similarly, water efficiency can reduce a firm's exposure to water price increases or supply constraints. Water and energy supply risks have the potential to disrupt operations for e-commerce companies; such disruptions, if frequent or significant, potentially could impact a company's risk profile and its cost of capital.

The probability and magnitude of these impacts could increase in the future as emerging governmental regulations on environmental impacts continue to drive energy and water cost increases and as water scarcity intensifies with the impacts of climate change.

Disclosure on total energy consumed provides analysts the ability to assess improvements in company performance over time and, when

normalized, can provide a comparative measure of energy efficiency. The percentage of a company's energy coming from grid electricity indicates its exposure to electricity price increases, as utilities internalize the costs of carbon pollution (for example, through new GHG mitigation regulations). It also indicates the potential for operational interruptions from grid disruptions. Disclosure on the percentage of renewable energy used indicates how well a company is positioned to capture possible cost savings and ensure stable energy prices from the use of renewables. Disclosure around a company's total water withdrawal and percentage in water stressed regions can provide further insight into the risks associated operating data centers. Discussions of a company's strategy to integrate environmental considerations into data center design can help highlight how companies are reducing environmental impacts, which have direct links to operating costs.

Logistics & Packaging Efficiency

A significant part of the added value of the E-Commerce industry comes from firms' ability to move a wide array of goods efficiently to consumers who would otherwise have to personally travel to collect the good from brick-and-mortar stores. This convenience for consumers adds to the environmental externalities created by e-commerce companies. As the volume of shipments increases and e-commerce expands, the environmental externalities of the industry will expand as well. These externalities include carbon emissions from transportation and greater use of packaging materials, which remain important business considerations for the long term. Risks include carbon pricing, which could affect fuel costs, and customer demand for more sustainable packaging and transportation.

Given the risks discussed above, it is important for companies to manage their logistics operations in an efficient manner. Additionally, as firms like Amazon supplement their third-party shipping with their own logistics fleets, as do traditional retail firms like Walmart, the management of logistics operations is becoming more important. The industry predominately relies on shipping service providers, such as FedEx, UPS, and the U.S. Postal Service. Smaller firms outsource logistics services for all of their shipping needs. As this is a highly competitive and low-margin industry, the ability to reduce shipping costs through a fleet's fuel economy and more efficient routing can allow e-commerce companies to pass those savings on to customers. While firms that outsource shipping logistics have relatively less control over the specific processes of shipping operations, they can still select providers with more energy-efficient business practices. Such providers may have lower fuel surcharges than less efficient ones.

Additionally, e-commerce firms have an incentive to minimize the use of packaging. Efficient packaging can lead to cost savings, from reducing the amount of material that needs to be purchased, as well as saving on logistics costs, as more of each product can fit into a single shipping load.

Packaging in the E-Commerce industry has some inherent differences from the packaging necessitated by traditional retail. Goods are displayed online and the purchase has already been made by the time the product reaches the consumer, so the packaging does not have to contain marketing information to entice the consumer to make a purchase. It also does not need to have the same type of anti-shoplifting packaging required by traditional retail. Instead, the main concerns with packaging are that it protects the items being shipped, with additional

benefits associated with the ability to lightweight packaging and more efficiently transport the product.

Innovations in packaging to improve lightweighting and reduce the amount of materials used can have both environmental and cost benefits for leading firms, giving them a competitive advantage over both peers and traditional retailers. Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Total GHG footprint of product shipments; and
- Description of strategies to reduce the environmental impact of product delivery.

Evidence

While the overall E-Commerce industry is presumed to be less carbon intensive than traditional retailers, the responsibility of carbon emissions falls more heavily on e-commerce companies and their third-party logistics providers, rather than on consumers and their transportation emissions associated with traveling to traditional retail stores.⁸⁰ One study suggests that online shoppers are less carbon intensive when compared with in-store shoppers who have to travel more than 8.7 miles to retail locations per transaction. After 8.7 miles, online shoppers' emissions stay relatively flat, while in-store shoppers' emissions can rise exponentially. Conversely, another study looking at the emissions associated with the "last mile," or the last trip between retailer and consumer, suggests that in-store shoppers have to purchase 24 items to generate the same emissions from just one item ordered online. Additionally, the added convenience of ordering even small items online may spur further consumption, which raises

questions for the industry's long-term environmental impacts.⁸¹

Long-term sustainability considerations may present risks for third-party logistics providers in the form of volatile fuel prices or the need to replace vehicles as GHG emissions become more regulated and priced. These costs could then be passed on to e-commerce companies in the form of fuel surcharges or generally higher shipping costs. Shipping costs can be influenced by the volatility in fuel prices, as some large shipping providers adjust fuel surcharges based on the market price for diesel and jet fuel.⁸²

GHG regulations and related cost increases are recognized as a key risk factor in FedEx's fiscal year (FY) 2015 Form 10-K, in which the company states, "Increased regulation regarding GHG emissions, especially aircraft or diesel engine emissions, could impose substantial costs on us, especially at FedEx Express. These costs include an increase in the cost of the fuel and other energy we purchase and capital costs associated with updating or replacing our aircraft or vehicles prematurely."⁸³

The responsibility and risks associated with the carbon footprint of shipping may grow and become more direct as the industry experiments with operating its own logistics fleets. For example, Amazon and eBay, as well as other traditional retailers, are testing their own delivery services to offer more convenience to customers.⁸⁴ This may present direct business challenges associated with volatile fuel costs or capital expenditures for replacing fleet to manage continually evolving fuel-economy standards.

Shipping is a major cost in this industry and has increased over time. In 2014, shipping costs for Amazon represented 9.8 percent of sales, up from 8.9 percent in 2013, representing a significantly growing cost for the company. Amazon expects

shipping costs to continually increase as customers utilize shipping offers, the product mixes shift, and the company chooses more expensive shipping methods.⁸⁵

The relatively low margins in this industry mean that profitability is highly sensitive to shipping prices. Shipping costs will increasingly impact the bottom line for e-commerce companies, as companies compete to offer lower shipping costs and faster shipping times to customers as a differentiating factor. As Amazon notes in its FY2014 Form 10-K, “We believe that offering low prices to our customers is fundamental to our future success, and one way we offer lower prices is through shipping offers.”⁸⁶ This competition on shipping times and costs provides opportunities for optimization in efficiency, which may provide a key business advantage relative to competitors.

As free shipping has become a leading industry practice, shipping costs are no longer as easily passed along to the consumer. This has become a more pressing problem after FedEx announced that it increased its fuel charge from 5.5 percent to 6 percent at the end of 2014, with UPS expected to follow suit.⁸⁷ Additionally, carriers are changing the formula for shipping costs to account for the size of packages, not just the weight, and they are charging more for small packages.⁸⁸ These price increases will cost the E-Commerce industry an estimated hundreds of millions of dollars.⁸⁹

Furthermore, besides the impact of GHG regulations on fuel and fleet costs, packaging plays an important role in influencing shipping costs for e-commerce companies. The new policies could increase the shipping costs of an individual item by up to 30 percent, depending on the size of the parcel.⁹⁰ However, these changes will reward firms that have already been focused on or are now implementing efficient shipping

practices, such as lightweighting packaging, optimizing space, and encouraging customers to group the shipping of purchases together.

Asos, a London-based e-commerce firm that focuses on clothing, uses contractors to ship its products. However, by switching from packing its apparel on pallets to shipping in loose cartons, Asos was able to pack 40 percent more stock onto an average trailer.⁹¹ These efficiencies resulted in lower logistics costs and helped Asos gain market share against larger firms by allowing it to have lower price points for its goods.⁹²

Besides reducing shipping costs, packaging improvements can also lower other operating costs, such as those associated with the purchase of materials for packaging. Staples, which operates one of the largest e-commerce fulfillment businesses in the world, behind Amazon, has implemented a “Smart-size Packaging Program” that optimizes packaging for each order. The program has helped optimize the packaging space per package, helping reduce the amount of corrugated packaging needed by 15 percent and the need for air bags by 60 percent. Additionally, 74 percent of workers find that their jobs are easier because of this program. Not only did this program help reduce the company’s carbon footprint by 25,000 metric tons annually, but it also reduced packaging costs, providing real environmental and economic benefits for the company.⁹³

Beyond cost considerations, packaging efficiency is driven by consumer preferences. Amazon offers “frustration-free packaging,” designed to be easy to open, to be made of recyclable material, and not require a second, external shipping box.⁹⁴ More than 200,000 products are currently available with this designation, and since the concept was unveiled in 2008, it has eliminated 33 million pounds of packaging from Amazon’s

logistics operations.⁹⁵ Products with such packaging have an average of 73 percent less negative consumer feedback on Amazon’s site, compared with feedback for those products that lack the “frustration-free packaging” designation.⁹⁶

Other firms have recently introduced innovations in packaging efficiency. Overstock.com has invested in technology that optimizes the box size for each product, which cuts costs while decreasing the frequency of product damage.⁹⁷ Target has begun using flexible envelopes instead of corrugated boxes to fulfill orders at Target.com, its e-commerce platform, which has reduced packaging by 89 percent and resulted in 50,000 fewer pounds of cardboard shipped annually.⁹⁸

Value Impact

Improved efficiencies in logistics operations can lead to a lower cost structure in the long term, while investments in fuel-efficient logistics fleets will raise capital expenditures, thus having one-off effects on cash flows. Companies can also lower their operating costs by focusing on the efficiencies gained from reducing packaging materials. Lower costs, when passed on to customers, can help drive market share or profitability—meaningful implications in a highly competitive industry with narrow profit margins. Packaging efficiencies could also have positive reputational implications and help add to the brand value of companies.

Inability to manage fuel cost risks and therefore maintain low shipping costs for customers could affect the overall risk profile of companies, with an impact on their cost of capital. This is particularly relevant as the probability and magnitude of financial impacts from this issue are likely to increase in the future, as e-commerce transactions increase and larger companies in the

industry invest in their own logistics fleets. The probability and magnitude are also likely to be influenced by fuel and materials costs being further affected by expanding environmental regulations.

Disclosure around a company’s shipping GHG footprint and a description of strategies to reduce the overall environmental impact of product shipping, which includes packaging, can provide a better understanding of a company’s potential risk exposure to volatile or rising costs, particularly as regulations force the internalization of environmental externalities by businesses.

SOCIAL CAPITAL

Social capital relates to the perceived role of business in society, or the expectation of business contribution to society in return for its license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government.

The vast majority of payments in this industry are electronic, making e-commerce firms vulnerable to the risk of data breaches. Revenue growth and market share are directly dependent on consumers’ trust in the security of their personal and financial information. Members of this industry need to be careful to follow proper data-protection and breach-disclosure expectations to mitigate these risks. Furthermore, there are emerging regulatory and consumer concerns about the use and protection of customer data. How a company handles financial and demographic data is likely to influence whether companies can attract and retain customers and build brand value.

Data Security & Fraud Protection

The general model of e-commerce depends on a firm's ability to process electronic payments securely. As consumers become more educated about the threats of cybercrime, particularly in the wake of continued high-profile attacks, having a reputation as a secure company will become increasingly important to maintain or gain market share. There is an opportunity for the most trusted brands to position themselves favorably in the eyes of consumers and gain a significant competitive advantage.

Unlike the traditional retail space, where the cost of obtaining prime real estate in important markets limits the number of stores and, therefore, competition in a particular geography, online shopping enables multiple vendors to use the internet to access customers in dispersed geographies at little cost. Due to the ease and convenience of browsing the online marketplaces of different e-commerce companies, customers have a larger number of options to choose from in the e-commerce space. This makes customer loyalty, which is highly influenced by customers' perception of the safety of their valuable financial and personal information, particularly important to maintaining market share. Consumer sensitivity to data security is especially challenging for smaller or new e-commerce firms, which can be perceived to be less secure, requiring capital expenditures to establish a robust security system.

Companies that do find themselves compromised must walk a fine line between disclosing the information publicly as soon as possible to avoid more damage to consumers and maintaining an optimal amount of secrecy to deal with the breach without tipping off the intruder.

Companies that are perceived as intentionally not disclosing information about a data breach to the

customers who have been affected open themselves up to public scrutiny as well as potential litigation.

Furthermore, the E-Commerce industry, given its inherent requirement to accept all its payments online, has an outsize risk for credit card fraud because criminals can make purchases remotely, lowering their chance of being caught. Criminals use or buy stolen credit card information, often spreading out their purchases to avoid detection. Once the original cardholder notices a fraudulent transaction and notifies his or her bank, the purchase is then charged back to the e-commerce firm. The company often cannot provide proof of verification of the customer's identity, such as a customer's signature, which is often required for brick-and-mortar sales. These charges are therefore difficult for companies in the E-Commerce industry to dispute. Companies also contend with "friendly fraud," in which customers who actually purchase a good contest the charge as fraudulent, leaving the retailer with the charge. This accounts for roughly one-fifth of all online fraud.⁹⁹

Companies can take several actions to improve data security and prevent fraud. These include placing high-level executives in charge of data security so there is a clear chain of command in the event of a breach; instituting stricter log-in systems for consumer financial data; employing fraud-detection services to identify potentially fraudulent charges before they are processed; maintaining robust data-security response systems and company procedures; and updating systems as the nature of data breaches evolves. These types of measures can be costly, but they are ultimately necessary, as data breaches increase in both cost and frequency.

Company performance in this area can be analyzed in a cost-beneficial way through the

following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Discussion of management approach to identifying and addressing data security risks; and
- Number of data security breaches, percentage involving customers' personally identifiable information, number of customers affected.

Evidence

E-commerce firms are major targets for cyber-attacks, as they process such large amounts of consumer financial data. Nearly 8 to 12 million U.S. consumers suffer from identify theft each year.¹⁰⁰ A 2014 study by Ponemon Institute suggested that the probability of a material data breach (according to study, one that involves a minimum of 10,000 records) for a firm over the next two years is nearly 19 percent.¹⁰¹ A 2014 global study on cybercrime by the security firm Trustwave found that e-commerce made up the largest portion, 54 percent, of assets targeted. This is a significantly larger portion of attacks than those experienced by traditional retail, which constituted 33 percent of assets.¹⁰² The Trustwave study also found that companies with a sophisticated internal data security team that was able to detect the breach could contain the security flaw in one day on average, compared with an average of 14 days if the flaw was detected by someone outside the organization.¹⁰³ Faster detection reduces costs for an organization, as it lowers the number of customers affected and also helps with reputation management.

There is investor interest in disclosures on the issue of cybersecurity. According to a survey of 405 investors released in February 2013 by security firm HBGary Inc., more than 70 percent

of investors are interested in reviewing company cybersecurity practices.^{VII} The U.S. Securities and Exchange Commission (SEC) issued guidance in October 2011 asking all companies to disclose any material information on cyber-attacks or risks. Furthermore, the SEC has asked companies in several sectors for more information about cybersecurity than they provided in their initial Form 10-K filings.¹⁰⁴

Organizations must carefully handle knowledge of a data breach. On the one hand, they may not want to go public with the information until they have eradicated all traces of the malicious software from their system, and they also need to avoid tipping off the criminals. On the other hand, companies have come under public scrutiny for failing to inform consumers immediately that their data has been compromised, which can give the criminals more time to steal from the affected customers.¹⁰⁵ Companies that wait to disclose breaches also open themselves up to government scrutiny.

A recent global study on the cost of cybercrime found that the cost, frequency, and time to resolve cyber-attacks has increased for four consecutive years. The study found that the average annualized cost of cybercrime incurred per organization ranged from \$1.3 million to \$58 million. The average time to resolve a cyber-attack was 32 days, with an average cost to organizations of just more than \$1 million during this period. The technology sector was among the top five sectors in terms of average annualized costs incurred for 2013.¹⁰⁶

While the majority of cyber-attacks are small and influence a low number of consumers, large data breaches do occur and can lead to significant direct and indirect costs for the companies

^{VII} Note that the survey does not refer only to companies in this industry, but to all companies.

targeted. eBay experienced a data breach between late February and early March 2014, in which the personal data of 145 million customers was compromised.¹⁰⁷ As a result of this cyberattack, eBay reported that it incurred \$46 million in expenses related to the cost of investigation, remediation, additional customer support, and marketing.¹⁰⁸ Instead of reporting the news of the breach in a timely manner, eBay waited a few weeks before making a public announcement, thus potentially compromising the data of unknowing customers who signed up for its service during that period. Public concern over this issue has prompted a government response—four states (Connecticut, Florida, Illinois, and California) are investigating the eBay case, in addition to an investigation by the U.K. Information Commissioner's Office. Although the exact legal implications are still unclear, the incident shows that data breaches are being taken more seriously by government officials and could have significant financial repercussions for companies.¹⁰⁹

New disclosure laws have been proposed for breaches. These laws generally deal with the amount of consumer records that need to be breached before companies should notify those harmed. Some companies would like to have more latitude in choosing when to inform consumers about a breach, but certain laws, such as the Florida Information Protection Act of 2014, have instituted a \$1,000-a-day penalty for failure to notify affected customers, which rises to \$50,000 a month 30 days after a breach is detected.¹¹⁰ In response to a rise in data breaches, California proposed the Data Breach Notification Law in October 2014, which places greater responsibility on retailers for breaches of data security, requiring them to provide services like identity-theft protection for any affected customer for a minimum of 12 months.¹¹¹ As of mid-2015, at least 32 states have proposed similar

laws.¹¹² Additionally, as discussed in the Legislative and Regulatory Trends section of this brief, regulation at the federal level has been issued surrounding the sharing of information on data breaches with federal governments.¹¹³

Another example of the magnitude of financial impacts from breaches is the large customer data breach at Target, a traditional retailer. In the fourth quarter of 2013, Target was the victim of a high-profile data breach involving the financial information of 40 million customers and the personal records for an additional 70 million customers.¹¹⁴ In February 2015, Target stated that the breach cost the company \$162 million between 2013 and 2014.¹¹⁵ In August 2015, Target's costs further increased as the company reached an agreement with Visa to reimburse card issuers up to \$67 million for fraudulent charges made as a result of the breach.¹¹⁶ While this breach occurred for customers' data processed in stores, it highlights the importance of protecting customer data across all mediums.

Alibaba, in the F-1 filing for its September 2014 initial public offering (IPO), disclosed that a data breach could affect consumer sentiment and the company's business results: "Our business generates and processes a large amount of data, and the improper use or disclosure of such data could harm our reputation as well as have a material adverse effect on our business and prospects."¹¹⁷ Amazon, in its FY2014 Form 10-K, discloses that data breaches open the firm up to potential legal trouble: "We process, store, and transmit large amounts of data, including personal information... Failure to prevent or mitigate data loss or other security breaches... [could] adversely affect our operating results, result in litigation or potential liability for us, and otherwise harm our business."¹¹⁸ These disclosures demonstrate that substantive and intelligent investment in data security measures

will be a constant and essential factor of success in this industry.

Fraud cost the online retail industry as a whole an estimated \$3.5 billion in 2013, up from \$2.7 billion in 2010.¹¹⁹ This trend will likely continue as U.S. standards on credit card security get stricter for retailers, pushing more fraud to the e-commerce space, where it is harder for firms to detect fraudulent purchases. This will affect companies that are direct victims of fraudulent purchases and subsequent chargebacks, as well as those that intermediate online sales, like Amazon. Amazon guarantees customers reimbursement for fraudulent purchases in order to encourage them to use its platform.¹²⁰

In 2014, eBay's marketplaces segment experienced transaction losses of \$24 million, up by 10 percent from 2013. These losses include charges related to fraud and customer protection.¹²¹ The company recognizes the risk of fraudulent activities in its FY2014 Form 10-K. Specifically, eBay states, "Failure to deal effectively with fraud, fictitious transactions, bad transactions, and negative customer experiences would increase our loss rate and harm our business, and could severely diminish consumer confidence in and use of our services."¹²² Improvements in the perception of e-commerce security may be a competitive advantage for companies operating in the industry.¹²³

Certain credit card companies, such as Visa and MasterCard, provide customers with a PIN authorization for online purchases, which can shift liability back to the bank if an e-commerce firm requires the PIN for purchase. This is a mandated practice in the U.K., but it is not commonly used in the U.S., which may be a factor in the higher fraud rates experienced in the U.S.¹²⁴ E-commerce firms may be able to lower their risk profile by supporting and providing incentives for

their customers to enable this fraud protection. However, firms also need to balance these antifraud precautions with a need to make the user experience as streamlined as possible, so as not to lose business from frustrated customers.

Value Impact

To generate profits, companies in the E-Commerce industry depend on attracting new customers and building customer loyalty. Therefore, their ability to combat cyber-attacks and fraud with minimal disruption to the ease of using their websites can affect their reputation and the competitiveness of their services. This can have direct impacts on market share and revenues over the long term.

Companies may face chronic increases in selling, general, and administrative expenses (SG&A) and extraordinary expenses for small but frequent incidents. Companies could also face significant operating expenses related to provisions for transaction losses associated with credit card fraud. High-impact, low-probability data security incidents can generate substantial one-time costs to remediate, in addition to contingent liabilities, with an impact on companies' risk profile and cost of capital.

Technology system upgrades and other efforts could be required to meet higher standards for data security and fraud prevention and detection, resulting in additional capital expenditures and operating costs. Fraudsters will likely attack a system that has a reputation for being weak, so companies have an incentive to constantly invest in innovative methods of combatting fraudulent charges. Furthermore, violations of new and emerging data security regulations can affect extraordinary expenses due to regulatory fines and remediation requirements. Additionally, security breaches may bring about consumer lawsuits that increase contingent liabilities.

As customers and regulators begin to understand the security implications of customer data generated and saved on the systems of e-commerce companies, and as cyber-attacks continue to grow in both frequency and sophistication, the probability and magnitude of these impacts are likely to increase in the future.

The number of data security breaches, those involving personally identifiable information, and the number of customers affected show the historical strength of companies' data security management and systems and the potential magnitude of financial impacts from breaches, including systems costs and litigation. The discussion of management's approach to identifying and addressing security risks provides a forward-looking indication of the level of risk from data security breaches.

Data Privacy

Large amounts of consumer data are being generated by the increasing use of e-commerce platforms to make purchases. Companies in this industry must carefully manage two separate and often conflicting priorities. On the one hand, companies compete on their ability to leverage data to provide customers with relevant services and targeted advertising or product recommendations based on their preferences and behavior patterns. On the other hand, the fact that companies have access to a wide range of customer data, such as personal, demographic, and behavioral data, raises privacy concerns among users and the public at large, and is leading to increased regulatory scrutiny from the FTC, authorities in Europe, and other jurisdictions (see the Legislative and Regulatory Trends section).¹²⁵

These trends are driving companies to engage in self-policing and to adopt and communicate

policies on customer data use. Consumers can respond negatively to being targeted by advertising or product suggestions if they are unaware, for example, that their previous buying patterns were being tracked. This risk of negative consumer sentiment can be mitigated when firms make their privacy policies easier for the average consumer to understand.

Companies will have to balance customers' expectations of privacy with the use and disclosure of their data, both within and outside the organization, and particularly the sharing of data with third parties. Failure to manage privacy expectations through appropriate policies and practices could affect companies' ability to use customer data to their competitive advantage. Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Percentage of users whose customer information is collected for secondary purpose, percentage who have opted in; and
- Discussion of policies and practices relating to behavioral advertising and customer privacy.

Evidence

E-commerce companies are becoming sensitive to the potential for negative consumer sentiment from perceived breaches of consumer privacy. In its FY 2013 10-K filing, eBay discloses, "Any failure, or perceived failure, by us to comply with our posted privacy policies or with any regulatory requirements... [could] subject us to significant penalties and negative publicity, require us to change our business practices, increase our costs, and adversely affect our business."¹²⁶

A study by Carnegie Mellon University found that subjects were more likely to make purchases from sites where the privacy policy was clear and transparent. In fact, the study reveals that online shoppers would even be willing to pay a premium for goods sold on sites with stronger privacy policies.¹²⁷ Similarly, a recent study conducted by McCann Truth Central found that 70 percent of consumers surveyed worldwide were concerned about the erosion of personal privacy,¹²⁸ and a 2013 JD Power and Associates survey found that 81 percent of consumers felt that they had lost all control over how their data was collected and used by companies.¹²⁹ Companies have to consider their customers' perception of their privacy policy as a key driver of customer loyalty. Netflix's FY2013 Form 10-K filing discusses the company's consideration of this risk: "In addition, if we were to disclose data about our members in a manner that was objectionable to them, our business reputation could be adversely affected, and we could face potential legal claims that could impact our operating results."¹³⁰

Customer concerns have led to some companies, such as online shoe retailer Zappos.com, to "dumb down" their search results. They attempt to blend their sophisticated ad targeting techniques with more generic advertising so that customers don't feel like their privacy has been invaded.¹³¹

Furthermore, a dynamic regulatory environment can affect how some companies in the industry gather useful information on their customers and can increase penalties for data privacy violations. Some states, such as California have implemented regulation that requires operators of commercial websites to disclose how their privacy policy responds to consumers who opt out of the online tracking of personal information, as well as disclose whether third parties have access to tracking consumer information on the operator's

site.¹³² In October 2013, the E.U. introduced draft rules for fines of up to €100 million or 5 percent of annual global sales (whichever is greater) for data-protection violations under revisions to the E.U.'s privacy law (discussed in the Legislative & Regulatory Trends section). Previously, the maximum fine imposed on a company by privacy regulators was only €100,000.¹³³ New E.U. online privacy directives require Internet companies to follow strict rules governing the collection of their consumers' data. For example, consumers must consent to the use of cookies, which track user information and data online. Additionally, companies must disclose how tracking cookies are used. Previously, consent was not needed to track consumer data.¹³⁴

Companies operating in, or looking to expand to overseas markets, must contend with differing forms of privacy regulations that create business risks. For example, Alibaba stated in its FY2014 Form 20-F, "The laws, rules and regulations of other jurisdictions, such as the United States and Europe, may impose more stringent or conflicting requirements and penalties than those in China, compliance with which could require significant resources and costs... Any failure, or perceived failure, by us to comply with our posted privacy policies or with any regulatory requirements or privacy protection-related laws, rules and regulations could result in proceedings or actions against us by government entities or others. These proceedings or actions may subject us to significant penalties and negative publicity, require us to change our business practices, increase our costs and severely disrupt our business."¹³⁵

Value Impact

Industry players depend on collecting user data to target products and advertisements to consumers, which can present privacy concerns that threaten customer usage of their website. Unclear

communication to users regarding privacy policies and use of data for advertising or other purposes is likely to affect company reputation and brand value. Companies are likely to face erosion of their customer base as a result, with an impact on market share and revenue.

Violations of new and emerging data privacy regulations can result in fines that reduce company profitability, with chronic violations resulting in increased government pressure and reputational risks. Violations could also result in regulatory action that forces companies to change their business practices, imposing a new cost burden, or limiting their use of customer data. Such limitations could affect company growth potential. The level of data privacy regulation in new markets may further preempt growth opportunities that reduce revenue potential.

Without clear policies and communications on the use of customer data, companies also expose themselves to the risk of litigation, which could generate significant liabilities.

As customers and regulators begin to understand and respond to the privacy implications of customer data generated and saved on the systems of e-commerce companies, the probability and magnitude of these impacts are likely to increase in the future.

Disclosure of the percentage of customers' information that is collected for secondary purposes and those who opt in can highlight potential risks for companies that may use customer data without permission. Additionally, this provides insight into revenue opportunities associated with a company's ability to leverage customer data. Disclosure on a company's policies associated with the collection and use of data can provide analysts with a clearer picture of the potential brand and regulatory risks to which companies may be exposed, as well as

opportunities companies have to leverage customer data, which can drive revenues.

HUMAN CAPITAL

Human capital addresses the management of a company's human resources (employees and individual contractors), as a key asset to delivering long-term value. It includes factors that affect the productivity of employees, such as employee engagement, diversity, incentives, and compensation, as well as the attraction and retention of employees in highly competitive or constrained markets for specific talent, skills, or education. It also addresses the management of labor relations in industries that rely on economies of scale and compete on the price of products and services. Finally, it includes the management of the health and safety of employees and the ability to create a safety culture within companies that operate in dangerous working environments.

The E-Commerce industry is playing an increasing role in modern economies. Companies thus require experienced and talented employees to develop and advance their technology offerings and capabilities. These requirements for talent, along with the projected growth of the industry, have raised talent-shortage concerns for companies, particularly positions associated with the STEM disciplines. This skills shortage influences a company's decisions regarding developing or recruiting from domestic talent pools and recruiting foreign employees. It also affects companies' ability to ensure diversity in their workforces. An e-commerce company's employee recruitment, inclusion, and engagement practices and policies directly influence the results of its operations, while also having implications for the development of human capital resources in modern economies.

Employee Recruitment, Inclusion, and Performance

Firms in this industry rely on, and compete for, a scarce number of employees with highly technical STEM skill sets. The ability to recruit and retain highly skilled employees is of the utmost importance in a field where technological innovation is a vital part of gaining a competitive edge and increasing market share.¹³⁶

While the number of job openings in the E-Commerce industry is growing, companies are finding it difficult to recruit qualified employees to fill software engineering and research positions. This is due in part to a shortage of qualified STEM workers in the U.S. and leads to intense competition among e-commerce, software and IT services, and Internet media and services companies to acquire highly skilled employees. This competition for talent and the search for innovation opportunities present several inter-related sustainability challenges regarding human capital that companies must manage, including risks related to recruiting foreign employees, ensuring diversity in the workforce, and employing policies to protect employee work-life balance while enhancing productivity.

Currently, industry CEOs feel that there is a lack of sufficient talent in their companies to fulfill the company's mission.¹³⁷ To respond to the domestic talent shortages for STEM-based skills, companies are actively recruiting foreign nationals for their domestic operations. Recruitment of foreign workers can create social tensions in both the host and home countries, as the broader societal impacts of migration are not always fully understood. While the migration of skilled labor benefits the migrating worker, overall, the issue is typically perceived in terms of its negative impacts, which could include the "brain drain" of workers over the long term in the home country

and negative pressure on wages in the host country.¹³⁸ As a result, companies in the E-Commerce industry can face uncertainties about the stability and growth of their migrant workforce in the context of social tensions, immigration policy changes, and protectionist tax or trade policies. In the U.S., in particular, this can play out in the form of the limitations on and risks of recruiting employees on an H-1B (work) visa.

Companies can manage risks associated with obtaining visas for foreign workers through appropriate hiring practices and planning. Companies are also often engaged in lobbying efforts to showcase to policymakers their need for foreign workers and the benefits of a migrant workforce to the economy. In addition, companies can provide funding or undertake other actions to improve education and training of the domestic workforce to secure the required STEM skills in the future.

The industry is currently lagging in diversity, characterized by the relatively low representation of women and minority groups in the workforce, particularly in leadership positions. Recruiting and developing a more diverse talent pool can not only help alleviate the STEM talent shortage but also improve the value of a company's offerings.

Greater workforce diversity is important for innovation and helps companies understand the needs of their diverse customer base, which better enables them to design and showcase desirable products and services and communicate effectively with customers. For e-commerce firms, the need for innovation and the ability to understand the present and future buying patterns and preferences of customers around the world makes this an important issue.

Companies are constrained by low diversity in STEM education and training in the domestic economy. However, companies can take certain

actions to address these constraints and provide equal career progression opportunities for their employees. These include efforts to recruit and develop a diverse and inclusive workforce that at least reflects the makeup of local talent pools and their customers, provide adequate career support to traditionally underrepresented employees, and discourage implicit biases in promotions. Those companies that implement policies to develop a diverse and inclusive workforce have the potential to enhance innovation opportunities that can provide shareholder value over the long term.

Generally, in the context of competition for scarce talent, companies offer significant monetary and nonmonetary benefits to attract employees and to improve employee engagement and, therefore, retention and productivity. Flexible working arrangements are typical in the industry, which may support and respect personal needs, leading to greater employee satisfaction and commitment, but can have the potential to negatively affect work-life balance. Companies that manage this tradeoff effectively and create a working environment that is conducive to improved employee satisfaction and long-term productivity will likely be able to improve employee retention. These policies might also influence the recruitment and retention of a more diverse workforce.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Employee engagement as a percentage;
- Voluntary and involuntary employee turnover;

- Percentage of gender and racial/ethnic group representation for executives, technical staff, and all others;
- Percentage of technical employees who are H-1B visa holders; and
- Percentage of successful H-1B visa applications.

Evidence

Innovations in technology to improve customer experience and provide relevant goods and services are an important determinant of the competitiveness of e-commerce companies. Such innovation requires technical positions that often did not exist a decade ago, such as roles for data scientists to create algorithms that intelligently suggest goods to customers. However, there is currently a deficit of 190,000 qualified data scientists, meaning that the current potential workforce has to rise by 60 percent to meet demand.¹³⁹ In the short to medium term, before the supply of qualified candidates can meet demand, the firms that are able to attract and retain the best technical employees can gain significant competitive advantage.

A 2012 report by Forrester Research found that only 17 percent of e-commerce executives say they felt that they currently had the proper staff in place,¹⁴⁰ suggesting that companies' growth in this industry is being held back by a lack of skilled employees and applicants.¹⁴¹ E-commerce companies are finding it difficult to obtain highly skilled and creative software engineers and computer research scientists, and regularly compete with other technology companies to attract and retain top talent. Between 2010 and 2020, the number of additional annual computing jobs in the U.S. that will require at least a bachelor's degree^{viii} is expected to be around 120,000; in 2010, however, only approximately

^{viii} This refers to overall computing jobs, not limited to software developers or information research scientists.

60,000 bachelor's, master's and PhD degrees were awarded in computer science in the U.S.¹⁴²

The overall number of STEM degrees awarded has slightly increased, while the overall share of bachelor's degrees awarded to STEM fields has shrunk to 15.6 percent in the U.S. This rate compares poorly with that in China, which awarded 46.7 percent of its degrees to STEM fields, along with South Korea, at 37.8 percent; and Germany, at 28.1 percent.¹⁴³ This shortage is due to a number of factors, including student interest and limited number of STEM teachers. A Business Higher Education Forum study concluded that bolstering student interest in these fields at a young age is critically important but that strengthening STEM undergraduate programs in the near term is the best method for improving employers' STEM workforce needs in the short term.¹⁴⁴

All five of the representative companies in this industry (see Appendix I) list the ability to retain and scout top talent in the risk factors section of their 10-K or 20-F forms.¹⁴⁵ Specifically, eBay stated in its FY2014 Form 10-K, "Our success largely depends on key personnel. Because competition for our key employees is intense, we may not be able to attract, retain, and develop the highly skilled employees we need to support our business. The loss of senior management or other key personnel could negatively affect our business."¹⁴⁶

Technology companies, including those in this industry, are employing various measures to address the domestic skills shortage, including recruiting foreign nationals. Computer occupations account for almost three-quarters of STEM requests and 50 percent of all requests for capped H-1B foreign worker visas, which are limited by annual quotas. Amazon was among the

top companies in terms of the highest number of requests of H-1B visas in 2014.¹⁴⁷

While companies in this industry make efforts to recruit qualified workers, they may also benefit from improving levels of diversity throughout the organization, which may help to attract and retain qualified employees. Currently, overall industry performance on diversity is relatively poor. Amazon has been publicly criticized for not having enough women in management roles¹⁴⁸ and has faced calls for the release of diversity data.¹⁴⁹ Other firms, such as eBay, voluntarily disclose diversity data and have been publicly commended for having relatively better diversity numbers than their tech industry peers. However, eBay admits that more work is needed, as its workforce does not mirror its consumer base.¹⁵⁰

In leadership and technical roles, the E-Commerce industry reflects the technology sector's skew toward white and Asian male employees. Among tech employees at eBay, 40 percent are white and 45 percent are Asian, while only 2 percent are black and 2 percent are Hispanic. Women hold only 24 percent of tech roles. In leadership roles, 72 percent of employees are white and 23 percent are Asian, with 2 percent Hispanic and 2 percent black employees in these roles, as well. Women currently represent 28 percent of leadership positions.¹⁵¹ In part, this discrepancy is due to the lack of qualified women and minority candidates. A recent study by the Computing Research Center determined that a typical computer and information science undergraduate class at U.S. universities is about 87 percent men, 66 percent white, 15 percent Asian, 6 percent Hispanic, and 4 percent African American.¹⁵²

Although it is difficult to establish general causality between employee diversity and profitability in the economy, academic studies suggest that diversity is likely to add value for

high-tech, knowledge-intensive industries such as E-Commerce, in which companies rely heavily on quick adaptations to new technologies as a way to differentiate themselves from competition and gain market share. A 2013 working paper synthesizing research on the impacts of diversity on productivity, wages, and profits found that when gender diversity increases by one standard deviation in high tech or knowledge-intensive firms, productivity increases, on average, by between 2.5 and 6 percent. This can be explained by research suggesting that firms that depend on innovations and whose activities involve complex tasks are likely to benefit more from diversity than traditional firms. The paper concludes that effective diversity management, such that the benefits of a more diverse workforce outweigh the costs, is critical for a firm's success. For increased productivity to translate into higher profitability, "the gains of a more diverse workforce in terms of complementary skills and information sets" need to outweigh "additional costs related to communication and conflicts."¹⁵³

A diverse and inclusive workforce is increasingly being recognized in human resources literature as contributing to company value. Recent research suggests that companies that effectively manage gender diversity, especially at the leadership levels, outperform their peers. For example, those companies with a sustained high representation of women on their board of directors outperformed those with a sustained low representation by 46 percent on return on equity.¹⁵⁴ In a survey of 321 executives from global companies with annual revenues of more than \$500 million, 85 percent of respondents agreed that a diverse and inclusive workforce provides different perspectives and ideas that foster innovation.¹⁵⁵

Companies recognize the need to engage employees and promote diversity through all

levels of the organization to better cater to customer needs and inspire innovation. The CIO of eBay stated that employees are the number-one asset at the company. eBay employees devote one day a month to reflect on and consider problems the company should be solving—thus allowing for innovative ideas and solutions to internal and external business issues. eBay also attempts to better engage women employees and develop the next generation of women leaders, stating that diversity in executive positions leads to better business outcomes.¹⁵⁶ In 2010, eBay started an internal program, the Women's Initiative Network, to increase the number of women in leadership roles.¹⁵⁷ While the program helped the company double the number of women in leadership roles, eBay acknowledges that it is far from reaching its goal, as men still held 72 percent of leadership roles as of June 30, 2014.¹⁵⁸

Continued public scrutiny, especially from groups who are specifically calling for reformed diversity policies at technology firms,¹⁵⁹ will likely see more firms voluntarily disclosing their diversity numbers. This growing transparency will also likely bring increasing public criticism to any firm that fails to promote a sufficiently diverse workplace, with reputational implications and possible impacts on market share.

Besides focusing on improving diversity, some companies in the industry also provide flexible working arrangements and other amenities to enhance employee satisfaction and engagement and, therefore, improve recruitment and retention. Reports suggest that tech companies have the highest rates of turnover among all industries surveyed. For example, Amazon has a median employee tenure of one year, making it tied for second with the highest turnover rate among Fortune 500 companies.¹⁶⁰

A study on work-life balance among software employees discusses their long hours and expectations of flexible working arrangements, autonomy, and significant rewards in return. The study concludes that time flexibility, organizational support for nonwork commitments in terms of their effect on career advancement, and low negative work-life spillover are all associated with greater trust in the organization, organizational commitment, and satisfaction with pay, supervision, and career prospects. Evidence not specific to the industry suggests a relationship between these attitudes and actual employee turnover. The study also highlights continued negative attitudes toward workers taking advantage of family-friendly benefits like parental leave, which could affect the careers of women and those with care responsibilities.¹⁶¹

Therefore, employee-engagement initiatives and flexibility in working conditions might influence the recruitment and retention of a more diverse workforce, in addition to improving employee productivity more generally. The opportunity of improving worker satisfaction has become particularly evident at Amazon, which has been criticized in the media for its treatment of workers and lack of a flexible work environment, which has led to lawsuits, and disgruntled workers. While the company has been in favor with investors, it is questioned over whether its alleged treatment of workers is a sustainable strategy in the long term.¹⁶² Employees have asked the company for changes to their current working conditions and policies that “burn out” employees.¹⁶³

Value Impact

As the industry is experiencing a shortage in the number of qualified STEM workers, initiatives to improve the recruitment and retention of talented workers may lead to a competitive advantage. E-commerce companies’ performance in recruiting

and managing a diverse, inclusive, and skilled workforce can influence their revenue-generation ability and cost structure.

Performance on recruiting and managing STEM-qualified employees and ensuring workforce diversity can lead to value creation in the long term through more innovation and a superior ability to cater to a diverse customer base. This can have an impact on a company’s ability to capture new customers, which leads to greater market share. It can also influence companies’ reputation and their ability to attract employees. A company’s effective management of its human capital can serve to lower its operating costs related to recruiting, developing, and retaining employees. As an increasing number of other industries and e-commerce companies compete for STEM-qualified workers and the debate on immigration policies continues to evolve, the probability and magnitude of these impacts are likely to grow in the future.

Disclosure of the percentage of H-1B visa holders within a company and the percentage of successful applications can highlight a company’s risk exposure to new regulation, as well as its ability to fill labor shortage gaps in the short term. Employee engagement and turnover rates indicate a company’s ability to retain its talented and in-demand workforce. High turnover rates can be costly, while strengthening engagement can improve talent retention. Disclosure around diversity can provide insight into a company’s ability to generate innovative ideas and to meet the needs of a broad base of customers, which can lead to long-term revenue growth. Low diversity performance may be indicative of potential reputational harm and legal risks associated with discrimination.

APPENDIX I

FIVE REPRESENTATIVE E-COMMERCE COMPANIES^{ix}

COMPANY NAME (TICKER SYMBOL)
Amazon.com Inc. (AMZN)
Alibaba Group Holding—ADR (BABA)
eBay Inc. (EBAY)
Netflix Inc. (NFLX)
Land's End Inc. (LE)

^{ix} This list includes five companies representative of the E-Commerce industry and its activities. This includes only companies for which the E-Commerce industry is the primary industry, companies that are U.S.-listed but are not primarily traded over the counter (OTC), and companies for which at least 20 percent of revenue is generated by activities in this industry, according to the latest information available on Bloomberg Professional Services. Retrieved on July 1, 2015.

APPENDIX IIA: Evidence for Sustainability Disclosure Topics

Sustainability Disclosure Topics	EVIDENCE OF INTEREST				EVIDENCE OF FINANCIAL IMPACT				FORWARD-LOOKING IMPACT		
	HM (1-100)	IWGs		EI	Revenue & Cost	Asset & Liabilities	Cost of Capital	EFI	Probability & Magnitude	Externalities	FLI
		%	Priority								
Energy & Water Footprint of Hardware Infrastructure	21	94	4	Medium	•		•	Medium	•		Yes
Logistics & Packaging Efficiency	17	94	3	Medium	•	•	•	Medium	•		Yes
Data Security & Fraud Protection	63*	94	1	High	•	•	•	High	•		Yes
Data Privacy	63*	94	2	High	•	•		High	•		Yes
Employee Recruitment, Inclusion, and Performance	33	65	5	Medium	•	•		High	•		Yes

HM: Heat Map, a score out of 100 indicating the relative importance of the topic among SASB's initial list of 43 generic sustainability issues; asterisks indicate "top issues." The score is based on the frequency of relevant keywords in documents (i.e., 10-Ks, 20-Fs, shareholder resolutions, legal news, news articles, and corporate sustainability reports) that are available on the Bloomberg terminal for the industry's publicly-listed companies; issues for which keyword frequency is in the top quartile are "top issues."

IWGs: SASB Industry Working Groups

%: The percentage of IWG participants that found the disclosure topic to likely constitute material information for companies in the industry. (-) denotes that the issue was added after the IWG was convened.

Priority: Average ranking of the issue in terms of importance. One denotes the most important issue. (-) denotes that the issue was added after the IWG was convened.

EI: Evidence of Interest, a subjective assessment based on quantitative and qualitative findings.

EFI: Evidence of Financial Impact, a subjective assessment based on quantitative and qualitative findings.

FLI: Forward Looking Impact, a subjective assessment on the presence of a material forward-looking impact.

APPENDIX IIB: Evidence of Financial Impact for Sustainability Disclosure Topics

Evidence of Financial Impact	REVENUE & EXPENSES							ASSETS & LIABILITIES				RISK PROFILE	
	Revenue			Operating Expenses		Non-operating Expenses		Assets		Liabilities		Cost of Capital	Industry Divestment Risk
	Market Share	New Markets	Pricing Power	Cost of Revenue	R&D	CapEx	Extra-ordinary Expenses	Tangible Assets	Intangible Assets	Contingent Liabilities & Provisions	Pension & Other Liabilities		
Energy & Water Footprint of Hardware Infrastructure				•		•						•	
Logistics & Packaging Efficiency	•			•		•			•			•	
Data Security & Fraud Protection	•			•		•	•		•	•		•	
Data Privacy	•			•			•		•	•			
Employee Recruitment, Inclusion, and Performance	•			•					•				

MEDIUM IMPACT
 HIGH IMPACT

APPENDIX III: Sustainability Accounting Metrics | E-Commerce

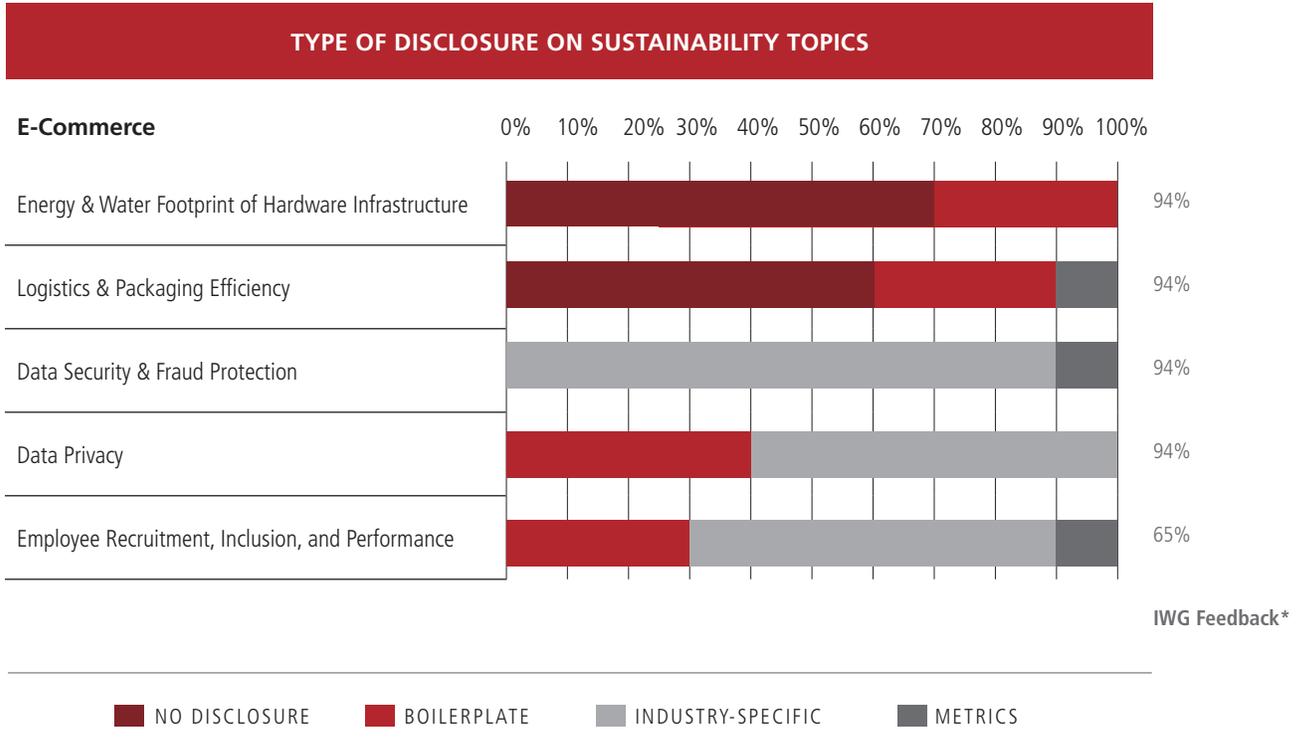
TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Energy & Water Footprint of Hardware Infrastructure	Total energy consumed, percentage grid electricity, percentage renewable energy	Quantitative	Gigajoules (GJ), Percentage (%)	CN0404-01
	(1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m3), Percentage (%)	CN0404-02
	Description of the integration of environmental considerations into strategic planning for data center needs	Discussion and Analysis	n/a	CN0404-03
Logistics & Packaging Efficiency	Total greenhouse gas (GHG) footprint of product shipments	Quantitative	Metrics tons CO2-e	CN0404-04
	Description of strategies to reduce the environmental impact of product delivery	Discussion and Analysis	n/a	CN0404-05
Data Security & Fraud Protection	Discussion of management approach to identifying and addressing data security risks	Discussion and Analysis	n/a	CN0404-06
	Number of data security breaches, percentage involving customers' personally identifiable information (PII), number of customers affected*	Quantitative	Number, Percentage (%)	CN0404-07
Data Privacy	Percentage of users whose customer information is collected for secondary purposes, percentage who have opted in	Quantitative	Percentage (%)	CN0404-08
	Discussion of policies and practices relating to behavioral advertising and customer privacy	Discussion and Analysis	n/a	CN0404-09
Employee Recruitment, Inclusion, and Performance	Employee engagement as a percentage**	Quantitative	Percentage (%)	CN0404-10
	(1) Voluntary and (2) involuntary employee turnover rate	Quantitative	Rate	CN0404-11
	Percentage of gender and racial/ethnic group representation for (1) executives, (2) technical staff, and (3) all others	Quantitative	Percentage (%)	CN0404-12
	Percentage of technical employees who are H-1B visa holders	Quantitative	Percentage (%)	CN0404-13
	Percentage of successful H-1B visa applications	Quantitative	Percentage (%)	CN0404-14

* Note to **CN0404-07**—Disclosure shall include a description of corrective actions implemented in response to data security breaches or threats.

** Note to **CN0404-10**—Disclosure shall include a description of the methodology employed

APPENDIX IV: Analysis of SEC Disclosures | E-Commerce

The following graph demonstrates an aggregate assessment of how representative U.S.-listed E-Commerce companies are currently reporting on sustainability topics in their SEC annual filings.



*Percentage of IWG participants that agreed topic was likely to constitute material information for companies in the industry.

REFERENCES

- ¹ Data from Bloomberg Professional service, accessed August 26, 2014, using the ICS <GO> command. The data represents companies listed on global exchanges and traded over-the-counter (OTC) from the E-Commerce SICs industry, using Level 3 of the Bloomberg Industry Classification System.
- ² Sally Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, IBISWorld Database, July 2014, p. 24.
- ³ Brittany Carter, *Industry Report 45411a E-Commerce and Online Auctions in the US*, IBISWorld Database, May 2015, p. 4.
- ⁴ *Ibid.*, p. 20.
- ⁵ Steven Schaefer, "JD.com IPO Shows Allure of Chinese E-Commerce, with Alibaba on Deck," *Forbes*, May 22, 2014, <http://www.forbes.com/sites/steveschaefer/2014/05/22/jd-com-jumps-in-ipo-debut-chinese-e-retailer-rallies-16/>.
- ⁶ Marc Lajoie and Nick Shearman, "What Is Alibaba?" *Wall Street Journal*, accessed October 20, 2014, <http://projects.wsj.com/alibaba/>.
- ⁷ Drew Harwell, "Web-Retail Titan Alibaba Took Over China. Could America's Web Be Next," *Washington Post*, September 18, 2014, accessed September 18, 2014, http://www.washingtonpost.com/business/economy/web-retail-titan-alibaba-took-over-china-could-americas-web-be-next/2014/09/18/0176a204-3e72-11e4-b0ea-8141703bbf6f_story.html.
- ⁸ Hanna Ben-Shabat, Mike Moriarty, and Parvaneh Nilforoushan, "E-Commerce Is the Next Frontier in Global Expansion," *A.T. Kearney*, 2012, p. 4–5.
- ⁹ Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, p. 5.
- ¹⁰ Allison Enright, "U.S. Online Retail Sales Will Grow 57% by 2018," *Internet Retailer*, May 12, 2014, accessed September 23, 2014, <http://www.internetretailer.com/2014/05/12/us-online-retail-sales-will-grow-57-2018>.
- ¹¹ Richard Dobbs et al., "China's E-Tail Revolution: Online Shopping as a Catalyst for Growth," March 2013, p. 6, https://www.mckinsey.com/~media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Productivity%20Competitiveness%20and%20Growth/China%20e-tailing/MGI_China_e-tailing_Full_report_March_2013.ashx.
- ¹² *Ibid.*, p. 19.
- ¹³ *Ibid.*, p. 9.
- ¹⁴ Sally Lerman, *IBISWorld Industry Report 45291 Warehouse Clubs and Supercenters in the US*, IBIS World Database, June 2014, p. 22.
- ¹⁵ Brittany Carter, *IBISWorld Industry Report 45411 E-Commerce and Online Auctions in the US*, IBIS World Database, May 2014, p. 23.
- ¹⁶ Amazon.com Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed January 30, 2015), p. 26.
- ¹⁷ Brittany Carter, *IBISWorld Industry Report 45411 E-Commerce and Online Auctions in the US*, Ibis World Database, p. 15, 21.
- ¹⁸ Author's calculation from data from Bloomberg Professional service, accessed July 1, 2015, using the ICS <GO> command. The data represents industries listed on global exchanges and traded OTC from the E-Commerce SICs industry, using Level 3 of the Bloomberg Industry Classification System. Author excluded Usell.com and Delaine Corp. from calculations, as they were significant outliers.
- ¹⁹ Farhad Manjoo, "How Amazon's Ambitious New Push for Same-day Delivery Will Destroy Local Retail," *Slate*, July 11, 2012, accessed October 20, 2014, http://www.slate.com/articles/business/small_business/2012/07/amazon_same_day_delivery_how_the_e_commerce_giant_will_destroy_local_retail.html.
- ²⁰ Netflix Inc, FY2014 Form 10-K for the Period Ending December 31, 2014 (filed January 29, 2015), p. 2.
- ²¹ Sarah Perez, "With Newly Announced Expansions, Amazon's Same-day Delivery Service Now Outpaces Competitors," *Tech Crunch*, August 6, 2014, accessed September 14, 2014, <http://techcrunch.com/2014/08/06/with-newly-announced-expansions-amazons-same-day-delivery-service-now-outpaces-competitors/>.
- ²² Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, p. 22.
- ²³ Laura Stevens, "For UPS, E-Commerce Brings Big Business and Big Problems," *Wall Street Journal*, September 11, 2014, accessed October 21, 2014, <http://online.wsj.com/articles/for-ups-e-commerce-brings-big-business-and-big-problems-1410489642>.
- ²⁴ From SASB's internal review of sell side research.
- ²⁵ Charles Harwood, "About the Bureau of Consumer Protection," Federal Trade Commission, last modified April 10, 2013, accessed September 21, 2015, <http://www.ftc.gov/bcp/about.shtm>.

-
- ²⁶ “Press Release—Article 29 Working Party, Joint Opinion on Mobile Apps,” Office of the Data Protection Commissioner—Ireland, accessed April 21, 2013, http://ec.europa.eu/justice/data-protection/article-29/press-material/press-release/art29_press_material/20130314_pr_apps_mobile_en.pdf.
- ²⁷ Stephanie Bodoni, “Mobile Apps Put Users’ Privacy at Risk, EU Regulators Say” *Bloomberg*, March 14, 2013, accessed September 21, 2015, <http://www.bloomberg.com/news/2013-03-14/mobile-apps-put-users-privacy-at-risk-eu-regulators-say.html>.
- ²⁸ Gagan Mehra, “Roundup of Privacy Initiatives, Effect on Ecommerce Merchants,” October 14, 2013, accessed October 20, 2014, <http://www.practicalecommerce.com/articles/59732-Roundup-of-Privacy-Initiatives-Effect-on-Ecommerce-Merchants>.
- ²⁹ “Data Protection in the Electronics Communications Sector,” Europa, May 19, 2010, accessed October 23, 2014, http://europa.eu/legislation_summaries/information_society/legislative_framework/l24120_en.htm.
- ³⁰ “Welcome to the U.S-EU Safe Harbor.” U.S. Exports, May 11, 2012, accessed September 23, 2014, http://export.gov/safeharbor/eu/eg_main_018365.asp.
- ³¹ Eric Sinrod, “United States: Are U.S. Companies Violating European Union Privacy Rules?” *Mondaq*, September 9, 2014, accessed September 29, 2014, <http://www.mondaq.com/unitedstates/x/338944/Data+Protection+Privacy/Are+US+Companies+Violating+European+Union+Privacy+Rules>; “EU Threatens Suspension of Data Deal with US,” Euractiv, January 29, 2014, accessed October 28, 2014, <http://www.euractiv.com/infosociety/eu-threatens-suspension-data-dea-news-533093>.
- ³² Bill Chappell, “Senate Approves USA Freedom Act, Obama Signs It, after Amendments Fail,” NPR, June 2, 2015, accessed September 21, 2015, <http://www.npr.org/sections/thetwo-way/2015/06/02/411534447/senateis-poised-to-vote-on-house-approved-usa-freedom-act>.
- ³³ C. Timberg, and A. Goldman, “U.S. to Allow Companies to Disclose More Details on Government Requests for Data,” *Washington Post*, January 27, 2014, accessed September 21, 2015, http://www.washingtonpost.com/business/technology/us-to-allow-companies-to-disclose-more-details-on-government-requests-for-data/2014/01/27/3cc96226-8796-11e3-a5bd-844629433ba3_story.html.
- ³⁴ “State Security Breach Laws,” American Institute of CPAs, February 11, 2011, accessed September 21, 2015, <http://www.aicpa.org/InterestAreas/InformationTechnology/Resources/Privacy/FederalStateandOtherProfessionalRegulations/StatePrivacyRegulations/Pages/State%20Security%20Breach%20Laws.aspx>; “2015 Security Breach Legislation,” National Conference of State Legislatures, June 11, 2015, <http://www.ncsl.org/research/telecommunications-and-information-technology/2015-security-breach-legislation.aspx>.
- ³⁵ “Cyber Security,” European Commission, accessed October 3, 2014, <http://ec.europa.eu/digital-agenda/en/cybersecurity>.
- ³⁶ C. Strohm, “Cybersecurity Bill Passes House after Obama Veto Threat,” *Bloomberg*, April 18, 2013, accessed April 21, 2013, <http://www.bloomberg.com/news/2013-04-18/cybersecurity-bill-passes-house-after-obama-veto-threat.html>.
- ³⁷ Carl Franzen, “President Obama Signs Cybersecurity Order,” *Verge*, February 12, 2013, <http://www.theverge.com/2013/2/12/3982302/president-obama-signs-cybersecurity-order>.
- ³⁸ Tim Groenfeldt, “American Credit Cards Improving Security with EMV at Last,” *Forbes*, January 28, 2014, accessed October 2, 2014, <http://www.forbes.com/sites/tomgroenfeldt/2014/01/28/american-credit-cards-improving-security-with-emv-at-last/>.
- ³⁹ John Heggstuen, “Here’s What Will Change When the US Switches over to the New EMV Chip on Credit Cards,” *Business Insider*, April 21, 2014, accessed September 23, 2014, <http://www.businessinsider.com/what-will-change-when-the-us-switches-over-to-the-new-emv-chip-on-credit-cards-2014-4#ixzz3Gjb7YNlv>.
- ⁴⁰ “Chargeback Management Guidelines for Visa Merchants,” Visa, 2014, accessed September 21, 2015, <http://usa.visa.com/download/merchants/chargeback-management-guidelines-for-visa-merchants.pdf>.
- ⁴¹ Gautham Nagesh and Amol Sharma, “Court Tosses Rules of Road for Internet,” *Wall Street Journal*, January 14, 2014, accessed September 22, 2014, <http://online.wsj.com/news/articles/SB10001424052702304049704579320500441593462>.
- ⁴² Robert McMillan, “What Everyone Gets Wrong in the Debate Over Net Neutrality,” *Wired*, June 23, 2014, accessed October 19, 2014, http://www.wired.com/2014/06/net_neutrality_missing/.
- ⁴³ “Net Neutrality: What You Need to Know Now,” FreePress, accessed August 25, 2015, <http://www.savetheinternet.com/net-neutrality-what-you-need-know-now>.
- ⁴⁴ Sean Work, “How Loading Time Affects Your Bottom Line,” *Kiss Metrics*, 2011, accessed October 20, 2014, <https://blog.kissmetrics.com/loading-time/>.
- ⁴⁵ Chana Joffe-Walt, “Most People Are Supposed to Pay This Tax. Almost Nobody Actually Pays It,” NPR, April 16, 2013, accessed October 18, 2014, <http://www.npr.org/blogs/money/2013/04/16/177384487/most-people-are-supposed-to-pay-this-tax>.

-
- ⁴⁶ Tad Reuter, "Amazon Will Start Charging Sales Tax in Minnesota," *Internet Retailer*, September 24, 2014, accessed September 28, 2014, <http://www.internetretailer.com/2014/09/24/amazon-will-start-charging-sales-tax-minnesota>.
- ⁴⁷ Bryan Keogh, "E-Retail Faces Patchwork of State Sales-Tax Laws," *Wall Street Journal*, May 13, 2014, accessed October 2, 2014, <http://blogs.wsj.com/cfo/2014/05/13/e-retail-faces-patchwork-of-state-sales-tax-laws/>.
- ⁴⁸ "S. 698: Marketplace Fairness Act of 2015," Gov Track, accessed August 25, 2015, <https://www.govtrack.us/congress/bills/114/s698>.
- ⁴⁹ Bernie Becker, "Congress to Push Internet Sales Tax after Midterm Elections," *Hill*, August 23, 2014, accessed September 28, 2014, <http://thehill.com/policy/finance/domestic-taxes/218576-congress-to-push-internet-sales-tax-after-midterms>.
- ⁵⁰ Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, p. 29.
- ⁵¹ "Watching water. A guide to evaluating corporate risks in a thirsty world," *JPMorgan Global Equity Research*, March 31, 2008.
- ⁵² Sam Lewis, "Is TJX the Retailers of the Future?" *Integrated Solutions for Retailers*, October 31, 2013, accessed October 18, 2014, <http://www.retailsolutionsonline.com/doc/is-tjx-the-retailer-of-the-future-0001>.
- ⁵³ Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, p. 2.
- ⁵⁴ M. Barg, "Software and Services Industry Report," Sustainalytics, 2012.
- ⁵⁵ J Koomey, "Growth in Data Center Electricity Use 2005 to 2010," *Analytics Press*, report completed at the request of the *New York Times*, August 2011, accessed on September 18, 2015, <http://www.analyticspress.com/datacenters.html>.
- ⁵⁶ Gary Cook, "Clinking Green: How Companies are Creating the Green Internet," Greenpeace, April 2014, p. 10.
- ⁵⁷ Amanda, "China E-Commerce Market to Reach 30 Trillion Yuan in 2020" *China Internet Watch*, March 13, 2013, accessed October 11, 2014, <http://www.chinainternetwatch.com/2007/china-e-commerce-market-2020/#ixzz3GjdQepNA>.
- ⁵⁸ Cook, "Clinking Green," p. 10.
- ⁵⁹ "Average Retail Price of Electricity, Monthly," U.S. Energy Information Administration, accessed August 11, 2015, <http://www.eia.gov/electricity/data/browser/#/topic/7?agg=0.1&geo=g&endsec=vg&linechart=ELEC.PRICE.US-ALL.M~ELEC.PRICE.US-RES.M~ELEC.PRICE.US-COM.M~ELEC.PRICE.US-IND.M&columnchart=ELEC.PRICE.US-ALL.M~ELEC.PRICE.US-RES.M~ELEC.PRICE.US-COM.M~ELEC.PRICE.US-IND.M&map=ELEC.PRICE.US-ALL.M&freq=M&start=200103&end=201504&ctype=linechart<ype=pin&rtype=s&maptype=0&rse=0&pin=>.
- ⁶⁰ "Growth in Residential Electricity Prices Highest in 6 Years, but Expected to Slow in 2015," U.S. Energy Information Administration, March 16, 2015, accessed September 1, 2015, <http://www.eia.gov/todayinenergy/detail.cfm?id=20372>.
- ⁶¹ Ibid.
- ⁶² "Electricity: End-Use Prices: All Sectors Average: Multiple Cases," U.S. Energy Information Agency, accessed September 1, 2015, <http://www.eia.gov/beta/aeo/#/?id=8-AEO2015®ion=0-0&cases=ref2015~highmacro~lowmacro~highprice~lowprice&start=2013&end=2040&f=A&linechart=~8-AEO2015.64.highmacro-d021915a~8-AEO2015.64.highprice-d021915a~8-AEO2015.64.lowmacro-d021915a~8-AEO2015.64.lowprice-d021915a~8-AEO2015.64.ref2015-d021915a&map=&ctype=linechart&chartindexed=1>.
- ⁶³ T. Randall, "Enlightened Power: New Eco Warriors Are Really Well Armed," *Bloomberg*, January 29, 2014, accessed January 29, 2014, <http://www.bloomberg.com/news/2014-01-29/enlightened-power-new-eco-warriors-are-really-well-armed.html>.
- ⁶⁴ "Shareholder Resolutions," Ceres, accessed October 20, 2014, <http://www.ceres.org/investor-network/resolutions>.
- ⁶⁵ Cook, "Clinking Green," p. 43.
- ⁶⁶ Aaron Gell, "Amazon Flunks New Energy Report—Facebook and Amazon get 'A's" *Business Insider*, April 2, 2014, accessed October 20, 2014, <http://www.businessinsider.com/greenpeace-cloud-computing-report-2014-4>; Peter Burrows, "Greenpeace Says Apple, Amazon Clouds Are Dirty, but They Disagree," *Bloomberg*, April 17, 2012, accessed October 20, 2014, <http://go.bloomberg.com/tech-blog/2012-04-17-greenpeace-says-apple-amazon-clouds-are-dirty-but-they-disagree/>.
- ⁶⁷ eBay Inc., *Corporate Sustainability Report*, 2013, p. 24.
- ⁶⁸ Heather Clancy, "Why Facebook, eBay Measure Power and Water Consumption in their Data Centers," *Forbes*, March 16, 2014, accessed October 11, 2014, <http://www.forbes.com/sites/heatherclancy/2014/03/16/why-facebook-ebay-measure-power-and-water-consumption-in-their-data-centers/>.
- ⁶⁹ eBay Inc., "Digital Service Efficiency," accessed September 20, 2014, <http://tech.ebay.com/dashboard>.
- ⁷⁰ Ibid.

-
- ⁷¹ James Niccolai, "New Data Center Survey Shows Mediocre Results for Energy Efficiency," *Computer World*, April 12, 2013, accessed September 29, 2014, <http://www.computerworld.com/article/2496597/data-center/new-data-center-survey-shows-mediocre-results-for-energy-efficiency.html>.
- ⁷² Marc Gunther, "eBay's Renewable Energy Boom Latest in Green Data Center Race," *GreenBiz*, June 22, 2012, accessed October 20, 2014, <http://www.greenbiz.com/blog/2012/06/22/ebays-renewable-energy-bloom-latest-green-data-center-race>; Rich Miller, "eBay Goes Live with Its Bloom-Powered Data Center," *Data Center Knowledge*, September 26, 2013, accessed September 5, 2015, <http://www.datacenterknowledge.com/archives/2013/09/26/ebay-goes-live-with-its-bloom-powered-data-center/>.
- ⁷³ Sustainable Business, "ebay Will Add Waste Heat to Power Utah Data Center," *Green Biz*, October 4, 2013, <http://www.greenbiz.com/blog/2013/10/04/ebay-tap-waste-heat-power-data-center>.
- ⁷⁴ Derrick Harris, "Alibaba's Cloud Business Has Built a Data Center Cooled by Lake Water," *Fortune*, September 5, 2015, accessed September 18, 2015, <http://fortune.com/2015/09/08/alibaba-lake-water-data-center/>.
- ⁷⁵ Rich Miller, "Data Centers Move to Cut Water Use," April 9, 2009, accessed January 29, 2014, <http://www.datacenterknowledge.com/archives/2009/04/09/data-centers-move-to-cut-water-waste/>.
- ⁷⁶ Drew Fitzgerald, "Data Centers and Hidden Water Use," *Wall Street Journal*, June 24, 2015, accessed July 31, 2015, <http://www.wsj.com/articles/SB10007111583511843695404581067903126039290>.
- ⁷⁷ "Grand New Canals," *Economist*, September 27, 2014, accessed October 20, 2014, <http://www.economist.com/news/leaders/21620202-vast-new-waterways-will-not-solve-chinas-desperate-water-shortages-grand-new-canals>.
- ⁷⁸ Fitzgerald, "Data Centers and Hidden Water Use."
- ⁷⁹ Mark Gregory, "Inside Facebook's Green and Clean Arctic Data Centre," *BBC News*, June 14, 2013, <http://www.bbc.com/news/business-22879160>.
- ⁸⁰ Anna Argyridou, "The Environmental Impact of Online Shopping: Nitty-Gritty," Stanford University, accessed August 26, 2015, https://alumni.stanford.edu/get/page/magazine/article/?article_id=30436.
- ⁸¹ Lindsay Clinton, "Online Commerce: Cutting Energy and Resource Use—but at What Cost?" *Guardian*, September 3, 2014, <http://www.theguardian.com/sustainable-business/2014/sep/03/online-commerce-store-amazon-zappos-grocery-delivery-usps-carbon-emissions>.
- ⁸² "Fuel Surcharges," FedEx, accessed September 9, 2015, <http://www.fedex.com/us/services/fuelsurcharge.html>.
- ⁸³ FedEx Corp, FY2015 Form 10-K for the Period Ending May 31, 2015 (filed July 14, 2015), p. 85.
- ⁸⁴ Greg Bensinger and Laura Stevens, "Amazon, in Threat to UPS, Tries Its Own Deliveries," *Wall Street Journal*, April 24, 2014, <http://www.wsj.com/articles/SB10001424052702304788404579521522792859890>.
- ⁸⁵ Amazon.com Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed January 30, 2015), p. 26.
- ⁸⁶ Ibid.
- ⁸⁷ Josh Beckerman, "FedEx Plans January Rate Boost," *Wall Street Journal*, September 16, 2014, accessed September 11, 2014, <http://online.wsj.com/articles/fedex-plans-january-rate-boost-1410904056>.
- ⁸⁸ Dan Weissmann, "UPS and FedEx Increase Fuel Surcharge—Because They Can," *Marketplace World*, February 3, 2015, <http://www.marketplace.org/topics/world/ups-and-fedex-increase-fuel-surcharge-%E2%80%93because-they-can>.
- ⁸⁹ Laura Stevens, "Web Shoppers Beware: FedEx to Charge by Package Size," *Wall Street Journal*, May 7, 2014, accessed September 22, 2014, <http://online.wsj.com/news/articles/SB10001424052702304655304579547632772245734>.
- ⁹⁰ Robert Bowman, "With FedEx and UPS Rate Increases Looming, Shippers Explore Their Options," *Forbes*, August 19, 2014, accessed September 29, 2014, <http://www.forbes.com/sites/robertbowman/2014/08/19/with-fedex-and-ups-rate-increases-looming-shippers-explore-their-options/>.
- ⁹¹ "Carbon and Energy," Asos, 2012, accessed October 20, 2014, <http://www.asosplc.com/responsibility/sustainable-business/the-environment/carbon-and-energy.aspx>.
- ⁹² Ibid.
- ⁹³ "Staples Takes Top Prize with Move to Smart Packaging," *Supply Chain Brain*, accessed August 3, 2015, <http://www.supplychainbrain.com/content/nc/research-analysis/supply-chain-innovators/single-article-page/article/staples-takes-top-prize-with-move-to-smart-packaging-1/>.
- ⁹⁴ "Frustration-Free Packaging," Amazon.com Inc., accessed October 20, 2014, <http://www.amazon.com/b?ie=UTF8&node=13786331>.
- ⁹⁵ Amazon.com Inc., FY2013 Form 10-K for the Period Ending December 31, 2013 (filed January 30, 2014), p. 6.
- ⁹⁶ Stephanie Clifford, "Packaging Is All the Rage, and Not in a Good Way," *New York Times*, September 7, 2010, accessed September 22, 2014, http://www.nytimes.com/2010/09/08/technology/08packaging.html?_r=0.
- ⁹⁷ Overstock, *Corporate Sustainability Report*, 2012, p. 12.

-
- ⁹⁸ Target Inc., *Corporate Sustainability Report*, 2012, p. 12.
- ⁹⁹ Thad Rueter, "E-Retailers Face the Threat of So-Called 'Friendly Fraud,'" *Internet Retailer*, February 27, 2014, accessed October 22, 2014, <http://www.internetretailer.com/2014/02/27/e-retailers-face-threat-so-called-friendly-fraud>.
- ¹⁰⁰ "2013 LexisNexis® True Cost of FraudSM Study: Merchants Struggle Against an Onslaught of High-Cost Identity Fraud and Online Fraud," LexisNexis, 2013, p. 7, <https://www.lexisnexis.com/risk/downloads/assets/true-cost-fraud-2013.pdf>.
- ¹⁰¹ Ponemon Institute, "2014 Cost of Data Breach Study: United States," May 2014, accessed October 22, 2014, p. 3, www.ibm.com/services/costofbreach.
- ¹⁰² Trustwave, "2014 Trustwave Global Security Report," 2014, p. 2, <https://www.trustwave.com/Resources/Library/Documents/2014-Trustwave-Global-Security-Report/>.
- ¹⁰³ *Ibid.*, p. 14.
- ¹⁰⁴ C. Strohm, "Cyberattacks Abound Yet Companies Tell SEC Losses Are Few," *Bloomberg*, April 3, 2013, accessed April 21, 2013, <http://www.bloomberg.com/news/2013-04-04/cyberattacks-abound-yet-companies-tell-sec-losses-are-few.html>.
- ¹⁰⁵ Andy Greenberg, "eBay Demonstrates How Not to Respond to a Huge Data Breach," *Wired*, May 23, 2014, accessed September 22, 2014, <http://www.wired.com/2014/05/ebay-demonstrates-how-not-to-respond-to-a-huge-data-breach/>.
- ¹⁰⁶ "2013 Cost of Cyber Crime Study," Ponemon Institute, 2013, http://media.scmagazine.com/documents/54/2013_us_ccc_report_final_6-1_13455.pdf.
- ¹⁰⁷ Greenberg, "ebay Demonstrates How Not to Respond to a Huge Data Breach."
- ¹⁰⁸ eBay Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed February 6, 2015), p. 48.
- ¹⁰⁹ Ryan Mac, "California Joins Other States in Investigation of eBay Hack," *Forbes*, May 23, 2014, accessed September 24, 2014, <http://www.forbes.com/sites/ryanmac/2014/05/23/as-ebay-notifies-users-of-hack-states-launch-investigation>; Jim Finkle and Karen Freifeld, "U.S. States Probe eBay Cyber Attack as Customers Complain," Reuters, May 22, 2014, accessed October 18, 2014, <http://www.reuters.com/article/2014/05/22/us-ebay-password-idUSBREA4K0B420140522>; Ryan Neal, "UK Joins Investigation of eBay Data Breach: Did Company Do Enough to Protect User Data?" *International Business Times*, May 23, 2014, <http://www.ibtimes.com/uk-joins-investigation-ebay-data-breach-did-company-do-enough-protect-user-data-1589452>.
- ¹¹⁰ Alison Diana, "Florida Law Aims to Tighten Data Security," *InformationWeek Health Care*, July 7, 2014, accessed September 22, 2014, http://www.informationweek.com/healthcare/security-and-privacy/florida-law-aims-to-tighten-data-security/d/d-id/1279159?itc=edit_in_body_cross.
- ¹¹¹ Anthony Lupo et. al, "High Profile Data Breaches Spur Legislative Action on Cyber Security," Arent Fox LLP, August 19, 2014, accessed September 21, 2014, <http://www.mondaq.com/unitedstates/x/335322/Data+Protection+Privacy/High+Profile+Data+Breach+Spur+Legislative+Action+on+Cyber+Security>; Tanya Forsheit and M. Scott Koller, "California's Latest Amendments to Its Data Security Breach Notification Law—Much Ado about Nothing?" BakerHostetler, October 2, 2014, accessed August 11, 2015, <http://www.bakerlaw.com/alerts/californias-latest-amendments-to-its-data-security-breach-notification-law-much-ado-about-nothing>.
- ¹¹² "2015 Security Breach Legislation," National Conference of State Legislatures, June 11, 2015, accessed August 8, 2015, <http://www.ncsl.org/research/telecommunications-and-information-technology/2015-security-breach-legislation.aspx>.
- ¹¹³ Carl Franzen, "President Obama Signs Cybersecurity Order," *Verge*, February 12, 2013, <http://www.theverge.com/2013/2/12/3982302/president-obama-signs-cybersecurity-order>.
- ¹¹⁴ Drew Reading and Poonam Goyal, "Home Depot Data Breach Likely More Headline than Business Risk," Bloomberg Industries Industry Primer (BI MMERN command), Bloomberg Professional Services, p. 2, accessed August 20, 2015.
- ¹¹⁵ Ingrid Lunden, "Target Says Credit Card Data Breach Cost It \$162M in 2013–14," *TechCrunch*, February 25, 2015, accessed August 17, 2015, <http://techcrunch.com/2015/02/25/target-says-credit-card-data-breach-cost-it-162m-in-2013-14/>.
- ¹¹⁶ Robin Sidel, "Target Reaches Settlement with Visa over 2013 Data Breach," *Wall Street Journal*, August 18, 2015, accessed August 18, 2015, <http://www.wsj.com/articles/target-reaches-settlement-with-visa-over-2013-data-breach-1439912013>.
- ¹¹⁷ Alibaba Group Holdings Ltd, Form F-1 (filed May 6, 2014), p. 25.
- ¹¹⁸ Amazon.com Inc, FY2014 Form 10-K for the Period Ending December 31, 2014 (filed January 30, 2015), p. 10.
- ¹¹⁹ Paul Demery, "Online Fraud Costs E-retailers \$3.5 billion in 2012," *Internet Retailer*, March 28, 2013, accessed October 20, 2014, <http://www.internetretailer.com/2013/03/28/online-fraud-costs-e-retailers-35-billion-2012>.
- ¹²⁰ Amazon.com Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed January 30, 2015), p. 13.

-
- ¹²¹ eBay Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed February 6, 2015), p. 57.
- ¹²² *Ibid.*, p. 30.
- ¹²³ “2013 LexisNexis® True Cost of FraudSM Study,” p. 7.
- ¹²⁴ “What Is Liability Shift,” World Pay, <http://support.worldpay.com/support/kb/bg/authentication/auth1010.html>.
- ¹²⁵ O. AKharif, “Google to Apple Gird for FTC-Led Mobile-Privacy Crackdown,” *Bloomberg*, February 25, 2013, accessed April 21, 2013, <http://www.bloomberg.com/news/2013-02-26/google-to-apple-gird-for-ftc-led-mobile-privacy-crackdown-tech.html>.
- ¹²⁶ eBay Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed February 6, 2015), p. 29.
- ¹²⁷ V. Chegar, “The Extinction of Online Anonymity,” *ESG Matters* 3, Allianz Global Investors, May 2012, <http://www.allianzglobalinvestors.co.uk/en/products/InstitutionalClientsOld/rcm/Documents/ESGMattersIssue.pdf>.
- ¹²⁸ Gina Pingitore et al, “Data Privacy and Ownership: What Consumers Think,” J.D. Power and Associates, February 2013, p. 5, <https://c.ymcdn.com/sites/www.casro.org/resource/collection/0A81BA94-3332-4135-97F6-6BE6F6CEF475/Paper - Gina Pingitore - JD Power and Kristin Cavallaro - SSL.pdf>.
- ¹²⁹ *Ibid.*
- ¹³⁰ Netflix Inc., FY2013 Form 10-K for the Period Ending December 31, 2013 (filed February 3, 2014), p. 7.
- ¹³¹ Paul Demery, “How Zappos Balances Privacy and Targeted Ads,” *Internet Retailer*, October 12, 2012, accessed October 11, 2014, <http://www.internetretailer.com/2012/10/19/how-zappos-balances-privacy-and-targeted-ads>.
- ¹³² “State Laws Related to Internet Privacy,” National Conference of State Legislatures, last modified February 24, 2015, accessed September 10, 2015, <http://www.ncsl.org/research/telecommunications-and-information-technology/state-laws-related-to-internet-privacy.aspx>.
- ¹³³ S. Bodoni, “EU Panel Backs Fines up to \$137 Million in Privacy Law,” *Bloomberg*, October 21, 2013, accessed January 31, 2014, <http://www.bloomberg.com/news/2013-10-21/eu-panel-backs-fines-up-to-137-million-in-privacy-law.html>.
- ¹³⁴ Michael Cobb, “For U.S. Companies, EU Cookie Compliance Calls for Website Changes,” *Tech Target*, accessed September 13, 2015, <http://searchsecurity.techtarget.com/tip/For-US-companies-EU-cookie-compliance-calls-for-website-changes>.
- ¹³⁵ Alibaba Group Holding, FY2014 Form 20-F for the Period Ending March 31, 2015 (filed June 25, 2015), p. 14.
- ¹³⁶ Lerman, *Industry Report 45411 E-Commerce and Online Auctions in the US*, p. 20.
- ¹³⁷ Zak Stambor, “Good Help Is Hard to Find,” *Internet Retailer*, January 9, 2012, accessed October 20, 2014, <http://www.internetretailer.com/2012/01/09/good-help-hard-find>.
- ¹³⁸ P. Collier, “Migration Is Expensive, but Pays Off in Productivity,” *Bloomberg*, August 27, 2013, <http://www.bloomberg.com/news/2013-08-27/migration-is-expensive-but-pays-off-in-productivity.html>.
- ¹³⁹ Claire Cain Miller, “Data Science: The Numbers of Our Lives,” *New York Times*, April 11, 2013, accessed September 23, 2014, http://www.nytimes.com/2013/04/14/education/edlife/universities-offer-courses-in-a-hot-new-field-data-science.html?pagewanted=all&_r=0.
- ¹⁴⁰ Zak Stambor, “Good Help Is Hard to Find,” *Internet Retailer*, January 9, 2012, accessed October 20, 2014, <http://www.internetretailer.com/2012/01/09/good-help-hard-find>.
- ¹⁴¹ Cliff Saran, “IT Headcount Lags behind Growth in Digital Strategies,” *Computer Weekly*, May 19, 2014, accessed October 14, 2014, <http://www.computerweekly.com/news/2240220876/IT-headcount-lags-behind-growth-in-digital-strategies>.
- ¹⁴² “A National Talent Strategy, Ideas for Securing U.S. Competitiveness and Economic Growth,” Microsoft, 2012, p. 3 and endnote 9.
- ¹⁴³ “Increasing the Number of STEM Graduates: Insight from the U.S. STEM Education and Modeling Project,” Business Higher Education Forum, 2010, p. 4, http://www.ncci-cu.org/downloads/BHEF_STEM.pdf.
- ¹⁴⁴ *Ibid.*, p. 2.
- ¹⁴⁵ Amazon.com Inc., FY2013 Form 10-K for the Period Ending December 31, 2013 (filed January 30, 2014), p. 9; eBay Inc., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed February 6, 2015), p. 52; Netflix Inc., FY2013 Form 10-K for the Period Ending December 31, 2013 (filed February 3, 2014), p. 10; Alibaba Group Holdings Inc., Form F-1 (filed May 5, 2014), p. 22; Jd.com Inc., Form F-1 (filed January 30, 2014), p. 13.
- ¹⁴⁶ eBay Inc., FY14 Form 10-K for the Period Ending December 31, 2014 (filed February 6, 2015), p. 38.
- ¹⁴⁷ “2014 H1B Visa Report,” My Visa Jobs, accessed October 20, 2014, <http://www.myvisajobs.com/Reports/2014-H1B-Visa-Sponsor.aspx>.

¹⁴⁸ Juliette Garside, "Amazon Employs 18 Women among 120 Most Senior Managers," *Guardian*, April 25, 2014, accessed September 23, 2014, <http://www.theguardian.com/technology/2014/apr/25/amazon-employs-18-women-among-120-senior-managers>.

¹⁴⁹ Jessica Guynn, "Jesse Jackson Targets Amazon.com over Diversity," *USA Today*, September 3, 2014, accessed September 20, 2014, <http://www.usatoday.com/story/tech/2014/09/03/amazon-diversity-jesse-jackson-rainbow-push/15032879/>.

¹⁵⁰ Michelle Angier and Beth Axelrod, "Realizing the Power of Talented Women," *McKinsey Quarterly*, September 2014, accessed September 25, 2014, http://www.mckinsey.com/insights/organization/realizing_the_power_of_talented_women.

¹⁵¹ Lisa Eadicicco, "eBay Just Released Its Diversity Numbers, and They're Better Than Some Other Companies in Silicon Valley," *Business Insider*, July 31, 2014, <http://www.businessinsider.com/ebay-diversity-statistics-2014-7>.

¹⁵² Julianne Pepitone, "Tech Industry's Diversity Problem Starts in College—and Earlier," *CNN Money*, November 10, 2011, accessed February 6, 2014, http://money.cnn.com/2011/11/09/technology/diversity_college_degrees/.

¹⁵³ A. Garnero, S. Kampelmann, and F. Rycx, "The Heterogeneous Effects of Workforce Diversity on Productivity, Wages, and Profits," *Centre pour la recherche économique et ses applications document de travail no 1304*, September 2013, p. 4–5, <http://www.cepremap.fr/depot/docweb/docweb1304.pdf>.

¹⁵⁴ "The Bottom Line: Corporate Performance and Women's Representation on Boards (2004–2008)," *Catalyst*, March 1, 2011, <http://www.catalyst.org/knowledge/bottom-line-corporate-performance-and-women%E2%80%99s-representation-boards-2004%E2%80%932008>.

¹⁵⁵ "Global Diversity and Inclusion: Fostering Innovation Through a Diverse Workforce," *Forbes Insights*, www.forbes.com/forbesinsights.

¹⁵⁶ Scott Seese, "eBay's CIO Focuses on Employee and Customer Engagement," *CIO.com*, April 29, 2013, <http://www.cio.com/article/2386447/staff-management/ebay-s-cio-focuses-on-employee-and-customer-engagement.html>.

¹⁵⁷ Angier and Axelrod, "Realizing the Power of Talented Women."

¹⁵⁸ "Building a Stronger, Better, More Diverse eBay," eBay, July 31, 2014, accessed October 10, 2014, http://www.ebayinc.com/in_the_news/story/building-stronger-better-more-diverse-ebay.

¹⁵⁹ Guynn, "Jesse Jackson Targets Amazon.com over Diversity"; "Mission," Kapor Center, accessed October 20, 2014, <http://kaporcenter.org/>.

¹⁶⁰ "Tech Companies Have Highest Turnover Rate," *Tech Republic*, accessed September 11, 2015, <http://www.techrepublic.com/blog/career-management/tech-companies-have-highest-turnover-rate>.

¹⁶¹ D. Scholarios and A. Marks, "Work-Life Balance and the Software Worker," *Human Resource Management Journal* 14, no. 2, 2004, p. 54–74.

¹⁶² Jodi Kantor and David Streitfeld, "Inside Amazon: Wrestling Big Ideas in a Bruising Workplace," *New York Times*, August 15, 2015, accessed September 21, 2015, <http://www.nytimes.com/2015/08/16/technology/inside-amazon-wrestling-big-ideas-in-a-bruising-workplace.html>.

¹⁶³ Daniel Kline, "Employees Are Finally Asking Amazon.com Inc. for Changes," *Motley Fool*, August 26, 2015, accessed September 21, 2015, <http://www.fool.com/investing/general/2015/08/26/employees-are-finally-asking-amazoncom-inc-for-cha.aspx>; David Streitfeld and Jodi Kantor, "Jeff Bezos and Amazon Employees Join Debate over Its Culture," *New York Times*, August 17, 2015, accessed September 21, 2015, <http://www.nytimes.com/2015/08/18/technology/amazon-bezos-workplace-management-practices.html>.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450

San Francisco, CA 94111

415.830.9220

info@sasb.org

www.sasb.org

ISBN#: 978-1-940504-61-2

The content made available in this publication is copyrighted by the Sustainability Accounting Standards Board. All rights reserved. You agree to only use the content made available to you for non-commercial, informational or scholarly use within the organization you indicated you represent to keep intact all copyright and other proprietary notices related to the content. The content made available to you may not be further disseminated, distributed, republished or reproduced, in any form or in any way, outside your organization without the prior written permission of the Sustainability Accounting Standards Board. To request permission, please contact us at info@sasb.org.