World Studies

An Investigation on the Impacts of Big Data Technology

Global Theme: Science, Technology and Society

Disciplines: Business Management & Information Technology in a Global Society

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Abstract

This essay will examine the following question: How does Big Data technology impact businesses, and communities in the national and international level? Big Data technology harness computers to analyze a vast quantity of digital information and predict future trends. Its role in technological evolution, of which the world is dependent upon makes Big Data technology a worthwhile topic to investigate.

The global theme considered in this essay is science, technology and society. This essay uses aspects from two IB disciplines: business management and information technology in a global society. Business management involves case studies and analysis of successful business models. By using various examples, this essay will examine how personalized marketing maximizes revenue for a company. Furthermore, it will explore the efficiency, accuracy and low cost Big Data technology brings to business.

The subject of information technology in a global society considers how technology and data collection affects people and their communities. A large portion of the essay will explore the benefits Big Data technology brings to the citizens and government of a country, and at an international scale. On the other hand, this essay will also explore the drawbacks regarding personal privacy. This occurs when vast amounts of digital information collected by technology companies are leaked or misused. Examining both sides of the argument provides a comprehensive picture of the effects and future for this new technology.

The conclusion drawn from this essay proves Big Data technology to be of incredible assistance in the marketplace, and vital for the security and order of the national and international community. Although there are drawbacks to collecting personal information from citizens, the

misuse of information is always a risk. The benefits that Big Data technology brings to humanity outweigh its drawbacks, proving worthy to hold much potential for the global community.

(299 words)

Introduction

Technology has developed exponentially throughout the last century, allowing it to become a necessity for over 40% of the human population[1]. For the daily lives of many individuals, using the internet to check emails and communicating with relatives over social media has become a ritual. The efficiency of technology also allows for more innovative breakthroughs in the professional community, making it a worthwhile area of global study.

A recent evolution in technology is the making and use of Big Data technology. Although Big Data technology is a relatively new concept and still in its infancy stage, it proves to have much potential in changing the lives of the international community. This essay will explore the following question: How does Big Data technology impact businesses, and communities in the national and international level? In Cukier and Schönberger's novel *Big Data: A Revolution That Will Transform How We Live, Work and Think,* Big Data technology is defined as the "ability of society to harness information to produce insights on goods and services.[2]" The science behind Big Data technology is using machine learning. Machine learning requires feeding small sets of training data to a computer for it to analyze and find a correlation of patterns. Afterward, data scientists adjust mathematical models based on the feedback from computers and input larger sets of data. This allows the computers to generalize patterns based on experience, and later predict similar correlations for larger and messier sets of data[3]. Not only does Big Data technology have the flexibility to embrace vast amounts of real-world information, it has been praised to be accurate and efficient. This has allowed Big Data technology to be integrated into

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[1] "Number Of Internet Users (2016) - Internet Live Stats". 2016. *Internetlivestats.Com*. http://www.internetlivestats.com/internet-users/.

[2] Mayer-Schönberger, Viktor and Kenneth Cukier. 2013. *Big Data*. 1st ed. Boston: Houghton Mifflin Harcourt.

[3] Domingos, Pedro. 2017. *A Few Useful Things To Know About Machine Learning*. Ebook. 1st ed. Seattle: University of Washington. Accessed January 19. https://homes.cs.washington.edu/~pedrod/papers/cacm12.pdf.

many successful businesses models. The specific reasons why businesses employ Big Data technology, and an analysis of its benefits both for the company and its customers will be analyzed as part of the business management discipline of this essay.

Having stated that Big Data technology requires an astronomical supply of digital information to make predictions, it is necessary to question where this information comes from. Data is taken from databases and social media sites to collect a myriad of digital information. Facebook, for example, gets over ten million photos every hour and leaves a digital trail over three billion times a day[4]. With continuous improvements in the speed and efficiency of collecting data, the risk of losing privacy becomes an emerging threat. Yet, the results of Big Data technology has proved to continuously benefit businesses and global communities such as preventing crime and signaling the spread of epidemics. The second discipline explored in this essay is information technology in a global society, which analyzes the effects of technology on the human population.

This essay demonstrates that Big Data technology brings valuable benefits to businesses, the national and international community. It also proves that these benefits outweigh the risk Big Data technology brings to user privacy.

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[4] Mayer-Schönberger, Viktor and Kenneth Cukier. 2013. *Big Data*. 1st ed. Boston: Houghton Mifflin Harcourt.

Body

The Benefits of Big Data Technology at a Business Level

Personalized Marketing

For decades, businesses have revolved around the product model to guarantee customer satisfaction. This meant "finding and reaching customers, transacting a sale, distributing the product or delivering the service.[5]" With the efficiency of Big Data technology, the product model has transformed into a service model. Today, market research allows companies to directly target customers based on their preference and buying patterns. An example is Wal-Mart. This transnational corporation was one of the first in the marketplace to mine sales data through algorithms that analyze information commonly purchased together in a particular sequence[6]. Wal-Mart discovered from Big Data technology that before a hurricane, the sale of pop-tarts rose 70% because more customers were storing food. This pattern gave Wal-Mart indication to stock their shelves with pop-tarts before the next natural disaster, gaining huge amounts of profit in the endeavor.

Not only does personalized marketing save businesses money when it comes to investments, it also guarantees the best shopping experience for customers. According to magazine *Canadian Grocer*[7], "You come up with a strong list of 20 items per household that you think they're likely to buy, and on the day the flyer comes out, you send those households an email listing those Top 20 products, telling them they're on sale at their favourite store." The

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[5] Ovans, Andrea. 2015. "What Is A Business Model?". *Harvard Business Review*. https://hbr.org/2015/01/what-is-a-business-model.
[6] "The Walmart Big Data Case Study: Think Large, Act Small". 2016. *Bridg | Retail & Restaurant Predictive Technology*. http://bridg.com/blog/walmart-big-data/.

[7] "Big Data Is Changing Grocery". 2016. *Marketingmag.Ca*. http://www.marketingmag.ca/brands/big-data-is-changing-grocery-149735.

implementation of Big Data technology highlight its ability to personalize the lives of customers, making the shopping experience quick and easy. This in addition to companies investing the resources wisely, gives businesses an edge in the competitive marketplace.

An intriguing example of the accuracy in personalized marketing is evident with the American company Target[8]. Target's computer system realized that expecting mothers would buy unscented lotions during the third month of pregnancy, and then soon pay for supplements such as magnesium, zinc, and calcium. This pattern enabled Target to calculate a "pregnancy prediction" for every customer who walked in. On one account, a father stormed into a Target store in Minnesota because his teenage daughter was receiving coupons for baby clothes and cribs. When Target's manager called the father soon after to explain for their mistake, it was the father who apologized after discovering his daughter was actually pregnant. This example is limited in that the scenario is unique and rarely found in real life. Additionally, the use of Big Data technology did not benefit the shopping experience and may have lost revenue for Target. Nevertheless, this superpower inherent of Big Data technology—to *accurately* predict an event becomes essential when businesses want to sell products with low risk and high success.

E-Commerce and Recommendation Engines

E –commerce is a new branch of business that values the internet to make transactions and business deals[9]. According to the *Canada Post* in 2014, 76% of Canadians today do their shopping online[10]. Kaufman, an entrepreneurship foundation says that "due to social networking,

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[8] Mayer-Schönberger and Cukier 2013

[9] Fontinelle, Amy. 2016. "Electronic Commerce - Ecommerce". *Investopedia*. http://www.investopedia.com/terms/e/ecommerce.asp.

[10] CBC News,. 2015. *76% Of Canadians Shopped Online Last Year, Canada Post Says*. The Canadian Press. http://www.cbc.ca/news/business/76-of-canadians-shopped-online-last-year-canada-post-says-1.3070651.

the internet, mobile telephony and all kinds of new technologies that create and capture data"[11],

companies today are incorporating e-commerce to take advantage of consumer attachment and

dependence on technology. One of the key tools businesses use to ensure customer satisfaction

are recommendation engines. Backed by Big Data technology, recommendation engines are

tailored offers that are highly relevant to the customer's interest.[12] A case study analyzing the

success of recommendation engines is the company Amazon.

Case Study- Amazon

Amazon, a company founded by Jeff Bezos in 1994 started out as an online bookstore

and quickly became an iconic role model for the future of e-commerce[13]. Amazon's success

arises from harnessing Big Data technology to make immediate, effective and real-time decisions

based on consumer demands. For example, the company developed recommendation engines

that automated customer service systems by adjusting sites to suite satisfaction every 15

seconds[14]. The company also recognized the variety Big Data technology provides when

interacting with consumers on social media. This includes monitoring blogs, target marketing,

introducing new products and reaching out to customers during public relations. Controlling the

quantity of information and making smart decisions allowed Amazon to maintain a fine balance

between supplier needs and consumer demands. Furthermore, because Big Data technology

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[11] Akter, Shahriar and Samuel F. Wamba. 2016. *Big Data Analysis In E-Commerce: A Systematic Review And Agenda For Future Research*. Ebook. 1st ed. Institute of Applied Informatics at University of Leipzig. http://link.springer.com/article/10.1007/s12525-016-0219-0

[12] *Personalized Recommendations*. 2014. Ebook. 1st ed. Accenture. https://www.accenture.com/t20150523T135428__w__/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Technology_8/Accenture-Interactive-PoV-ARE-5-15-14.pdf.

[13] "History Of And Information On Amazon.Com". 2016. *The Balance*. https://www.thebalance.com/amazon-com-company-research-2071316.

[14] Akter, Shahriar and Samuel F. Wamba. 2016. *Big Data Analysis In E-Commerce: A Systematic Review And Agenda For Future Research*. Ebook.

provides an abundance of different varieties of information, it created a historic account that kept track of what aspects of e-commerce benefited Amazon, helping it develop into the future.

Increasing Efficiency and Minimizing Risk

An assistant professor at Harvard University ran a contest to see if Big Data technology or tradition could best predict the results of the Supreme Court cases that year[15]. He made a statistical model, and compared his algorithm to 87 law professors who were familiar on "jurisprudence and what each of the justices had decided in previous cases". The assistant professor, who had no previous knowledge on court cases won. In this particular example, Big Data technology is efficient, because the user is not required to have any previous training in a particular field. Furthermore, patterns concluded from Big Data technology are flexible and adaptable to a variety of situations. For employers who are training employees, Big Data technology will dramatically decrease time, money and effort invested to specialize workers. Instead, the company can focus to create targeted products for their customers.

In addition to the inherent efficiency of Big Data technology, it also maximizes decision making by minimizing risk-taking. This was proven in 2009 when Oren Ezioni created the project "Hamlet" to buy plane tickets.[16] Taking a risk, Ezioni bought plane tickets early believing they would be cheaper. He was frustrated, however, after finding the price of his ticket to be significantly higher compared to another man's recent purchase. Ezioni's program "Hamlet" (later bought by Microsoft), aimed to predict when an airline ticket price would go up or down. He sampled 12,000 prices from travel websites over the course of 41 days. "Hamlet" saved air

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[15] Shaw, Jonathan. 2014. "Why "Big Data" Is A Big Deal". *Harvard Magazine*. http://harvardmagazine.com/2014/03/why-big-data-is-a-big-deal.

[16] Mayer-Schönberger and Cukier 2013

travelers on average \$50 per ticket, with an accurate prediction 75% of the time. The reason why Big Data technology is so accurate in its predictions is due to a large sample size. During machine learning, the computer finds trends and disregard outliers, ensuring a consistent performance. [17] Compared to conventional data collection carried out by humans, its objectivity and accuracy is reliable and minimizes blind risk taking. Provided the shortest path and best business deals, Big Data technology provides employers dependable information to make the smartest decisions.

According to *Ivey Business Journal*,[18] Big Data technology is the new competitive advantage because it is timely, accessible, trustworthy and actionable. For an average business that does not incorporate Big Data technology, 50% of senior executives admit that accessing accurate and relevant data is difficult. Workers spend 60% of their effort every day to find and manage data, 29% of the company measures outdated information and results in 46% of companies making wrong decisions that cost the company billions[19]. Statistics show that Big Data technology immediately assesses risks worth taking and considers other alternatives. More importantly, it will benefit the company by looking into the future and predict trends such as consumer needs, giving companies the time and confidence to act before it is too late.

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[17] "Center For Research And Scientific Computing | Just Another Tulane Wordpress Network Site". 2016. *Crsc.Tulane.Edu*. https://crsc.tulane.edu/.

[18] McGuire, Tim, James Manyika, and Michael Chui. 2015. "Why Big Data Is The New Competitive Advantage". *Ivey Business Journal*. http://iveybusinessjournal.com/publication/why-big-data-is-the-new-competitive-advantage/.

[19] Karr, Douglas. 2016. "What Is Big Data? What Are The Benefits Of Big Data?". Blog. *Marketing Techblog*. https://marketingtechblog.com/benefits-of-big-data/.

Lowering Cost

In addition to the efficiency of Big Data technology, its low cost in comparison with conventional forms of data collection is highly favorable for businesses. A petabyte cluster costs around $1 million, whereas a conventional data warehouse costs $10s-$100s of millions.[20] Businesses today invest in cloud storage, which are massive storage structures without significant capital investment in tools or hardware[21]. According to *Market Blog*, storing digital information in cloud storage offers "highly indexed and optimized data structures, automatic archival and extraction capabilities[22]." It has provided companies with "more accurate analyses" that enables businesses to make more profitable decisions.

The Benefits of Big Data Technology at a National and International Level

Recently, the Government of Canada has provided an online census for every family to input private information. Our family received a survey that included questions such as 'How many people are in the family? How many people work? Etc…' This survey is a prime example of "crowd-searching", a system where the government can collect and store large amounts of information with permission, to draw the larger picture of a nation. Other examples of crowd-searching include phone apps, where citizens are encouraged to report civic issues to the government. Not only does crowd-searching engage the public towards a nation's cause, the cost

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[20] "Forbes Welcome". 2017. *Forbes.Com*. http://www.forbes.com/sites/ciocentral/2012/04/16/the-big-cost-of-big-data/#40a3a8826a21.

[21] Chouffani, Reda. 2013. "5 Reasons To Move To Big Data (And 1 Reason Why It Won't Be Easy)". *CIO*. http://www.cio.com/article/2385690/big-data/5-reasons-to-move-to-big-data--and-1-reason-why-it-won-t-be-easy-.html.

[22] Karr, Douglas. 2016. "What Is Big Data? What Are The Benefits Of Big Data?". Blog. *Marketing Techblog*. https://marketingtechblog.com/benefits-of-big-data/.

of social services are significantly decreased[23]. In addition, the government becomes a transparent body which diminishes the chance of corruption and unjust distribution of information. By collecting and storing vast amounts of personal data, the government is given the opportunity to address many different goals, namely: prevent crime, achieve sustainable development, and promote the general welfare and economic growth.

Big Data technology is a relatively new process, however, the world has seen many governments incorporate the system. For example in 2012, the Obama Administration of the United States announced the *Big Data Research and Development Initiative* to be implemented[24]. This was a $200 million invested project to fund the use of Big Data technology in federal departments and agencies to strengthen national security and accelerate scientific discoveries. Its increased prominence has made it widespread across all seven continents to ensure citizen welfare and safety.

Predictive Policing

Big Data technology has made crime prevention easy as computer systems increasingly capture, store and analyze geographical information (GIS) [25]. GIS allows for strategic planning. This includes predicting a potential crime location, known as "hotspots" and notifying the closest personnel in the vicinity. The efficiency brought to predictive policing was proven to be very successful in a 7-day study in East Midlands of the United Kingdom. Big Data technology pinpointed hotspots as neighbouring houses of a family who were recently robbed. Of the

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[23] V, Morabito. 2015. *Big Data And Analytics For Government Innovation*. Ebook. 1st ed.

[24] Kim, Gang-Hoon, Silvana Trimi, and Ji-Hyong Chung. 2014. "Big-Data Applications In The Government Sector". *Researchgate*. https://www.researchgate.net/publication/262211098_Big-Data_Applications_in_the_Government_Sector.

[25] Rathbone, Daniel and Abbi Hobbs. 2014. *Big Data, Crime And Security*. Ebook. 1st ed. Houses of Parliament: Parliamentary Office of Science and Technology.

projected "hot spots", 78% were predicted accurately using Big Data technology compared to traditional techniques.

Despite the superpower to predict and prevent, there are drawbacks to calculating an individual's risk of crime. Imagine if movies became a reality and an officer stops a criminal before a crime was even committed! Would people feel safe? To some extent yes…, but without proper control, Big Data technology can lead to discrimination of individuals who share particular characteristics with criminals, but may have never committed a crime themselves. In the US, some states such as Philadelphia and Chicago are using Big Data technology to support a police piloting program. This gives officers the authority to visit the homes of individuals they identify as likely perpetrators of a crime. In this sense, Big Data technology can be detrimental, reducing privacy and increasing racial profiling.

Monitoring Financial Crime

Another purpose Big Data technology serves is monitoring financial crime and bank fraud. The HM Revenue and Customs implemented a Big Data system in 2013 called "Connect" to detect fraud in electronic bank transfers[26]. The system found correlations in simple searches and analyzed profiles that had data patterns indicative of a crime. The company recovered $2.6 billion dollars from the $45 million originally invested. Big Data technology is efficient and accurate compared to conventional methods of collecting and analyzing information, increasing its potential to be invested in by many governments.

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[26] Rathbone, Daniel and Abbi Hobbs. 2014. *Big Data, Crime And Security*. Ebook. 1st ed. Houses of Parliament: Parliamentary Office of Science and Technology.

Strengthening the Health of Nations around the World

While addressing the well-being of nations are governments primary concerns, multiplying populations make the process increasingly chaotic. Harnessing Big Data technology to create patterns and correlate probabilities will streamline the process. This was evident in the 2009 H1N1 epidemic. Using 450 million mathematical models, Google compiled 50 million of the most common search terms typed by Americans, such as "medicine for cough"[27]. They then compared the results with the predictions of actual flu cases from 2007 to 2008. The company discovered a combination of 45 search terms that provided a confident correlation between predictions and the official figures worldwide. This allowed Google to narrow down specific areas that were infected by the flu. Big Data technology, therefore, has the potential to prevent the spread of disease in the future and save lives before cases are detected. These benefits are also evident with the Bureau of Labor Statistics publishing monthly price indexes[22]. The purpose of price indexes is to analyze inflation rates and from there adjust economic policies to ensure a healthy economy. Previous to using Big Data technology, the Bureau hired hundreds of staff members in 90 cities to report 80,000 prices that cost $250 million every year. The results seemed to be clean and orderly, provided however it was too slow. After incorporating Big Data technology into the government system, the Bureau was able to collect half a million prices of products sold in the US per day, a better alternative than conventional methods to monitor the economy.

Not only are the benefits of Big Data technology seen in America, its role in improving the health of a nation has spread to countries all over the world. In 2011, the United Kingdom's HSC Foresight International Dimensions of Climate Change promoted the use of Big Data

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[27] Mayer-Schönberger and Cukier 2013

technology to analyze weather patterns as a source of climate change[28]. Similarly MOPAS, the Ministry of Food, Agriculture, Forestry and Ministry of Public Administration Plan in South Korea launched a system using Big Data technology to prevent foot and mouth disease syndrome[29]. Large quantities of information related to animal disease oversea, immigration records, farm-breeding surveys and livestock migration were analyzed as a result. Ranging from economy to national security, Big Data technology can harness real-time data to make fast and accurate decisions to protect the international community.

Privacy of the International Community

Drawbacks to Personal Privacy

In 2013, US citizen Edward Snowden became an international celebrity. Known by some as a hero and by others as a criminal, Snowden released millions of government documents that contained telephone records of customers to the public. According to Snowden, the National Security Agency "targets the communications of everyone, collects them, filters them, analyzes them, measures them and stores them for periods of time." The American government has this information for census but also crime prevention. Snowden felt "the public needs to decide whether these programs and policies are right or wrong", rather than the hands of the government[30]. Snowden's leak of private information was a wake-up call to people who had no knowledge, control or liberty of the collection and storage of their private information.

While Snowden's leak raised awareness for the protection of personal privacy, the leaks from the popular Ashley Madison dating site proved much more disastrous. Ashley Madison was

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[28] Kim, Gang-Hoon, Silvana Trimi, and Ji-Hyong Chung. 2014. "Big-Data Applications In The Government Sector". *Researchgate*.

[29] Kim, Gang-Hoon, Silvana Trimi, and Ji-Hyong Chung. 2014. "Big-Data Applications In The Government Sector". *Researchgate*.

[30] Moretti, Anthony. 2013. "Whistleblower Or Traitor:Edward Snowden, Daniel Ellsberg And The Power Of Media Celebrity". Ph.D, Robert Morris University.

found in 2008 with the intention of helping married couples have affairs. When looking for partners, personal information such as height, weight, address and credit card numbers are stored in the Ashley Madison database[31]. In 2015 the site was hacked, targeting 37.6 million users. Suddenly, high profile individuals worldwide were exposed. Some victims who were unwilling to face tragic repercussions committed suicide, including a priest living in the United States. This example is another tragic flaw of Big Data technology. The vast amounts of information, ideally used for a beneficial purpose to provide customers with the best user experience, becomes an opportunity for attackers to hunt and hurt a population. With the evolution of Big Data technology, speed and efficiency of data collection will only be made easier. Yet due to the benefits it brings to businesses and the national and international community, the use of Big Data technology becomes a continuous debate within the global community.

Positively Impacting the International Community

The other side of this debate considers the benefits of Big Data technology. This essay has outlined its advantages to businesses and the national and international community. It will now address the concept of non-identifiable information and the valuable innovations available for individuals worldwide that was created from collecting personal information.

Many technology companies such as Google stores 24 petabytes of personal data per day, a volume that is thousands of times the quantity of all printed material in the United States Library of Congress[32]. While the information is collected from private users, a large quantity of the information is un-identifiable. For example, the global positioning system (GPS) pinpoints a

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[31] Lamont, Tom. 2017. "Life After The Ashley Madison Affair". *The Guardian*. https://www.theguardian.com/technology/2016/feb/28/what-happened-after-ashley-madison-was-hacked.
[32] Mayer-Schönberger and Cukier 2013

location on a map by compiling un-identifiable geographical information[33]. Google also stores

billions of audio samples from around the world to invent autocorrect and voice recognition.[34]

The large quantity of gathered material is anonymous, with the sole purpose of innovating

technologies to benefit a global population. Without the use of Big Data technology, these

technologies would not exist. People's lives that are dependent on technology will thus be

dramatically changed.

The benefits of Big Data technology has proven to be a *fact*. Whereas, leaking private

information from collecting astronomical amounts of data is a *risk* that may occur even without

the use of Big Data technology. Many companies are incorporating policies and judicial laws to

enforce user protection. Mark Zuckerberg, the founder of Facebook has included privacy features

that will control who will see one's post[35]. He has also settled with the Federal Trade

Commission to integrate internal controls preventing third-party editors from sharing public

information. Companies are making an effort to enforce user privacy, and ultimately, it becomes

the user's responsibility to minimize the risk of security breach.

The motives of technological companies such as Google and Facebook are storing private

information to heighten user experience. While these examples are advantageous, it greatly

contrasts leaks by Snowden and hackers of the Ashley Madison website that shows large data

collection can potentially harm a population. It becomes a question of: are we willing to sacrifice

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[33] Manjoo, Farhad. 2016. "Google Privacy: The Good Things That Happen When Web Companies Use Our Personal Data.". *Slate Magazine*.
http://www.slate.com/articles/technology/technology/2011/04/no_more_privacy_paranoia.html.
[34] Manjoo, Farhad. 2016. "Google Privacy: The Good Things That Happen When Web Companies Use Our Personal Data.". *Slate Magazine*.
http://www.slate.com/articles/technology/technology/2011/04/no_more_privacy_paranoia.html.
[35] Manjoo, Farhad. 2016. "You're As Much To Blame For Facebook'S Privacy Woes As Mark Zuckerberg". *Slate Magazine*.
http://www.slate.com/articles/technology/technocracy/2011/11/facebook_privacy_you_re_as_much_to_blame_for_t he_site_s_privacy_woes_as_mark_zuckerberg_.html.

some of our rights to continue living a life dependent on technology? This essay proves that the benefits of Big Data technology for the global community significantly outweigh the drawbacks presented.

Conclusion

The research question explores: "How does Big Data technology impact businesses, and communities in the national and international level?" For businesses, Big Data technology is employed as a marketing strategy, transforming traditional product models to personalized service models. Many companies such as Wal-Mart and Amazon now use recommendation engines to secure customer satisfaction and loyalty towards their company. The inherent accuracy of data collection using Big Data technology minimizes risk taking for businesses and increases efficiency. Last but not least, data clusters and storage devices cost significantly less compared to traditional data warehouses, giving businesses more leeway to invest in more valuable structures.

The benefits of Big Data technology is also evident in securing order and safety at a national and international level. Many governments are planning to enact "predictive policing" to prevent crimes from occurring at "hotspots" identified using Big Data technology. It also comes into play when monitoring financial crime and detecting bank fraud. In a wider perspective, Big Data technology has the ability to monitor the economy, contain the spread of epidemics, and secure a healthy global society. From the analysis conducted in this essay, it is concluded that Big Data technology provides valuable benefits for business models in the competitive marketplace, and contributes greatly to the safety and security of the global community.

Apart from predicting that Big Data technology provides benefits to businesses, the national and international community, the thesis also states that "the benefits outweigh any

drawbacks information technology brings to user privacy." Explored at the end of the essay is the idea that collecting large quantities of private information invades user privacy. Additionally, it gives hackers an opportunity to re-wire and attack other populations. Clearly, Big Data technology has its limitations with the quantity of information necessary to function. Despite its downsides, however, the vast collection of private information has led to the developments of the GPS system, voice recognition and autocorrect and have benefited a large portion of humanity. Furthermore according to Google, the vast majority of the information is un-identifiable, protecting user identity. Through many case studies, it is concluded that Big Data technology has benefited businesses and national and international communities to a greater degree than the drawbacks to privacy.

Limitations

Although many case studies have demonstrated the potential of Big Data technology, many people throughout the world are still skeptical and unmotivated to implement it into their system. Firstly, there is a lack of data scientists who have the ability to modify models so computers can analyze a wide variety of digital information. Secondly, the relatively new concept brings a fear for many companies on how to harness and protect such a vast quantity of information. At the end of the day, the global community must make a decision that considers both the benefits and drawbacks of Big Data implantation. Big Data technology has so far benefited the world confidently and continues to grow in potential for years to come.

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