

## Growth, Security, and Forecasts of e-Commerce and m-Commerce

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### ABSTRACT

Businesses in the United States and over the world gain great sums of revenue because of the use of Electronic Commerce (e-commerce) and Mobile Commerce (m-Commerce). E-commerce users over the last decade has spiked significantly. Technology has become a way of life for many individuals as well as organizations to conduct business virtually. However, with the rapid progress of e-commerce and m-commerce, security issues are becoming a matter of public concern. The security of a transaction is the core and a key concern for the development of a successful business. However, there are always going to be threats that compromise the integrity of e-commerce and m-commerce security. Judging from the past history, e-commerce and m-commerce are faced with unique risks on a daily basis. It is important to update and implement new safety procedures to protect the security of e-commerce/m-commerce so they do not become vulnerable to attacks. This paper explores the progression of e-commerce throughout the past decade and the implementation of m-commerce; determine whether m-commerce is more widely used and relevant compared to e-commerce on the web; assess factors affecting each sector of both e-commerce and m-commerce security; evaluate the growth despite such threats; and discover different methods of implementing and evaluating the key elements to control risks.

**Key words:** e-commerce, m-commerce, security, growth, forecasts.

### 1. INTRODUCTION

The number of internet users has grown significantly over the past several years. E-commerce is the manner of buying and selling goods, products and services over electronic systems, such as the internet. M-commerce is the manner of buying and selling products and services with a wireless handheld devices, such as cell phones or PDAs. M-commerce has become an instant hit and is being called the next generation e-commerce. Many enterprises are completely dependent on conducting business online or electronically. M-commerce lets users carry out financial transactions using mobile phones and does not always require the internet [7]. E-commerce and m-commerce transactions are less time consuming and take away a lot of the difficulties when buying, trading, and selling a product.

This paper illustrates the use of e-commerce over the web as well as on mobile devices known as m-commerce; describe major sectors of e-commerce/m-commerce and state which sector is more dominant; discuss problems that businesses and customers face while conducting business online; and security practices and risk assessments for online trading, as well as forecasts the future growth of e-commerce/m-commerce.

#### 1.1 Background History

E-commerce was first used in the 1960s to conduct transactions over the computer network. However, it was not to the benefit of the general public. The NSFNET in the United States controlled activities over the internet and only granted access to scientists and idealists. Commercial transaction by anyone else was strictly prohibited until about 1995, when the NSFNET stranglehold on conducting business online was lifted for the general public. The first e-commerce commercial internet service provider was introduced in 1991. However, the epic moment of e-commerce was when a Pizza Hut pizza was ordered over the internet in Santa Cruz, California in 1994. This was akin to a single train leaving the track and with each passing year a new cargo is added on to that train: this has offered us the luxury of having so many different forms of e-commerce avenues today. One of the most successful companies to have used e-commerce to change the face of the internet is Amazon, which was founded by Jeff Bezos selling books out of his garage.

Today e-commerce is one of the easiest and most non-confrontational ways to conduct business. E-commerce has become so huge that it is on every platform in today's society. M-commerce initially began with the use of wireless POS (Point Of Sale) swipe terminals and has since then made its way into cellular phones and PDAs. The first enabling m-commerce technologies were presented through Wireless Application Protocol (WAP) and i-mode mobile Internet service. WAP builds on digital phone technology and first emerged on 2.5G phone technology that allowed users to browse the Internet. This technology cemented the way of m-commerce, which has strongly developed on 3G-phone technology. This leads to the topic of this paper: is e-commerce over the web still rising compared to that of m-commerce? Also what are the risk factors and how to minimize or eliminate those risks?

## 1.2 Statement of the Problem

Doing business via web and mobile device poses many threats and dangers to its users. People as well as organizations have to be careful with sensitive data that may be compromised by intruders. E-commerce security threats affect the credibility of conducting business online. To the extent that it is enough to sway users from conducting business online, resulting in financial loss and the decrease of user fractionation online. Is doing business online, despite the risk, growing along with business via mobile device? Does recession pose the greatest risk to e-commerce and m-commerce?

## 1.3 Statement of the Objective

This research will examine commerce via the web and on a mobile device; highlight the sectors of e-commerce/m-commerce and the security risk; and examine prevention procedures as well as systems set in place to control commerce security issues whenever they are presented. The vulnerable points of e-commerce/m-commerce will be identified and key defensive points will be addressed; the growth and stability of commerce over the web and on mobile devices will be analyzed after assessment of all the risks affecting e-commerce from 2004 to 2015; the components of e-commerce/m-commerce, and the fastest growing sectors will be determined.

## 2. MAJOR SECTORS OF E-COMMERCE AND M-COMMERCE

The e-commerce industry is quite large and very demanding. The constant change in technology has given commerce many avenues to travel. E-commerce is a must have for any company with the ambition to stay competitive and relevant. E-commerce has been entered in finance, services, retail, communication, and information technology services. In these sectors, m-commerce is not only widely accepted, it is more used. E-commerce has leapfrogged over its expected mark with the invention of mobile apps. Mobile apps are the alternative to doing business on the web. Apple app store and Google Play are the two largest app stores in the world, with a growing global population

### 2.1 Financial Sector

In addition to e-commerce, m-commerce works enormously in the financial sector, including all the big and major financial institutes, banks, stock market, and share brokers, enabling users to access money or any wants concerning all sorts of banking and finance related services. Users can access the services or register services via voice calling or via Short Message Services (SMS) services. WAP based mobile handsets allow the user to access the official website of the institute. Users can transact money or transfer money, or pay the bill from a bank account using mobile commerce facilities. Banks offer 24 hour customer service that can be used any time through voice calling.

### 2.2 Telecommunication Sectors

In addition to e-commerce, m-commerce has played a giant role in communication technology through its versatility and superiority. The ubiquity and easy usage have made it extremely popular across the globe. Worldwide use of mobile devices has already surpassed the use of fixed phones. The software platform is essential for operating any mobile device, and this tool has revolutionized the communication world because of its functioning as a small computer. The booming popularity has forced the corporate world to develop a new commerce platform that can reach the masses. Both e-commerce and m-commerce have attracted massive traffic because of its unique characteristics. The user can change the product/service if a better product and service is available, or if the user is unsatisfied with the service of the subscribing company. Besides this, bills can be paid using mobile devices and a user can also check the available balance, the status, and customer care support [6].

### 2.3 Service/Retail Sector

Through e-commerce, the service and retail sectors are among the sectors that have advanced most in the m-commerce sector. M-commerce has proved a major benefit for these sectors. Several business dealings, no matter how big or small, are being finalized on the mobile phone. The customer would be able to book the order, can hire carrier/courier services and, above all, could also pay the dues related to it through mobile.

### 2.4 Health Care

Both e-commerce and m-commerce have helped to reduce the high cost of health care. Using this technology, physicians and nurses can remotely access and update patient records immediately, a function which has often incurred a considerable delay in the past. This improves efficiency and productivity, reduces administrative overheads, and enhances overall service quality. Mobile technologies such as PDAs, laptops or tablet PCs can be of great value in hospitals and healthcare facilities by allowing better access to critical information – e.g., patient status, staff and patient location, and facility availability. Healthcare facilities that choose to adopt such technologies may be able to not only perform better, but ultimately provide more efficient and better quality care for patients.

### 2.5 Information Sector

Although the information sector has had numerous hiccups over the years, primarily due to data breaches, this sector has had a major role in the success of e-commerce. After the overflowing of the dotcom bubble, e-commerce has declined. However, the evolution of m-commerce has again worked.

The webmasters have skillfully exploited this new area of IT-enabled commerce. In the IT field, mobile commerce has been used massively to deliver financial news, stock updates, sports figures, traffic updates, onto a single handheld device mobile.

**3. METHODOLOGY**

To better understand the importance of e-commerce and m-commerce in the United States, a number of graphs and tables are provided to show the statistics and levels of internet users. To predict the amount of revenues generated through e-commerce and m-commerce, Microsoft Excel was used to apply linear regression equation mathematically. The process of predicting the future values of e-commerce users involved two steps.

**3.1 Data Collection and Analysis**

Figure 1 shows the trend of e-commerce growth over a decade. Web sales totaled \$304.91 billion in 2014, up 15.4% from 2013, according to Commerce Department estimates. Q4 sales of \$95.98 billion accounted for 31.4% of full-year web sales [8].

Year	Web Sales (in billions)	Growth
2014	\$ 304,913	15.49%
2013	\$264,279	16.50%
2012	\$226,878	14.70%
2011	\$197,883	17.20%
2010	\$168,895	16.60
2009	\$144,908	2.60%
2008	\$141,233	3.80%
2007	\$136.126	20.50%
2006	\$112,994	24.00%
2005	\$91,080	26.00%
2004	\$72,340	

Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/2015/02/17/us-annual-e-retail-sales-surpass-300-billion-first-time>

**Figure 1:** Trend of e-commerce growth over a decade

As shown in Figure 1, the growth of sales in 2008 through 2009 was very low compared to the other years. The result of this decrease in sales is credited to the crisis that started with the housing market in the U.S., and spread quickly into financial markets. It has had a ripple effect around the world, many other industrialized economies were troubled by its consequences, and almost every industry has been influenced by its outcomes. Online retail (or B2C e-Commerce) as a part of retail industry was not immune from the financial crisis and its sales suffered a dramatic decline. In the first quarter of 2008 and before crisis signs appeared, online retail sales were about \$ 32.4 billion, a growth of 13.4% over the same time

period the previous year. A 16.9 % decline in online retail sales in the first quarter of 2008 from the prior quarter was because of increasing sales in the holiday season as there was in the 4th quarter of 2008 and first quarter of 2009. In the 2 next quarters, it has 8.9% and 4.6% growth respect to over the same period in the previous year, a decreasing growth. Online retail growth decreased in 2008, and the trend continued into 2009. These statistics show how the financial crisis has caused a decline in the overall growth rate for the industry. There could be supposed several reasons for the decline [10].

	Online Retail Sales	Percent Change from Prior Quarter	Online Retail Sales Percent Change from Same Quarter a Year Ago	Retail Sales Percent Change from Same Quarter a Year Ago	Online Retail as a Percent of Total
1 <sup>st</sup> Q 2008	\$ 32.4 billion	-16.9%	13.4%	3.7%	3.4%
2 <sup>nd</sup> Q 2008	\$ 32.5 billion	0.5%	8.9%	2.3%	3.1%
3 <sup>rd</sup> Q 2008	\$ 31.6 billion	-2.8%	4.6%	0.9%	3.1%
4 <sup>th</sup> Q 2008	\$ 37.1 billion	17.3%	-5.5%	-8.6%	3.8%
1 <sup>st</sup> Q 2009	\$ 30.2 billion	-17.7%	-5.7%	-11.6%	3.6%
2 <sup>nd</sup> Q 2009	\$ 30.8 billion	2.1%	-4.5%	-10.6%	3.3%

Source: Ghadami, F., Aghaie, A., & Mohammadkhan, M. (2010). *The impact of financial crisis on B2C e-commerce. IBusiness IB, (1), 193-200. doi:10.4236/ib.2010.22024*

**Figure 2:** Retail and online retail sales 2008 – 2009

As shown in Figure 2, in the third and fourth quarters of 2008, consumption expenditures had 4.7% and 5% decline respectively, and in the first and second quarters of 2009, with smoother decline, it had 1.5% and 1.3% negative growth respectively. Furthermore, savings rate grew significantly in the same period. It grew from 2.2% in the third quarter of 2008 to 5% in second quarter of 2009. Reduced consumption expenditures means a decline in spending by customer and increasing saving rate also implies a further decline [10].

Case	Percent Change From Prior Quarter					
	1 <sup>st</sup> Q 2008	2 <sup>nd</sup> Q 2008	3 <sup>rd</sup> Q 2008	4 <sup>th</sup> Q 2008	1 <sup>st</sup> Q 2009	2 <sup>nd</sup> Q 2009
Consumption Expenditures	3.7%	3.9%	-4.7%	-5.0%	-1.5%	-1.3%
Saving Rate	1.2%	3.4%	2.2%	3.8%	3.7%	5.0%

Source: Ghadami, F., Aghaie, A., & Mohammadkhan, M. (2010). *The impact of financial crisis on B2C e-commerce. IBusiness IB, (1), 193-200. doi:10.4236/ib.2010.22024*

**Figure 3:** The Impact of Financial Crisis on B2C e-Commerce

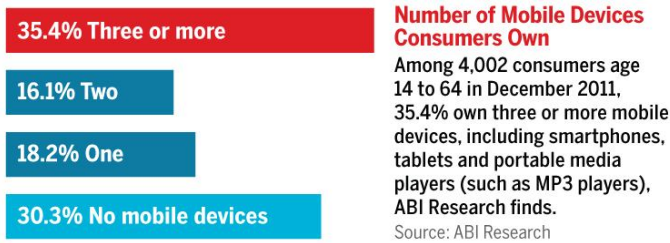
Figure 3 shows as a result of the recession, consumers remained more concerned about saving their money and not spending it in hard times.

	1930	1970	2010	Future
Power	Manufacturer	Retailer	Consumers	Individual Consumer
Enabler	Mass Production	Automobile	Internet	Smartphones/ Tablets/ Wearable
Example	General Store	Department Store	Mail, Online	Mobile
Experience	Daily Needs	Family Excursion	Convenience	Instant Gratification/ Social Urban Renewal
Lifestyle	Rural	Urban	Sub-Urban	Urban Renewal

Source: *E-Commerce Landscape and Trends 2014*. (2014, June 9). Retrieved December 8, 2015, from <http://www.slideshare.net/Haruki79/us-ecommerce-landscape-and-trends>

**Figure 4:** US Consumer Power Enabler

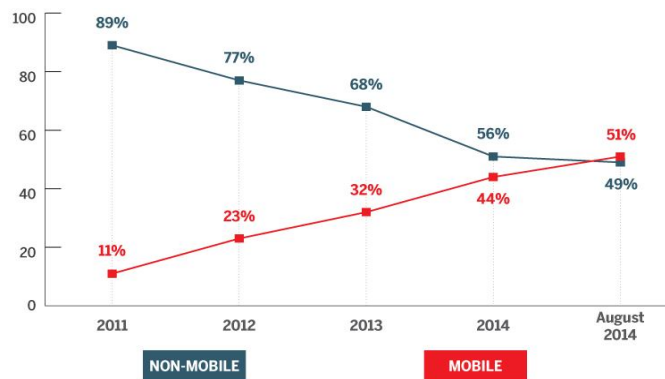
Figure 4 shows the progression of consumer desires towards what appease their needs over a span of 70 years, resulting in the recent gratification of m-commerce [15].



Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/web-technology/number-of-mobile-devices-consumers-own/>

**Figure 5:** Number of Mobile Devices Consumers Own

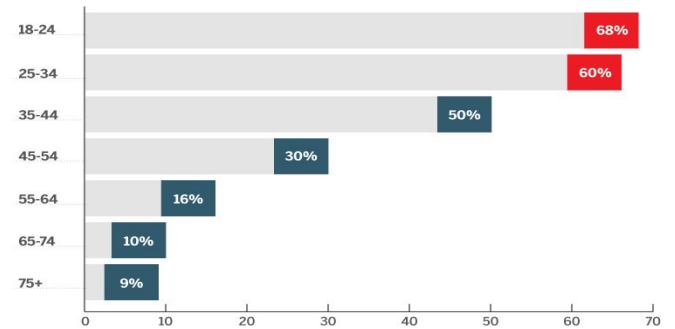
As shown in figure 5, 35.4 percent of consumers own more than one mobile devices.



Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/mobile-commerce/ascension-mobile-commerce/>

**Figure 6:** The Ascension of Mobile Commerce

As shown in figure 6, mobile percentage has risen greatly compared to desktop users, which has contributed to the invention of mobile apps. Its growth can be traced back to technological and demographic developments that have influenced many aspects of contemporary social-cultural behavior. Mobile services have registered impressive growth in preceding years and m-commerce is slowly but surely showing signs of a healthy growth [13].



Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/mobile-commerce/us-internet-users-who-use-mobile-apps-store/>

**Figure 7:** U.S. Internet Users Who Use Mobile Apps In-Store

Figure 7 shows retail mobile apps have become something of a personal shopping assistant [16]. Wal-Mart’s app, for example, senses via GPS when a shopper is in a specific Wal-Mart store and offers the consumer to switch the app to Store Mode, a completely different app experience, within the same app, that offers features and functions designed to ease a shopper’s in-store visit. There has been growth in every age area that uses e-commerce as a way of conducting transactions.

Shipments (in millions)			Market Share		
Mobile OS	Q4 2013	Q4 2014	Mobile OS	Q4 2013	Q4 2014
Android	47.8	51.8	Android	62%	66%
Apple iOS	26.0	21.4	Apple iOS	34%	27%
Windows	3.4	5.1	Windows	4%	7%
Other	0.0	0.0	Other	0%	0%
<b>Total</b>	<b>77.2</b>	<b>78.3</b>	<b>Total</b>	<b>100%</b>	<b>100%</b>

Tablet Sales Growth		
Mobile OS	Q4 2013	Q4 2014
<b>Total</b>	<b>20%</b>	<b>1%</b>

Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/mobile-commerce/us-internet-users-who-use-mobile-apps-store/>

**Figure 8:** Platforms used in e-commerce (U.S. Internet Users Who Use Mobile Apps In-Store)

Figure 8 shows that, android is on the top of the table as it relates to shipment as well as market share [16].

Unique Monthly Visitors, in Millions, January 2015	Total Digital	Desktop	Mobile	Mobile-Only	Mobile-Only as % of Total Digital
<b>Total Digital</b>	<b>255,849</b>	<b>230,604</b>	<b>185,223</b>	<b>25,244</b>	<b>10%</b>
<b>Total Retail Digital</b>	<b>234,066</b>	<b>202,507</b>	<b>166,361</b>	<b>31,559</b>	<b>13%</b>
1. Amazon.com	179,966	110,993	121,090	68,974	38%
2. eBay	122,083	68,465	81,919	53,618	44%
3. Wal-Mart	83,192	41,127	54,022	42,066	51%
4. Apple	79,065	32,405	55,079	46,660	59%
5. Netflix	67,637	47,908	34,219	19,729	29%
6. Target	50,156	23,333	31,440	26,823	53%
7. Best Buy	36,221	19,668	19,954	16,553	46%
8. Ticketmaster	33,363	13,800	21,807	19,563	59%
9. QVC	28,267	13,349	17,271	14,918	53%
10. Kohl's	27,576	14,460	16,043	13,116	48%

Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/mobile-commerce/shopper-s-who-visit-top-10-retailers-only-on-mobile/>

**Figure 9:** U.S. Shoppers Who Visit Top Retailers ONLY On Mobile Devices

As shown in figure 9, Amazon has taken over the every aspect of e-commerce. However, in terms of price, Amazon is not the leader; it is 20.5% more expensive than Walmart, but because of its customer service, it leads [17].

Quarter	E-commerce	Stores	Amazon
Q1 2013	15.10%	3.60%	26.30%
Q2 2013	17.70%	4.00%	26.30%
Q3 2013	17.60%	4.00%	25.90%
Q4 2014	15.70%	3.10%	30.70%
Q1 2014	15.50%	1.70%	29.60%
Q2 2014	15.70%	3.70%	26.40%

Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/e-retailers/amazon-grows-faster-us-e-commerce/>

**Figure 10:** Amazon grows faster than U.S. e-commerce. (n.d.).

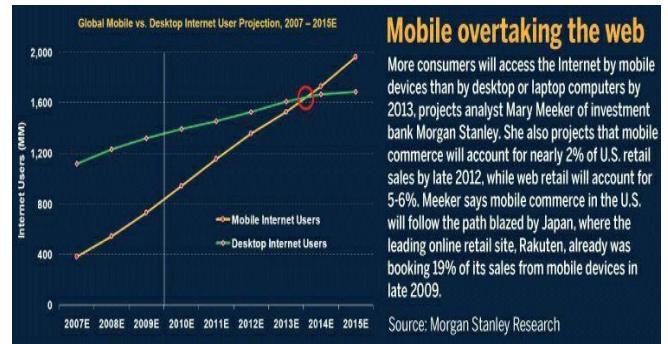
Figure 10 shows, not only is Amazon.com by far the largest U.S. retailer in terms of online sales, it's also growing faster than e-commerce as a whole, and e-commerce is growing much faster than in-store retail sales [1].

Rank	Retailer	Mobile Unique Visitors (000)	% Reach
	<b>Total Mobile (Smartphone &amp; Tablet, Browser &amp; App) Retail</b>	<b>176,841</b>	<b>100.0%</b>
		158,355	89.5%
1	Amazon Sites	106,305	60.1%
2	eBay	70,840	40.1%
3	Apple Sites	69,155	39.1%
4	Wal-Mart	44,281	25.0%
5	Netflix	30,913	17.5%
6	Target	30,029	17.0%
7	Ticketmaster	19,905	11.3%
8	Samsung	17,615	10.0%
9	Liberty Interactive (QVC)	16,673	9.4%
10	Nike	16,444	9.3%
11	Best Buy Sites	14,816	8.4%
12	Redbox	12,893	7.3%
13	Shopzilla/Aisle A Sites	12,602	7.1%
14	Walgreens	12,516	7.1%
15	Etsy	12,405	7.0%

Source: Retrieved December 8, 2015, from <https://www.internetretailer.com/trends/mobile-commerce/top-15-retailers-us-mobile-unique-visitors/>

**Figure 11:** Top 15 Retailers by U.S. Mobile Unique Visitors

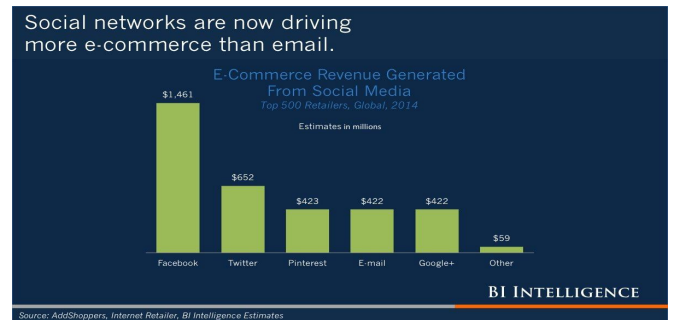
As shown in figure 11, Amazon is leading the way with mobile sites [14].



Source: Morgan Stanley internet trends ri\_041210. Retrieved December 8, 2015, from <http://www.slideshare.net/fred.zimny/morgan-st>

**Figure 12:** Growth of commerce both on the web and through a mobile device

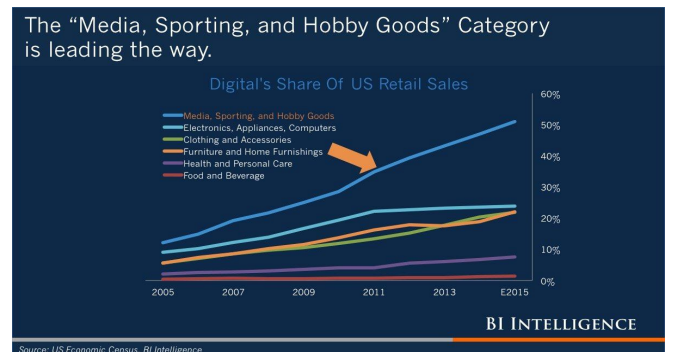
Figure 12 illustrates, the number of mobile internet users has grown significantly over the past years, and access to the internet has become more relevant to users using m-commerce rather than over the web [18].



Source: E-COMMERCE AND THE FUTURE OF RETAIL: 2015. Retrieved December 8, 2015, from <http://www.slideshare.net/CooperSmith/ecommerce-and-the-future-of-retail-2015>

**Figure 13:** Social Media and E-commerce

Figure 13 illustrates that Facebook has a strong hold on e-commerce as it relates to social media [11].

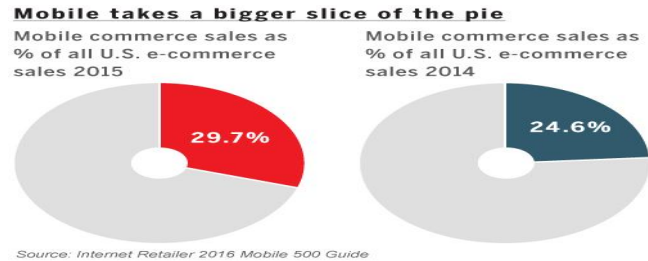


Source: The media, sporting, and hobby goods. Retrieved December 8, 2015, from <http://www.slideshare.net/CooperSmith/ecommerce-and-the-future-of-retail-2015>

**Figure 14:** The media, sporting, and hobby goods

Figure 14 shows that media, sporting, and hobby goods are leading the way in share of digital US retail sales [11].

Mobile commerce continues to gain momentum as a mainstream way for consumers to shop online. In fact, mobile commerce now accounts for nearly one-third of all U.S. e-commerce sales, according to an analysis of data from Internet Retailer’s newly published [4].



**Mobile takes a bigger slice of the pie**  
 Mobile commerce sales as % of all U.S. e-commerce sales 2015  
 Mobile commerce sales as % of all U.S. e-commerce sales 2014  
 Source: Internet Retailer 2015 Mobile 500 Guide  
 Source: Mobile commerce is now 30% of all U.S. e-commerce. Retrieved September 15, 2015, from <http://www.scoop.intl.commerce-pulse-e-commerce-news-for-manufacturers/p/4049748314/2015/08/19/mobile-commerce-is-now-30-of-all-u-s-e-commerce>

**Figure 15:** M-commerce sales

As shown in figure 15, Internet Retailer projects that mobile commerce will account for about 29.7% of all U.S. e-commerce sales compared with 24.6% in 2014. There are other statistics confirming that more consumers are using web-enabled smartphones and tablets in general. Web measurement firm comScore Inc. estimates 189.7 million consumers, or nearly 60% of the U.S. population of 319.8 million, now own a smartphone. U.S. consumers are using those web-connected devices more often on mobile sites and through mobile apps [4].

The data analysis helps to show records for e-commerce and m-commerce growth. According to the U.S. Census Bureau, the manufacturing sector is the largest contributor to e-commerce sales (46.4% of their total shipments), followed by merchant wholesalers (24.6% of their total sales). These two segments make up the business-to-business category. Retailers and service providers generated just 4.4% and 2.3%, respectively, of their revenues online, a slightly higher percentage than in the prior year. The Bureau categorizes these two segments as business-to-consumer. This places the business-to-business category at 90% of total e-commerce sales, with the balance coming from the business-to-consumer category [3].

**3.2 Forecasting**

The Forecast function is a linear regression method used in calculating, or predicting, a future value by using existing values. The estimated value is a y-value for a given x-value.

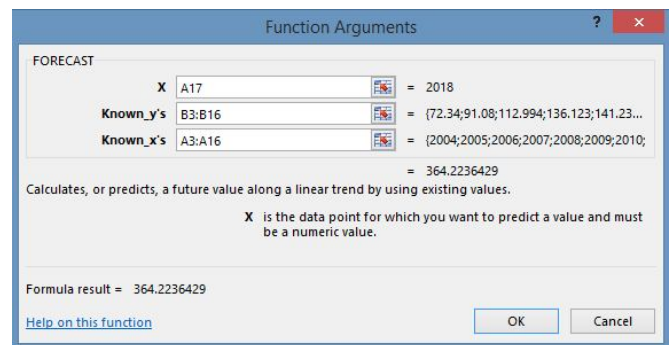
By using the Forecast function, the results predictions from 2004 to 2015. Once a good fitting relationship was found, it was used to predict the average value for y for a specified value of x.

Data used in this research to predict the U.S. Retail Revenues per year are based on publications from the U.S. Census Bureau. Given the availability of statistics, the information used by the Census Bureau from 2005 throughout 2015 is shown in Figure 16 as predicted targeted years.

U.S. E-Commerce Sales, 2004-2018	
Year	U.S. Commerce Sales Growth
2004	Web Sales \$72,340
2005	Web Sales \$91,080
2006	Web Sales \$112,994
2007	Web Sales \$136,123
2008	Web Sales \$141,233
2009	Web Sales \$144,908
2010	Web Sales \$168,895
2011	Web Sales \$197,833
2012	Web Sales \$226,279
2013	Web Sales \$264,279
2014	Web Sales \$304,913
2015	Web Sales \$310,319
2016	Web Sales \$318,668
2017	Web Sales \$340,017
2018	Web Sales \$364,223

**Figure 16:** U.S. E-commerce revenues

As shown in Figure 16, revenues of internet sales and trade have been growing rapidly each year. There are new members to e-commerce every day because it is so easy and convenient for its users, plus e-commerce is helping to boost the US economy. Figure 17 shows the , Figure 18 shows the current US economic sales growth from year 2004-2015, Figure 18 represents the forecast, and Figure 19 represents the trend. The prediction for years 2015-2018 are as follows:



**Figure 17:** Forecasts Calculation

The linear regression method used as forecasting function in calculating, or predicting, a future value by using existing values. The estimated value is a y-value for a given x-value. By using the Forecast function, the results predictions from 2004 to 2015.



Figure 18 Forecasted Sales

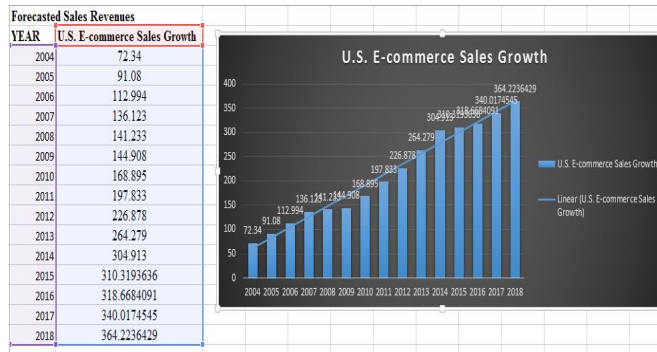
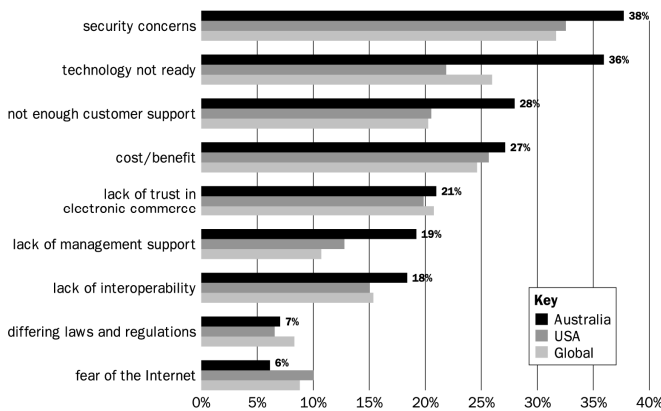


Figure 19: Trend

TREND is an array function and returns an array of unknown y values. The first two arguments to TREND are the known x and y data sets. The third argument is the array of x values for which we wish to predict the corresponding y data, where x values are the years and y values are the billions of e-commerce sales in the United States. The general format for this function is: =TREND (range of y values, range of x values, range of x values to be used for predicting). The trend is the long-run shift or movement in the same time series observable over several periods of time.



Source: Retrieved from

<https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=chart%20of%20online%20security%20attacks>

Figure 20: Factor Impacting E-commerce.

Illustration above in Figure 20 shows the global, US, and Australian, percentage of various elements that impact e-commerce.

#### 4. THREATS

Samsung launched its smart TV which was a big boost to m-commerce. The tech savvy consumers loved this new technology and embraced it. However, its popularity was undermined by the security and privacy threats that it presented. A story broke on the news confirming that these televisions could potentially expose buyers to a breach of their privacy, and claiming that Samsung was spying on the customers that use their Samsung televisions to connect to the internet. This claim caused a significant drop in the sale of those televisions. Due to this, the sale price of those particular televisions dropped significantly. Sony is one of the most well recognized electronic retailers in the world. They too have faced security threats. Data on thousands of their customers were compromised by attackers on Sony. As a result, Sony's PlayStation users were knocked offline on Christmas day in 2011. Also in 2014, the FBI confirmed that North Korea was behind a vicious attack on Sony.

#### 4.1 Managing Data Security

Data security is the most important part of electronic commerce. However, it has been tough to manage secure data. Data security is a comprehensive data loss prevention (DLP) system that discovers, monitors, and protects critical information holdings, whether that data is stored on servers currently in use or located in off-network endpoints. Data security protects against data loss by quickly analyzing data and enforcing customized policies automatically, whether users are on the network or offline. Administrators manage who can send what information, where, and how. Data security problems include treating all data as equal, outsourcing, faith in risk assessments, and settling for less than real security.

Important factors to make data security more efficient:

- Classifying data according to its sensitivity and its worth to the organization so they can correctly evaluate and fund different levels of protection.
- Laws concerning data privacy and security vary internationally. To lessen the chance of sensitive data being exposed deliberately or by mistake, you must ensure that the company you are partnering with offshore or domestic takes data security seriously and fully understands the regulations that affect your business [2].
- Risk assessments tend to look at one item at a time, and do not offer a complete view of the system. Each component may look secure, but the breach may still occur at the interface points or the points of inconsistency

across systems. Think holistically to secure a system, considering the flow of data through the entire system rather than testing individual points [2].

- Model your policies and processes after best practices of the most secure organizations in your industry, rather than those used by the common denominator.

High	4	5	2
Medium	2	4	2
Low	2	4	1
<b>Cause</b>	Security	Recession	Time

**Figure 21:** Use the matrix below to quantify all risks from 1 to 5 Probability

Figure 21 shows the most important risks are indicated as 5, with the lesser ones rated as 1. Showing the highest numbers of risks, a recession poses the most threat to e-commerce.

#### 4.2 The New Age of e-Commerce/m-Commerce

The impact of m-commerce on society is very captivating, as a result more people have access to mobile devices. M-commerce has the ability to connect big and small businesses with consumers on a massive scale. In this sense, mobile devices have the potential to bridge the digital gap, allowing organizations, and individuals to connect to each other more than ever before.

#### 4.3 Secure Apps and Technologies

Containers are playing a big part in the new wave of enterprise mobile security [9]. Secure containers protect enterprise data on smartphones and tablets by limiting what users can do with it. Information Technology can control everything from email to the camera in a container. A secure data container is a third-party mobile application that is used to separate and secure a portion of a device's storage from the rest of the device. Mobile operating systems consume resources from unknown sources on the Internet all the time, and yet they are not infected in the same manner as desktop operating systems. Desktop endpoint security has not been as successful as mobile security layers, such as application code-signing and app sandboxing. Sandboxing of mobile device apps is very strong compared to sandboxing of applications on desktop operating systems. Mobile operating systems have barriers between apps that extend much deeper. Apps have no user rights into the memory space of other apps, and this is engineered without compromise due to backward compatibility that often plagues desktop operating systems.

Out of the box, mobile operating systems provide a good deal of security. This truth is muddled by the hype surrounding mobile malware [12]. Cost to have this type of security varies from as low as \$76.95 a year to \$399.

Google cloud is a wonderful option to save secure data. Google implements appropriate technical and organizational measures to protect data against accidental or unlawful destruction or accidental loss, alteration, or unauthorized disclosure or access. Google data are stored with very high level of durability and availability. Google Cloud Storage stores and copies data, allowing a high level of persistence. All data is encrypted both in-flight and at rest. With 15 years of experience, Google security model is an end-to-end process, making it more resourceful to its users. Google has no minimum fee and a pay for what you use model, making Google the most cost effective in the market. Google Cloud Storage pricing is based on a flat rate for storage and a usage rate for the network. Project storage usage and bandwidth usage are calculated in gigabytes (GB), where 1GB is 230 bytes. This unit of measurement is also known as a gibibyte (GiB) [5].

Standard Storage (GB/Month )	Durable Reduced Availability (DRA) Storage (GB/Month)	Nearline Storage (GB/Month)
\$0.026	\$0.02	\$0.01

Source: [cloud.google.com/storage/pricing#storage-pricing](http://cloud.google.com/storage/pricing#storage-pricing)

**Figure 22:** Price of Google Cloud

Figure 22 shows the cost of Google Cloud to store data.

### 5. BENEFITS AND OPPORTUNITIES

Americans spend 600 billion dollars on groceries each year, but only 1% is spent online. This offers e-commerce a big opportunity where users can shop online for their groceries. Only 5% of supermarkets have ordering capability, proving that there is a big opening for e-commerce to capitalize on, which will take e-commerce to another level.

The era of mobile commerce has swollen significantly in comparison to web commerce over the past years. There is a capability for m-commerce to be placed on any electronic device. We have observed the influence of m-commerce in every sector of the U.S. economy. Just by connecting to the internet with a television, any user can shop from various vendors for games, movies, music, and even live events. For instance, in 2014, the World Wrestling Entertainment (WWE) Company launched its very own mobile network giving access to the fans of wrestling from all over the world.



This network can be viewed on almost any mobile device and Wi-Fi capable TV for a monthly subscription price of \$9.99. This is a fraction of the \$64.99 price on pay per view. This network has boosted the WWE reach on its fans in a big way, giving them access to thousands of video footage through their mobile devices. Other similar examples include Amazon Fire TV, Roku, Google Chromecast, etc.

When incorporating mobile commerce, the user is simply and at every place and times, able to access his/her own data. In fact, while the use of E-commerce is provided only when the user is at his/her own home or workplace, the m-commerce user has access to media such as the internet and TV in any location [7].

**Context-specific services** – m-commerce makes it possible to offer location based services, which are specific to a given context (e.g., time of day, location and the interests of the user).

**Time-critical situations** - The ubiquity and immediacy of m-commerce allows users to perform urgent tasks in an efficient manner, irrespective of the current geographic location.

**Spontaneous decisions and need** - Spontaneous needs are not externally triggered and generally involve decisions that do not require a very careful consideration, e.g., purchase decisions involving small amounts of money.

## 6. CONCLUSION

E-commerce has become a major player in the conduct of business in modern society. Every sector in the U.S. has incorporated it in order to reach a broader spectrum of people. M-commerce is gaining on increasing acceptance in every sector. Its growth can be traced back to technological and demographic developments that have influenced many aspects of the social-cultural behavior in today's world. Mobile services have registered impressive growth in preceding years and m-commerce has progressively shown signs of a healthy growth [7]. Over the past years, m-commerce has been upgraded to meet the user need in various ways; for instance, improvement from 3 Generation to 4 Generation, allows us to use the internet more conveniently, giving us a reason to not use a desktop. With companies using mobile apps, mobile users have soared past web users, because it allows companies to reach a broader range of consumers. Not everyone has a computer, but almost everyone has a mobile device they use to access the internet. The fact that it is safer to use a mobile device over a desktop, offers m-commerce additional advantage to appeal to more cautious users. M-commerce users outpace web users 3 to 1 because of the availability of mobile technology. It helps increase the

productivity of the workforce by increasing the efficiency of their daily routines. Security concerns is among the main factors from which e-commerce and m-commerce suffer. However, in a recession, consumers save more, via e-commerce/m-commerce than by traditional shopping. The economy is the biggest factor in the increase of e-commerce/m-commerce, along with a stable economy and the vast increase of mobile apps. M-commerce will continue to see a significant rise in the foreseeable future.

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