Strategies for Implementing Big Data Analytics

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Abstract:

The purpose of this work is to identify the opportunities and risks of companies adopting big data analytics capabilities and advise companies on how to best incorporate big data analytics into their current systems and business models. Section one of the paper examines how companies can understand big data and analytics tools and use data from both internal and external sources to drive their overall strategies. This section focuses on internal sources of data including data collected from operations and inventory tracking systems and external sources of data referring to data coming from social media platforms. By analyzing data from these sources, companies can better integrate their different business functions to cut costs and increase efficiency as well as learn more about their consumers through social media sentiment analysis.

After discussing the tools available and the information to be gained from big data analytics, the second section of the paper focuses on how companies should go about managing their big data initiatives. It calls for proper planning and training of employees and incorporating data analytics as a driver of all strategic decisions. Next, section three acknowledges threats to big data projects that companies must recognize and attempt to mitigate in order to be successful.

The fourth and final section of the paper gives examples of analytics leaders such as Amazon, Netflix, Target, and Geico and details how these companies have used big data analytics to drive their success. This section also contains a case study on J.C. Penney’s recent failed turnaround under CEO Ron Johnson and gives recommendations to the company on how it should incorporate big data analytics in order to refocus its operations, reconnect with customers, and prosper in the future.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Section 1: Big Data, Tools, &amp; Technology</td>
<td>4</td>
</tr>
<tr>
<td>Section 2: Managing Big Data Initiatives</td>
<td>12</td>
</tr>
<tr>
<td>Section 3: Threats to Big Data</td>
<td>17</td>
</tr>
<tr>
<td>Section 4: Case Studies</td>
<td>23</td>
</tr>
<tr>
<td>Conclusion</td>
<td>29</td>
</tr>
</tbody>
</table>
**Introduction:**

Big data is the most powerful trend in the realm of information technology today. Data is the new driving force behind corporate strategies as companies have begun to recognize the importance of knowing their businesses as well as knowing their customers. The World Economic Forum has, “declared data a new class of economic asset, like currency or gold” (Lohr). In fact, businesses are already seeing the benefits of big data analytics. In a study by MIT and IBM, researchers found that companies who, “agreed that the use of business information and analytics differentiates them within their industry were twice as likely to be top performers” (Kiron). MIT has also found that the results of using big data analytics are enormous and that those companies who use data to innovate enjoy returns on investments of 5-6% (Kiron). Although the technology for processing big data is ever-evolving in terms of its capacity to process greater amounts of data, process data faster, analyze different forms of data, and filter data to reflect accurate results, it is important for companies to invest in this field early.

There are two important sources of data that companies need to explore: internal data, such as operations and inventory tracking data, and external data such as weather patterns, macroeconomic events, and most social media data. The two sources that will be stressed in this paper are internal company data and social media data coming from Facebook and Twitter. By looking at companies like Amazon, Geico, Netflix, and Target one can begin to explore the possibilities that come from understanding data. Facebook and Twitter also drive many companies’ ability to understand their consumer bases and can offer valuable insight into public opinion of a given brand or product. Though there are many risks that come with big data analytics—security, availability of data, social media biases, and privacy concerns to name a few—the benefits outweigh the risks and companies must be willing to move forward with those risks.
in mind.

At the same time that there is all this potential with big data and companies need to adopt big data strategies as soon as possible, it is imperative to remember that big data initiatives can fail. There are many complications beyond the general big data risks to incorporating analytics into the core of the organization's operations. McKinsey & Company, a global management consulting firm, stresses that planning for big data initiatives needs to incorporate new management strategies and an overall corporate vision of how to use the information gained as well as new technology. With these ideas in mind this paper will conclude by examining the recent failure of J.C. Penney's turnaround with CEO Ron Johnson and provide final recommendations to the company and others in similar positions on how to succeed by understanding themselves and their customers through data analytics. Companies must recognize the need to know more about their operations and their consumers and create customized plans to incorporate big data analytics into the corporate culture in order to succeed in today's competitive markets.

Section 1: Big Data, Creating Value, and Tools & Technology

This section explores what big data is and how to derive value from analytics as well as the main tools for big data analytics (including tools for Twitter and Facebook) and the capabilities and potential of social media analytics.

What is Big Data?

It is first important to explain what is meant by the term big data. Big data is the name given to data that is just outside of technology’s processing abilities (Armour). It is usually characterized by the four “V’s,” namely volume, velocity, variety and veracity (Zikopoulos). Though big data is technically that which technology is not currently capable of processing, it is
used in business to describe any data that meets the criteria listed in the four “V's.” To give
some context to these characteristics, think of social media. There are currently 655 million
daily active users on of Facebook as of March of this year (Tomaszczyk). As of Twitter’s
seventh birthday, users were posting over 400 million tweets each day (Tsukayama). The sheer
volume of the data coming in through social media sources is enormous. The speed of which it
is coming in at 400 million tweets per day poses further challenges to those trying to make sense
of the raw data available. Now, recall that users do not just post data to these sites in text form;
they post in a variety of forms such as pictures, videos, and audio. Finally, IBM claims a need
for a fourth “V” veracity because not all of the data coming in is reliable (Zikopoulos).
Especially in the case of social media data, many would argue that much of the data is not
always complete or accurate. Despite the complexity surrounding harnessing big data,
businesses of all kinds would benefit greatly from investing in technologies that help them make
sense of their own data as well as data from outside sources.

**Deriving Value from Analytics:**

Why are analytics so valuable? What information can companies extract from their own
data? What is to gain from external data, whether public or from social media sources? These
are the main questions companies need to consider internally when adopting big data capabilities.
The answer is that analytics can support and drive every aspect of a business. This is because
analytics provides knowledge. The company learns about itself-its internal operations; about its
customers-who they are demographically, what they like; and about market trends-under what
conditions do consumers purchase certain products. Analytics of internal operations data such as
inventory tracking, customer relations data, and employee data can all help businesses make
decisions.
Bringing in data from outside sources is a way for companies to supplement the information they have already gathered about themselves and create a more comprehensive picture of their businesses. Not only can companies use customer preference data to produce more effective marketing and increase revenue, but they can also learn from social media analytics what the customer expects and wants to buy next. This is known as “next product to buy” analytics. It helps companies stay ahead of the curve with innovative products that match customer needs (Daruvala). In an interview, McKinsey director Toos Daruvala also discusses the ability of data analytics to help companies manage risk. Many tend to focus on the lead generation and revenue increases that can come from better marketing abilities. However, greater knowledge of a company's risks or, in the case of the financial sector, the risk of each customer, makes business much safer and much more efficient. Daruvala explains that one smaller bank was able to increase the accuracy of its internal data models from 40-45% to 75% just by incorporating outside correlating data.

Analytics Tools & Technology:

As big data expert Frank Armour explains, a major part of the challenge faced today is that people already have the data, however it is, “just beyond technology’s capability to store, manage and process efficiently” (Armour). Fortunately for companies interested in unleashing their data’s potential, there is plenty of funding for new analytics tools through universities (such as MIT), venture capitalists, and the government. In fact, MIT finding reveal that, “In 2011, big data companies received more than $350 million in venture capital” (Kiron). According to Armour, “the U.S. Geological Survey, the Departments of Defense and Energy, and the Defense Advanced Research Projects Agency announced a joint R&D initiative in March 2012 that will invest more than $200 million to develop new big data tools and techniques” (Armour). This
means that even if analytics companies may be at risk of falling behind or replaced as new and more advanced technologies are developed, companies paying for their services can easily adapt and commission new analytics companies as the needs of the business and technological capabilities change.

The major tools used for analyzing big data now include warehousing, map-reduce, and cloud computing. Data warehousing allows for, “analyzing structured data from various systems to deliver deep operational insight with advanced in-database analytics” (Agarwal). Map-reduce software is what helps process the high volume of data. Map-reduce technology is used in, “processing massive amounts of data in a scalable manner” (Agarwal). Hadoop map-reduce in particular allows users to sort data into groups and then runs and reduces the “tasks” and returns the data to storage (“Hadoop”). A further advantage of map-reduce is that it does not require a relational database system to be used. This is significant for big data analytics because with the various forms data can come in (e.g. pictures and videos) cannot always be stored in traditional relational databases. Cloud computing has also been an important development for big data analytics capabilities because it allows data to be stored online and supported by various servers. The Cloud also allows cooperation between the internal systems of a company and itself and gives companies the flexibility to access their data from anywhere in the world (“Hadoop”). These common tools are just a few of the many ways in which we can manage, store, and analyze big data that companies should consider for their data infrastructures.

There are also specific analytics tools being developed to work with social media data because of the variety of forms the data comes in such as video, images, and audio files. Companies, too, have audio data in the form of call center recordings and video data in the form of surveillance footage. Another issue that particularly revolves around Facebook and Twitter
analytics is that even what seem to be simple text messages have meanings that are very
dependent on context. To handle these issues, various leaders in the technology industry are
developing tools to process various forms of data. They are constantly working on improving
linguistic or natural-language, facial recognition, and speech analytics tools. Researchers
looking to extract emotion from texts are attempting to develop linguistic tools that can process
and handle different forms of writing a word (including misspellings), distinguishing between
multiple meanings of a word, and looking at phrases within a given context (Grimes). Other
developments are being made in the area of facial recognition technology and image analysis (“A
Chat”). Researchers aim to draw meaning from people’s expressions in photos to further
understand social media data. Finally, speech analytics tool aim to analyze every part of a given
conversation to detect customer tone and reaction. GSI Commerce is an example of a company
whose system, “indexes all the phonemes in every conversation,” and then separates the call data
into different categories used to determine satisfaction (Storm). The analytics tool GSI
Commerce uses can examine, “holds, transfers, talk-over, dead air,” and more to evaluate overall
effectiveness in responding to client calls. Matthew Storm explains that this is GSI Commerce's
method of providing “interaction analytics” and total quality assurance to its clients. All of these
technological developments can be used to better the understanding of customer emotions and
therefore reactions and opinions to what a company is doing. They allow for better customer
service, which can be a differentiating factor in many industries.

Social Media Analytics:

Goals of Social Media Analytics:

According to social media analytics guru Seth Grimes, the key to having success with
social media analytics is matching what information a business needs with the proper media
sources and analytics tools. He reveals that the social media analytics allows businesses to get real-time feedback from their customers. What Grimes stresses to be most important for social media analytics is sentiment analysis. He claims this goes beyond whether a tweet has a positive or negative underlying tone, and instead focuses understanding the emotion and intent behind each posting. It is every marketing person’s dream to have free access into the customer’s uninhibited opinions and comprehend how he or she thinks about a product. Grimes further states that analyzing social media data provides a psychological as well as demographic analysis of the consumer, and when companies combine this with their own internal data analytics, they have business intelligence (“A Chat”).

**Twitter Analytics:**

There are many different types of Twitter analytics platforms and offerings. The lower quality analytics may only count tweet mentions, organize them by location, or rank them by how many experts or influential followers mentioned the company. However, more advanced technologies have the natural-language processing capabilities described above and can account for consumer tone, in addition to different spellings of words (Grimes).

The market of Twitter analytics companies is huge, however only three organizations are official resellers of Twitter data (Delo). Out of the three Twitter resellers DataSift, Gnip, and Topsy, two focus on providing the social analysis Grimes values (Grimes “Twitter”). All three offer the standard demographic analysis, geographic and language identification, and expert and trending analysis. However, after further product offering consideration, DataSift offers the most in terms of language detection, sentiment analysis, and entity analysis (Social).

Other software companies are making news in Twitter analytics too. Although there are only three official resellers of Twitter data, there are many companies who use Twitter's Firehose
to gain access to its data and draw conclusions. One of these companies is HubSpot, a company known for its retweeting tool that allows users to analyze old tweets that were retweeted and figure out why those tweets were a success with consumers (Eaton). The company argues that retweets are a sure signal of customer satisfaction with a brand or advertisement because the customer went out of his or her way to share that tweet. Kit Eaton describes a retweet as the, “de facto currency of Twitter” (Eaton). Eaton further explains that the software allows companies to see information about specific retweets like when someone retweeted something and discovered that users do not respond as well when asked to retweet something (Eaton). HubSpot can provide valuable information to companies looking to discover what marketing worked for them, whether people liked a new product, and much more.

Companies like HubSpot are popping up left and right and constantly finding new ways to examine and use Twitter data to determine the effectiveness of marketing and give companies feedback on their brands. The big players in information technology are also showing up to capture some of these smaller social media analytics and marketing companies. Google, Oracle, and Salesforce.com all bought social marketing companies in 2012, demonstrating the high expectations these companies have for social media analytics in the future (Delo).

*Facebook Analytics:*

Like Twitter, Facebook is also storing and analyzing the massive amounts of data it collects about its customers and their social interactions on the site. In fact, Facebook is tracking the user's every move. Because it tracks the data of 655 million daily active users, Facebook must have the most advanced map-reduce technology and warehousing capabilities (Tomaszczyk).

Facebook uses its data not only for marketing analysis for its paying advertising
customers, but also to improve its internal operations. Unlike Twitter, however, Facebook keeps all of its data in-house. Because Facebook has such a large user base and so much data, it can easily evaluate the effectiveness of layouts and designs, advertisements, applications, and the accessibility of different platforms (Miners). Josh Constantine reveals that Facebook, “processes 2.5 billion pieces of content and 500+ terabytes of data each day” and also claims Facebook records 2.7 billion likes and 300 million pictures per day (Constantine). Zach Miners also explains that Facebook's data, “has grown nearly 4000-times in size over the last four years” (Miners). Because big data is already on the verge of technology's ability to process it and Facebook keeps acquiring huge amounts of data at an incredible rate, the company is investing heavily in analytics capabilities and data storage.

In addition to the information Facebook collects from the social media platform, the company has created other features specifically designed for consumer research (basically an unofficial psychological study of Facebook users for the benefit of marketers everywhere). One example of these consumer research initiatives is hidden in the “Compared to Me” application. This application allows users to play a game and compare themselves to their friends. Abbey Klaassen of Ad Age explains that this application asks users questions such as, “Who probably drives a better car? Who is probably better looking? and Who is probably better connected?” (Klassen). This information can be gathered to obtain a holistic look at how users perceive themselves. Klaassen further explains that, “Marketers can leverage these findings to uncover gaps in self-esteem/self-image and message more effectively on emotional attributes that are most important to us.” (Klaassen). The morality of these applications will be addressed later in this paper, however, the information that marketers could have from what users voluntarily reveal through the Facebook game can help them make infinitely better decisions because they
understand the people they are advertising to. Through this application, people are being more truthful than they would ever be otherwise because their reactions are based off of perceptions they have already formed of themselves and others and are produced automatically.

The amount of information that can be collected via these outside social media platforms is incredible. Marketers can do their jobs better the more information they have. Twitter and Facebook analytics open new doors for companies everywhere to understand customer sentiment toward their products and brands, provide indications for future product desires, and give an overall understanding of what people like and how people make decisions.

**Section 2: Managing Big Data Initiatives**

This section explores the management side of big data initiatives. It highlights the importance of having a data-driven culture and employees who understand the benefits of using analytics as well as how companies should plan and implement big data analytics strategies into their current business models.

**The Importance of a Data-Driven Corporate Culture:**

Last year, MIT in conjunction with IBM surveyed a combination of over 2,500 executives and academics from major corporations competing in industries across the board. The study found that, “67%...are gaining a competitive edge from their use of analytics” (Kiron). In addition, MIT noted that another study of “Fortune 500 companies found that 85% of those organizations had launched big data initiatives” (Kiron). The question then is what internally is driving these companies to succeed at using data. The study found that many executives believed in data as a critical asset to a company’s overall efficiency and strategy, and that companies are willing to pay for big data initiatives in order to be able to make more concrete data-driven decisions. The companies that are embracing the idea of big data and, “support their
digital investments with leadership and governance capabilities — are 26% more profitable than their industry peers, and outperform average industry performance by 6% to 9%” (Kiron). Now, it is clear why companies are investing in understanding their data. In certain instances, people have questioned investments in the information technology field because in these instances, it can be difficult to see any monetary return on investment. Technologies often save time or make the lives of employees easier, but there is often the debate of whether the benefits outweigh the cost. Through this 2012 study, however, MIT has revealed that companies are already enjoying a quantifiable gain over their competitors, which translates directly into more revenue for the company.

MIT also classifies the companies surveyed into three categories: the analytical innovators, the analytics practitioners, and the analytically challenged. The report states that the innovators are the ones finding the increase in market share and return on investment because they management believes in the power of data to drive efficiency within the company and because, “they are open to new ways of thinking” (Kiron). Being open-minded about solutions and accepting information from analytics, rather than just basing decisions are gut instincts, is working for this group of analytical innovators. The analytically challenged are described to be the exact opposite of the analytical innovators. They are lacking data management capabilities, are overwhelmed by the amount of data they have and cannot figure out what to do with it, and do not have a company culture that embraces data-driven solutions. MIT describes the analytics practitioners to be somewhere in the middle. They have made more progress that the analytically challenged, however they have, “just-good-enough data,” meaning that the analytics will be of equal quality (Kiron). The group, not shockingly, does not innovate with its data but rather uses it for productions and operations focuses. Finally this group shares the same cultural problem as
the analytically challenged and does not fully embrace the power data can bring.

For both analytics practitioners and the analytically challenged, when management decides that the technology investments are worth the return on investment (or management is in a position with no other choice, as will be described in the case of J.C. Penney), this group will be able to create a culture from the top down that respects information and solutions provided by data analytics. This attitude combined with the actual technological investments can transform these companies into analytical innovators. However, it is clear from the study that the culture of big data driving growth is critical to successful information technology investments. Recognizing that data can help with not just production and operations efficiencies, but also with knowing the consumer and designing marketing and strategies that are customer-oriented is essential for companies who want to use data to get ahead.

Implementing Big Data Strategies:

There are many companies hoping that investments in big data analytics and processing tools will be the answer and automatically give them the reported 5-6% return on investment and improve their market share. However, experts argue that there is a plethora of tools and technologies out there and most major corporations have huge amounts of data, but finding success with big data is not as easy as just purchasing the best tools and handing over the data to be processed. McKinsey & Company believes it is imperative to have a business value plan. McKinsey director Tim McGuire explains that firms need to have the right data, modeling techniques, and transformation process (McGuire). As social media guru Seth Grimes also notes that it is important to understand what the company hopes to get out of its data. If there is no goal or the company does not understand its own business needs, big data analytics will not be useful. Furthermore, the results of the data analysis have to mean something to the company's
employees. What is important to note is that now companies will need to integrate employees who can process big data analytics as well as those that can interpret and use the data. The data-driven business world will require more people to be educated in analytics. Data will also become central to each of the organization's operations, which means that, in agreement with MIT's study, big data initiatives must be integrated into the organization's culture itself. Companies will need to strive to be the analytical innovators, have an open-minded attitude toward data analytics and make analytics a driving factor behind decision making.

McKinsey argues for an analytics culture within companies and specifies that organizations need to plan how they will integrate data into their company culture. The consulting firm states that there needs to be someone in every step of the big data initiative that can bring the value to employees and therefore the firm as a whole. And the company does not just mean itself. The employees that do not understand analytics or the vast amounts of data that the company owns still need to be able to understand the benefits that the information provides them once it is properly modeled and analyzed. McKinsey consultant Matthias Roggendorf even argues that companies should run pilot analytics that show results in the short-term to demonstrate to employees that the initiative will provide a greater knowledge of internal operations, consumer preferences, and market data.

Roggendorf also explores the process and planning behind creating big data infrastructure from the consulting point of view. He explains that it is more than just the initial infrastructure including hardware, software, and analytics tools. Experts must examine the requirements of the business, the desired results, the feasibility of those results, the maintenance and new developments to the system, and protecting the data and business intelligence derived from that data (Roggendorf).
Planning a Big Data Initiative:

Despite the fact that McKinsey is indeed attempting to sell its own consulting services, the company highlights some very important issues surrounding big data success. In their article, “Big Data: What's Your Plan?,” Stefan Biesdorf, David Court, and Paul Willmott address three key issues that companies face when searching for big data success. They first reiterate the fact that any investment in big data technologies and analytics should have a purpose. The company should expect to know more than it already does by analyzing given data sets. It would be advantageous for companies to identify information that is critical to their businesses and then figure out how to better analyze the data to discover that needed information. It is further important that the data and conclusions based on that data are congruent amongst the organization. All data should be centralized and valued at the organizational level (Biesdorf). The more a company knows about itself as a whole, and not just by its different sectors, the better it can plan its overall corporate strategy.

A second challenge the McKinsey article acknowledges is matching a product with an organization. This is an obvious concern for any new technology or way of doing something. It is no different with big data initiatives. Just because it is the latest challenge in information technology and is known to provide a return on investment of 5-6% does not mean that just adopting whatever will work. It is, therefore, imperative that businesses find technology that can be customized to the business needs including industry based capabilities, specific companies requirements, and usability. In fact, the McKinsey article says, “there's no shortcut in the hard work of getting business players and data scientists together to figure things out” (Biesdorf). It is important for every business aspect to be involved in planning big data strategies.

The last challenge that McKinsey identifies is making sure that “frontline” employees
and management can actually utilize the information produced. If the analytics are superb but cannot be put into action on the ground level, the efforts of the company will be for nothing. McKinsey suggest that 50% of investments go to each the actual data capabilities and employee training. Managers and employees throughout the organization must play a key role in determining what the business needs are and what solution will benefit the organization most.

Understanding both the conclusions of the MIT study that companies who have successful big data initiatives make data-driven decisions and have an open-minded culture and employees that embrace data as way of better doing their jobs, in addition to remembering McKinsey's advice to have a plan for big data analytics and make sure that investments are in both people and technology is key to successfully deriving value from big data projects.

Section 3: Threats to Big Data

This section acknowledges the many risks identified in the field of big data and how companies should view and mitigate those risks. These concerns include the availability of external data, biases in social media, increased competition, cyber security issues, and the fear of “big brother.”

Data Availability:

In the realm of big data, there is quite a bit of public data available. However, companies like Twitter and Facebook that have essential access to social media analytics, fully control the data that their services produce. Facebook currently just sells advertising services and results analytics to other companies. Twitter, on the other hand, allows DataSift, Gnip, and Topsy to resell its data. The resellers and select privileged companies have access to the Twitter Firehose and can apply data analytics tools and technologies to extract customer sentiment analysis from tweets. However, who is to say that Twitter will guarantee this access forever. Or who knows
whether Twitter will remain popular and relevant.

These are huge concerns for companies hoping to invest in social media analytics. Fortunately for companies just looking to purchase the analytics results, however, the analytics companies are more likely to live or die by Twitter's data access decisions than the companies actually using the analytics.

Social Media Biases:

Social media analytics can be a great way to examine raw data and determine what consumers want in a product or how they perceive a brand. It can even give insight into customer behaviors and motivations. However, one key hole in the argument for social media analytics is that it does not represent the entire population. In “The Hidden Biases in Big Data,” an article for Harvard Business Review, Kate Crawford points out that numbers cannot, in fact, speak for themselves and argues that big data analytics can allow for many biases in regard to data collection. Crawford illustrates her point by explaining what happened on Twitter during Hurricane Sandy. She argues that because most of the tweets coming from New York were from Manhattan, “it creates the illusion that Manhattan was the hub of the disaster” (Crawford). Crawford claims that this is really because those actually hit worst did not have battery left on their cell phones. The information collected via Twitter during Sandy was not complete due to the lack of coverage of these areas. One can take away that the inability to access internet of power can limit to effectiveness of using social media to accurately report information.

In another case study covered by Crawford, she uses the Boston government to demonstrate further biases posed by Twitter. Unlike the Hurricane Sandy incident where users were unable to tweet because of power outages, the Boston government ends up excluding citizens who cannot afford to own cell phones or who are just not part of the smartphone
generation. Boston did not foresee this as a problem when developing a smartphone application that detects potholes (Crawford).

Although having data from social media sources can make any conclusions coming from that data biased, as long as organizations take those biases into account when making decisions, the information can still be useful. It paints a picture, albeit not always a complete picture, but nonetheless indicates how many people are behaving.

**Increased Competition:**

Based on the study completed by MIT and IBM, competition will learn what makes the leader of the industry successful and attempt to copy its strategy (Kiron). This is obviously a threat to companies investing in big data initiatives. Why should an organization spend so much money if its competitor will do the same tomorrow? MIT uses the case of Oakland Athletics as an example to explain what companies must do to protect their investments. The Oakland Athletics case is the story of how a baseball manager used analytics to recruit players that did not seem valuable to most, but who the statistical model identified as good players. The formulas used to analyze player statistics proved to be a successful measurement of player abilities. However, as MIT points out, other teams soon followed suit and the team had to devise a new analytics strategy to remain a leader. The study concludes that companies must continue to innovate and change the game in order to stay ahead. This further emphasizes the need for companies to make big data initiatives part of the corporate culture. If they do so, they will be more likely to be able to continue to innovate and use their investments to stay ahead of the market.

**Cyber Security Issues:**

Cyber security is one of the biggest threats to companies today. It is especially dangerous
for those companies who have large amounts of customer personal information and business intelligence data. Tim Wilson reveals that the, “Consumer Reports' Annual State of the Net Report states that a projected 58.2 million American adults had at least one malware infection that affected their home PC's features or performance in the past year” (Wilson). That is just the everyday American consumer. There are corporate and government attacks happening every second and companies' defenses are struggling to keep up.

Twitter has experienced many attacks recently. According to a New York Times article, The Associated Press's Twitter account, “sent out an erroneous message reporting explosions at the White House that injured President Obama” (Perlroth “In Hacking”). While this may have been caught as a prank by those who double check news with other sources, it caused massive moves in the financial market. Later exploration reveals that The Associated Press was not the first company to experience a Twitter hack. Five other major entities had come before it all targeted by the same group and many blame Twitter for not yet initiating two-factor authentication as a basic security measure (Perlroth). Although two-factor authentication will not solve all Twitter's cyber problems, it would be a sign of security improvement and that the company is taking security threats seriously.

In addition to individual accounts being hacked, Twitter's database itself was hacked in 2013. Nicole Perlroth of the New York Times reports that, “usernames, e-mail addresses and encrypted passwords—for 250,000 users may have been accessed” (Perlroth “Twitter Hacked”). Twitter seems to believe that this attack could be due to programming language or operating system vulnerabilities (Perlroth “Twitter Hacked”). If this is the case, then any corporation is vulnerable to these attacks because they systematically target as many users as possible.

Because of the sophistication of cyber attacks and the damage they can do to a company,
whether protected by the best security or not at all, corporations have a huge risk of losing their
data investments to cyber criminals. These cyber criminals often seek ransom payments, are
trying to steal credit card or personal information, or want to steal business secrets. Whichever
motive the criminal possesses, he or she can cause significant financial losses directly through
theft or indirectly in data protection services to be paid to clients. Furthermore, there is also a
risk that the company's reputation as being reliable and safe will be damaged.

In order to mitigate the risks associated with cyber security, companies will also need to
invest in sound information technology infrastructure with maximum security around data.
Though these investments are an additional cost to analytics technology, they are well worth the
money to gain protection from possible data loss or theft.

Fear of Big Brother:

The fear that “big brother” is watching is probably the greatest threat to big data analytics.
Many people are concerned that big data is taking “knowing the customer” too far. They feel
that it is creepy for companies to know so much about them-their habits, major events in their
lives, and how they make decisions. For this reason, big data has seen some push back. Take
Facebook as an example of how much companies know. People put so much information online,
many sharing intimate details of their lives. And it is not just demographic information such as
name, birth date, and gender that they are sharing. It is also contact information, where they live,
where they are from, where they went to school, their sexual orientation, their relationship status,
their employment status, their family members, and their friends. And this is just the information
page. Now think about Facebook's timeline that keeps a record of everything each user posts,
likes, comments on, and shares as well as when and where they did it. Facebook also knows
who or what each person has searched and exactly what they clicked and how long they spent
reading something. And do not forget, Facebook stores pictures too—300 million pictures per day, in fact (Constantine). Facebook essentially knows everything about its users' lives (Marr).

Here is another issue with Facebook privacy. According to an article in USA Today, Facebook is also tracking your other web interactions. It does not restrict its stalking to just the social media platform itself. No, it also “inserts a 'tracking cookie' into your Web browser that allows Facebook to track each website you are visiting” (Acohido). Now some may argue that if you are agreeing to the deal that Bernard Marr explains and are using Facebook's social media platform, you are willingly exposing yourself and allowing Facebook to collect data on you. However, when Facebook also has the capability to track your browser too, then you truly have no privacy.

And Facebook is not the only company who knows a scary amount about its customers. It is not necessary to join a social media platform to give away information about oneself. Many companies offer rewards cards, which really just serve to track one customer's purchases and gather information. The cards allow companies to figure out what that person is likely to buy and also, over a large sample, if correlations exist and can reveal certain purchasing patterns.

Take Target for example. Many women were disturbed when they found out that Target knew when they were pregnant before that was public information. It was seen as an invasion of privacy, even when the women were interested in Target's products. In an interview with The New York Times, Andrew Pole, a statistician at Target, explains how Target dealt with people's negative reactions to the amount of information knew about them. Pole says, 'we found out that as long as a pregnant woman thinks she hasn’t been spied on, she’ll use the coupons. She just assumes that everyone else on her block got the same mailer for diapers and cribs. As long as we don’t spook her, it works' (Duhigg). Although this may not be the solution pregnant women are
looking for, it is certainly a way that companies can gather information without revealing how much they know.

As big data analytics advances and becomes more common, companies will have to learn to respect customers and people's privacy in general. Customers can enjoy the many benefits of big data analytics such as customized products and advertising, increased efficiencies that lead to cheaper products, and safer security measures for financial services. However, people are afraid that their information will be used for evil rather than good. In moving forward with big data plans, companies need to remember to take privacy measures into account and not scare the customer.

Section 4: Case Studies

Analytics Leaders:

E-commerce: Amazon & Netflix

Many companies have already been benefitting from big data analytics; some owe everything to their data. Take Amazon and Netflix for example. Both companies offer online product platforms. Amazon is able to track not only customer purchases, but customer searches and shopping cart items as well. This means that the company knows what the customer is looking for, what his or her interests are, and whether the customer is likely to make purchases right away or not, in addition to knowing what the customer actually ended up buying. Because Amazon knows its customers so well, it is able to customize adds, promotions, and product recommendations to each customer’s interests. In fact, Amazon has such a great capacity data infrastructure for its own customers’ data that it has entered into the cloud and webs services business. Netflix works on the same premise; it uses demographic data of the customer and is able to gain a better understanding of each customer’s tastes and preferences with each additional
movie selection. Another thing these companies have in common is that they both displaced other businesses, notably book stores like Borders which went bankrupt and Blockbuster. From these two e-commerce examples, one can see that the power of analytics lies in the ability it gives companies to customize a shopping experience to each client’s desires (Armour).

**Retail: Target**

Target is one retailer who has already figured out the power of data analytics. Because Target can separate and sort purchases by some piece of unique customer information (e.g. credit card number, phone number, address, email, etc), the company knows what typical buying patterns exist in a customer's history and can match that knowledge with demographic information (Hill). The company understands that by collecting as much data as possible and associating it with one person, it can then predict patterns and what the customer will do next (Duhigg). Target's revolution began with statistician Andrew Pole. Pole began running statistical analyses on Target's data and with a particular statistical model. Target could successfully predict when a woman is pregnant based on her recent purchases. In an interview with The New York Times, Pole explains that knowing that women were pregnant when they were in their second trimesters gave the company an advantage over its competitors who would only find out about the pregnancies when public birth records were released (Duhigg). This meant Target knew information months before other companies hoping to market to the same audience. This is where the return on investment for big data comes in. Target will surely be able to capture more of its target market with such a head start in advertising. Target has proven that data analytics can allow companies to know their customers better than their competitors and capitalize on this business intelligence.

What The New York Times article argues is even more important to Target than the
increased revenue from pregnant women buying diapers and baby supplies from the company is that, “right around the birth of a child, when parents are exhausted and overwhelmed and their shopping patterns and brand loyalties are up for grabs” (Duhigg). It is not just the data that gives Target an advantage. It is being able to relate data to psychological states and determine when and how to change people’s minds and leave a lasting impression that truly makes a difference. And this is the incredible power big data solutions can offer. For companies hoping to have a relationship with their customers and create loyalty, knowledge is power.

Advertising: Geico Gecko

One example of a famous marketing success due to data analytics is the Geico Gecko. Geico owes its marketing success to Merkle who runs its marketing database. Geico’s Chief Marketing Officer Ted Ward explains in an interview with Advertising Age that, “The green scaly spokes-character you reference was actually born in a petri dish of data” (Kaye). What was never intended to be a long-term campaign is now what the company is known for. Based on Merkle's ability to analyze consumer responses to the gecko ads and identify it as something that worked for the company, the gecko was able to survive and become, “one of the best-liked icons in advertising today” (Kaye). However, Ward also notes that even more important than the development of the Geico Gecko is the power big data has to match the results to each person and the information collected about them. Ward explains that it is the relation of insights to the individual that make big data so influential in customer relations and the way companies do business.

J.C. Penney:

The previous four companies show what stands to be gained when a company can evaluate its business needs and capitalize on the data it has to create customer satisfaction.
Whether it be a sophisticated online e-commerce platform, traditional statistical analysis of correlation and trends, or simply analyzing customer responses to an advertisement to identify what is working, big data analytics can help businesses reach their sales goals. In the following examples above and the lessons about the power of analytics technologies, social media analytics capabilities, and planning and implementing big data strategies, J.C. Penney will be able learn from what has worked in the past and how to adjust analytics strategies to its own corporate culture in order to turn the failing company around.

*Current Situation:*

After stagnating past performance, J.C. Penney decided to replace CEO Myron Ullman with Apple Stores leader Ron Johnson. The idea was to steal the Apple design and marketing guru to give J.C. Penney a revamped, younger image (Berfield). On April 8, 2013, not even two years after he was hired, Johnson was terminated and J.C. Penney rehired Myron Ullman. Johnson made many mistakes as CEO that led to a $4.28 billion loss in revenue as of late February and a stock drop of approximately 55% (Clifford). Losses around the holiday season were a bad signal for the company’s future growth as well. Holiday sales, “fell 28.4 percent to $3.8 billion” and J.C. Penney’s, “net loss amounted to $552 million compared with $87 million in the year-ago period” (Clifford). Clearly, Mr. Johnson’s plan was not working.

But probably his biggest mistake with J.C. Penney was not listening to customers and making rash decisions for the retailer, based solely on what had worked in his experience at Apple. The New York Times writes, “In his quest to ‘be the favorite store for everyone,’ Mr. Johnson said the retailer had gotten some areas wrong, including marketing and an assessment that customers wanted simple pricing without constant sales” (Clifford). Johnson decided that opening new stores with redesigned layouts that matched the style of Apple’s stores was hugely
important for the company. In fact, Johnson revealed in his four-year plan to the board that he was willing to spend most of the requested $800 million on the new stores in 2012 alone (“Jcpenney”). However, Johnson seemed to miss the fact that what customers loved about J.C. Penney was the fashion and the deals. As a result of the misinterpretation of customer demands, “sales at stores open at least a year…fell by 31.7 percent” (Clifford). After realizing his mistake, Johnson reinstated sales and coupon programs at J.C. Penney saying the company would offer coupons and deals every week.

Another massive failure for J.C. Penney was its advertising campaigns. The retailer spent 14% more on media for a total of $504 million. However, sales continued to decrease a total of 25% (Zmuba). On top of failed advertising campaigns, the retailer has been exposed to more negative press through the lawsuit involving Martha Stewart and Macy’s over who has the rights to sell Stewart’s products in their home department (Clifford “J.C.”). Not only does this cause an additional financial burden on the company, but the negative press could not come at a worse time for the company.

What J.C. Penney is Doing Right:

In the realm of information technology, J.C. Penney has begun to invest in some big data initiatives. If Ron Johnson did one thing right it was to emphasize the need for better inventory tracking. Johnson had planned on implementing radio frequency identification (RFID) tags throughout J.C. Penney stores over a three-year time period. The argument was that, “J.C. Penney has nearly 500 systems and 95 percent of its budget goes to updating and maintaining them,” therefore updating the system would save money (Dignan). J.C. Penney is now prepared to implement Oracle technology to in addition to the existing Oracle platforms it has. Johnson hoped that this technology would allow for iPad checkout like those of the Apple stores and
eliminate the need for cash and many cashiers. Johnson explained that, ‘About 10 percent of all the money we spend—half a billion dollars a year—goes to transactions’ (Swedberg). The ultimate goal of the RFID tags would then be to cut costs, offer quality customer service, and have a more reliable inventory tracking system. Johnson’s plan seemed to show results that big data analytics can promise and decreased inventory by about 20 percent in one year (Clifford). The company has begun to understand how analytics can help companies plan for the future and know what to buy and stock and when to do it.

The company is already making progress in incorporating big data analytics from internal sources, however it could do much more. Instead of spending $800 million on opening and improving new stores, the company should look at investing that money into big data analytics that can make the organization more productive and more cost efficient.

*Where J.C. Penney is Still Lacking:*

The retailer still does not appear to be listening to its customers. J.C. Penney needs to focus on the second source of big data analytics which is external data. If J.C. Penney focuses specifically on social media analytics, it will be able to better analyze customer feedback and desires. It seems that with the launch of its seven Oscars commercials and Twitter contest and prizes associated with the ads that J.C. Penney is already making efforts to strengthen its social media presence (Heine). However, J.C. Penney needs to look past just having that social media presence and examine who its followers are and use social media data as a way to form a relationship with each of its customers.

*Planning for the Future:*

The question now remains: what could Ron Johnson have done better and how can Myron Ullman revive J.C. Penney in the future? J.C. Penney can certainly learn a lot from its
recent mistakes. Acting without listening or researching first is not wise. The company needs to understand its own business and its customers to be able to offer the services and products they want. In moving forward, JC Penney should be looking to take advantage of the vast amount of information it has on hand today through the new inventory tracking system it is currently investing, as well as closely monitor its customers through social media analytics. By making data-driven solutions part of the culture at J.C. Penney, the company can use the information it has to best please its customers and finally turn the company around. By simply incorporating internal operations analytics and social media analytics into J.C. Penney’s business strategy moving forward, the retailer will be able to identify who its customers are, what they look for in fashion, what promotions and sales they value, and what type of advertising they prefer. And by giving customers what they want, J.C. Penney can return as a competitor in the market.

**Conclusion:**

When thinking about big data analytics, it is important for companies to remember that it is not just a trend or something they can buy that will give automatic returns on investment. With the ever-evolving technologies and significant research investments made by universities, venture capitalists, and governments, big data is here to stay. Companies must invest early and keep innovating and adapting new technologies and strategies to keep up. They must also remember that in order for data analytics to be useful and lead to results, they must make data-driven decisions part of corporate culture and invest heavily in educating and managing the people using analytics to move the company forward. If a company considers the risks of analytics developments and makes an effort to not only adapt new technologies, but to also strategically manage their implementation, big data analytics will bring the success and return on investment that the company desires.
Works Cited:


