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**Gordon Institute  
of Business Science**  
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**Twitter's effect on share price movements of the  
Johannesburg Stock Exchange.**

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of

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# Abstract

This research project examines the link between social media and its effect on stock exchanges and movement of stocks. The study uses Twitter as its primary social media platform and focuses on its effect on the Johannesburg Stock Exchange.

The study examines various forms of social media and micro-blogging sites in its attempt to provide a thorough understanding of the role of social media within the market. In line with its exploration of social media, the study analyses User-Generated Content, Sentiment Analysis and the impact of Word-of-Mouth. A brief explanation of Algorithmic Trading, the Efficient Market Hypothesis, and the Adaptive Market Hypothesis is also provided.

The information used to show the relationship between Twitter and the JSE was extracted using a quantitative survey answered by registered traders on the JSE. The survey aimed to ascertain the level of information pertaining to stock movement posted to the platform by these traders, and how these traders used that same information to make trading decisions.

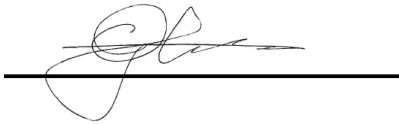
The results of the study show that Twitter and other micro-blogging sites have a level of determination in stock exchanges. This study shows that traders make some use of online information to inform their trading decisions on the Stock Market. The validity of this online information stems from the fact that traders place trust in other people and other users' experience, as proven by Word of Mouth.

The findings of this study were contrary to the researchers' expectation that Twitter was widely used as an informant for trade decisions. What is deduced from the available findings is that while Twitter and other social media platforms do to some extent provide information for traders on the JSE in making trade decisions, it is not a wide-spread basis for movement of shares.

**Key Words:** Twitter, Sentiment, Word of Mouth, Johannesburg Stock Exchange (JSE), Traders.

# Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

A handwritten signature in black ink, appearing to read 'Chad J. Gussenhoven', is written over a solid horizontal line.

29 January 2014

Signed: Chad J. Gussenhoven

Date

# Acknowledgements

Throughout the process of writing this thesis I was privileged enough to have the advice, guidance and support of many people. I would like to thank the following people for their contributions:

- I would like to thank my family for their undying support and loyalty throughout the research process. This thesis is dedicated to my mother Heidi, my father Charl, and my sister Maxine.
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## Dedication

I would like to dedicate this research to my mother, my father and my sister. You have all been my beacon of light and hope throughout the research process.

## Abbreviated Words

AMH	Adaptive Market Hypothesis
BRICS	Brazil, Russia, India, China, South Africa
EMH	Efficient Market Hypothesis
eWOM	Electronic Word of Mouth
FDI	Foreign Direct Investment
JSE	Johannesburg Stock Exchange
MNCs	Multinational Corporations
oWOM	Online Word of Mouth
SENS Announcements	Stock Exchange News Service Announcements
SNSs	Social Networking Services
SNS	Social Networking Sites
STF	SocioEconomic Theory of Finance
UGS	User Generated Services
UGC	User Generated Content
UGM	User Generated Media
WEF	World Economic Forum
WOM	Word of Mouth

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# Chapter 1: Introduction to Research Problem

## 1.1 Introduction

The aim of this research is to identify the extent to which traders and analysts operating on the Johannesburg Stock Exchange (JSE) use social media, more specifically Twitter, for information and as a means to influence the market. Part of the research will be to establish to what extent traders and analysts use Twitter as a means to access information and influence their purchasing decisions.

Copeland (2008), Byrne (2011) and Stevenson (2012) have posted arguments discussing whether the use of social media can be used to accurately predict stock market fluctuations. Recently, stock markets showed their ability to be directly influenced by the content of tweets, as recent tweets containing fake information caused high frequency traders to sell a broad range of stocks upon the dissemination of information (Philips, 2013; The Economist, 2013). The South African Social Media Landscape 2012 study revealed that 95% of leading South African brands surveyed do have some form of social media strategy aimed at consumers (World Wide Worx, 2013). The main finding to come out of the survey revealed that corporate South Africa has realised the importance of social media, but has not yet figured out the correct way to address and correctly manage it (World Wide Worx, 2013).

This study will provide greater understanding of how social media acts as a means to reliably predict and track daily stock market fluctuations in emerging market stock exchanges, with a specific focus on the JSE.

## 1.2 Background

Social Media is a term used to refer to any end user-generated content on the internet, such as: online review and rating sites, User-Generated Services (UGS), virtual game worlds, social networking sites (SNS), online communities, and video sharing sites (Krishnamurthy & Dou, 2008). Social Media has emerged due to the ideological, technological, and evolutionary platform of Web 2.0 (Kaplan & Haenlein, 2010).

The advent of Social Media has given rise to Online Social Networks which have the ability to link individuals and groups in terms of space, culture, ideas, and gives them the ability to share information quickly (Bryer, 2013). Many academics acknowledge the effects that exposure to technology has on everyday life, with the usage of these platforms continuously expanding (Hearing & Ussery, 2012). Research into the use of social media has revealed that the majority of users consume information from social media sites rather than contributing to social media (Bollen, Mao & Zeng, 2011). The high density traffic on social media networks indicates that the number of users of social media is high; however, the amount of original sources is lower. This means that more people are following the same information, which would increase the value of the information being shared.

Social Networking Sites have emerged in conjunction with social media. An SNS is an online space where users are given free rein to create their own profiles and connect with other users (Lenhart & Madden, 2007; Kaplan & Haenlein, 2010). The internet has been the primary vessel which has allowed people to expand their social networks, where social networking services (SNSs) are the primary tools for providing the online private space in which users can interact (Ahn, Han, Kwak, Moon & Jeong, 2007). SNS play an important role in the facilitation of people's and groups' social structure and communication (Naaman, Boase & Lai, 2010).

Within social media, social networking and social networking sites, the concept of microblogging has emerged, which provides users with the opportunity to produce, spread and retrieve information in a variety of fields (Vieweg, Hughes, Starbird & Palen, 2010). Microblogging has come to prominence through its public adoption speed and universal popularity (Vieweg et al. 2010). The most popular microblogging site to have emerged in recent years is Twitter, with over 200 million estimated users, and more than 95 million tweets (posts) being posted per day (Brown, 2012).

Twitter is a microblogging site that allows users to follow people and accounts of interest, update their tweets, retweet other Twitter users, and communicate directly with other Twitter users (Zhang, Fuehres, & Gloor, 2011). There is a large amount of information available on social networking sites in the form of blogs, review sites, and social networking applications (Eirinaki, Pisal & Singh, 2012); where Twitter has emerged as a social networking application and has become an important tool for businesses and individuals to share information and communicate (Brown, 2012). To date, Twitter has an impressive penetration rate: as of January 1<sup>st</sup> 2014 Twitter had

645,750,000 users, with 135,000 new users signing up per day, and 58 million tweets being posted per day (Statistic Brain, 2014).

Sentiment analysis or opinion mining is important in the case of news and information, with recent research suggesting that news is unpredictable and that early indicators may be extracted from online social media to predict changes in various economic and commercial performances (Bollen et al. 2011). Sentiment is important to businesses in the current day and age as psychological research shows that emotions and information play a significant role in the human decision-making process (Bollen et al. 2011). People are dependent on other users' experiences and opinions when making decisions relating to purchases (Eirinaki et al. 2012), which gives rise to the importance of WOM.

Twitter is used for electronic Word of Mouth (eWOM), marketing, and communication, as it is a form of microblogging that uses the Web and social communication to reach large groups of people (Jensen, Zhang, Sobel & Chowdury, 2009). Word of Mouth (WOM) is the process of conveying information from person to person that has an impact on customers' purchasing decisions. WOM consists of consumer's attitudes, opinions, or reactions to the sharing of information regarding business, products or services with other people (Davenport & Beck, 2001). Trust is the most important area surrounding WOM, as consumers rely on family and friends in their social network to inform their purchasing decisions (Jansen et al. 2009). According to Bakshy, Hofman, Mason & Watts (2011) the Twitter ecosystem is ideal to the study of sentiment and influencers, as its sole function is the broadcasting of information, as users can follow and "listen" to whom they please.

Further research and analysis of WOM and Twitter reveals that consumers are increasingly prone to using new communication technologies as trusted sources of information, insights and opinions on which to base their purchasing decisions (Jensen et al. 2009). Twitter as a microblogging service could develop into an important application in the economy as it provides an easy platform for consumers and companies to monitor brand sentiment, allowing microblogging to be a competitive intelligence source (Jensen et al. 2009).

More traditional trading sources of information for investors are largely based on Fundamental Analysis, Technical Analysis and Gut Feel. Fundamental Analysis is used when analysing trades over a long term period, while Technical Analysis is used by investors when focusing on the short term (Waring, 2008). Fundamental Analysis

consists of analysing financial statements, and assessing the financial health of the company. It focuses on the company's competitive advantages, management, market, and competitors. Fundamental Analysis also takes the state of the economy into account, considering a host of market related factors such as manufacturing, housing, GDP, employment, interest rates, production, and earnings (Waring, 2008). Two basic approaches exist when analysing stock: the Bottom Up Analysis, looking at the smaller details about a company and working its way up to the economy; and the Top Down Analysis, looking at the economy and then working its way down to smaller details (Waring, 2008). Technical Analysis focuses on assessing the historical price of an asset, determining whether it would be considered to be a good investment or not based on past market data (Waring, 2008).

### 1.3 Research Scope

The use of social media in the context of the stock market is an emerging market issue. Twitter has emerged as a global phenomenon, while South Africa provides the basis for the study. Social media and its uses are different in developed markets because the use of social media in emerging nations is higher than the use in developed nations. For convenience the study will be conducted in South Africa due to time constraints, geography, and ease of access.

Emerging markets are important to the state of the global economy as they offer large amounts of wealth opportunities such as, Foreign Direct Investment (FDI), trade, and technology transfers (Li, 2013). Emerging markets are important in offering significant growth opportunities in the evolving economic world order, as their emergence has already caused a shift in Multinational Corporations' (MNCs) investment strategies (Arnold & Quelch, 2012). MNCs and governmental institutions have had to develop new strategies to confront the broad scope and speed of political and economic change in emerging markets (Hoskisson, Eden, Lau, & Wright, 2000). What makes emerging markets important to investment, development, and trade are: they are regional economic powerhouses with large markets, resources and populations; and they constitute the world's fastest growing economies (Li, 2013). According to Forbes (2013) South Africa is considered to be an emerging market, and forms an integral part in the sub-Saharan African context.

South Africa is currently considered to be the most powerful emerging market in Africa (Nagar, 2013). As South Africa is considered to be the gateway to other African countries and is seen as an investment opportunity to private investors, many investors are moving into Africa through South Africa (The Global Business Advisor Magazine, 2013). According to the World Economic Forum (WEF) Global Competitiveness report, South Africa is the number one ranked country for its regulation of securities exchanges and strength in accounting and auditing standards (JSE Limited, 2013). South Africa is ranked highly for its standards of corporate governance, and boasts a sound banking sector, making it an attractive investment destination (JSE Limited, 2013).

Recent research shows that people in emerging markets are increasing their use of social networking sites, as access to the internet has become more widespread (JANA, 2013). The majority of people using Twitter and Facebook are based in developing countries, with users in emerging markets being more active on social networking sites than those based in developed nations (JANA, 2013). In the last year, Social Media has been playing an ever-increasing role in the day-to-day lives of South Africans, with Facebook overtaking Mxit (a cellular phone based chat-forum) for the first time, and Twitter seeing the highest percentage growth among the major social networking sites, growing by 129% in 12 months (World Wide Worx, 2013).

## 1.4 Research Problem and Purpose

Chen, De, Hu and Hwang (2012) in their study “Customers as Advisors: The Role of Social Media in Financial Markets” argue that peer-based advice and social media are playing a greater role in the decision-making process in financial markets, and suggest that:

“Exploring implications of peer-based advice and, more generally, using social media outlets as a laboratory to investigate the effects of social interactions on investment behaviour should prove to be interesting avenues for future research.” (Chen et al. 2012, p. 22)

Brown (2012), in his study “Will Twitter Make You a Better Investor? A Look at Sentiment, User Reputation and Their Effect on the Stock Market” suggests that future research could be conducted by:

“extending the analysis of sentiment to determine and report sentiment in near real-time to allow investors and traders to decide which stocks or sectors should be invested in throughout the trading day.” (Brown, 2012, p. 40)

Chen et al. (2012) and Brown (2012) assert the need for a study to be conducted in the above mentioned areas. The study will provide insight in to the field of social media and the effect the dissemination of information has on the JSE.

## 1.5 Research Motivation

The rationale behind this research is to extend the current academic literature in several ways. Primarily, this study is the first attempt to examine the link between sentiment analysis, WOM and market prices as determined by traders in the context of emerging markets, specifically South Africa and the JSE. This study therefore also expands on the literature on sentiment analysis and the use of information garnered from social media (Twitter), to monitor and influence the stock market.

Secondly, this study will examine the influence social media has on trading patterns, as perceived by traders. The research will specifically look at the relationship between traders’ use of Twitter to access and use information available on the microblogging site.

Finally, the study will examine how traders use Twitter in the context of the market and the stock exchange. The study will test the extent to which traders use and access Twitter as the basis of their purchasing decisions regarding market information, market influence, market penetration, and the spread of information.

The rationale behind this research is pertinent to South Africa’s current trading position, as it intends to add to research previously conducted in South Africa relating to social media usage on the JSE [with regards to information posted by the Stock Exchange News Service Announcements (SENS Announcements)]. There is a need for a study to



be conducted in emerging markets, specifically the South African context, as there is limited research pertaining to the South African position. It is a matter that requires immediate concern, as the author discovered that only one article has been published regarding the use of information obtained through social media forums in the trading of stocks in South Africa (Watermeyer, 2011).

## Chapter 2: Literature Review

### 2.1 Introduction

The literature review will cover a variety of theories relating to the diverse nature of the research topic. The literature review begins by focusing on the emergence of Social Networking, an umbrella term in which Social Media, User-Generated Content, Social Networking Sites, Microblogging and Twitter are grouped. The literature introduces Social Networking primarily to inform the reader of the new form of communication that has emerged through the advent of new technologies and the way in which information travels. The literature review moves on to Sentiment, grouping together Sentiment Analysis, Opinion Mining, Social Media, Word of Mouth and the Stock Market. The purpose of focusing on Sentiment is to familiarise the reader with the use of information and text found online as a determinate of public opinion, where public sentiment can be used to predict changes in the economic landscape. The third section of the literature review looks at the Market, introducing the Efficient Market Hypothesis (EMH), the Adaptive Market Hypothesis (AMH) and Arbitrage. The final section of the literature review focuses on Emerging Market, looking closely at South Africa and the effect social media has had on these markets.

Numerous authors suggest that information and news impacts the market (Nofsinger, 2005; Angel & McCabe, 2011; Bollen, Mao & Pepe, 2011; Brown 2012; Watermeyer, 2011). Angel and McCabe (2011) suggest that when news events occur, the market will respond in accordance with the announcement. Angel and McCabe continue to say that investors who process information available in news announcements are a part of the information processing system in markets that determine prices, and that investors have invested in resources to assist in the acquiring of information (Angel & McCabe, 2011).

Recent studies conducted by Bollen et al. (2011) and Brown (2012), test whether there is correlation between Twitter sentiment and the prediction of the stock market, and Watermeyer (2011) and Delort, Arunasalam, Leung and Milosavljevic (2012) test whether news breaks have an effect on trading volumes. The aforementioned authors

came to the consensus that random walk theory and the EMH were the early theories in trying to predict the stock market.

However, Bollen et al. (2011) state that the Socioeconomic Theory of Finance (STF), behavioral economics and behavioral finance have been used to critically examine the EMH and random walk theories. STF is a theory of human social behaviour that describes the relationship between the social mood and social action, meaning that the social mood affects the actions of large groups of people (Prechter & Parker, 2007). Brown (2012) indicates that the AMH is the ideal theoretical foundation that can prove that social media, more specifically Twitter, is one of the drivers of market prices.

Furthermore, it is stated by Asur and Huberman (2010, p. 499) that “social media can be utilized to forecast future outcomes,” a hypothesis supported by Nofsinger (2005). Bollen et al. (2011) in their research go on to cite that recent research conducted suggests that news is unpredictable. Early indicators can be seen on online social media feeds and can be used to predict changes in commercial and economic standings. Bollen et al. (2011) conclude that these instances might also apply to the stock market.

## **2.2 Social Networking**

### **2.2.1 Social Media**

It is commonly accepted that Social Media is any form of online communication or service where people can create, share and edit content (Bolton, Parasuraman, Hoefnagels, Migchels, Kabadayi, Gruber, Solnet, 2013; Kaplan & Haenlein, 2010; Krishnamurthy & Dou, 2008). Kaplan and Haenlein (2010, p. 61) state that “there is no systematic way in which different Social Media applications can be categorized.” Rather, Social Media is a blanket term created to encompass online review and rating sites, UGS, virtual game worlds, social networking sites, online communities, and video sharing sites (Krishnamurthy & Dou, 2008).

Kaplan and Haenlein (2010, p. 61) consider Web 2.0 as the ideological, technological and evolutionary platform from which social media has emerged. Bryer (2013) concludes that the ability of Online Social Networks to link individuals and groups in

terms of culture, space, ideas; and its ability to share information quickly; presents many risks and opportunities to governments and organisations in terms of public sentiment.

According to Kaplan and Haenlein (2010), the increase in availability of high speed internet has added to the popularity of the concept of social media, leading to the creation of websites “MySpace”, in 2003, and “Facebook”, in 2004. The term “Social Media” was coined with the creation of the aforementioned sites (Kaplan & Haenlein, 2010).

Hearing and Ussery (2012) acknowledge that most aspects of everyday life have been impacted by the exposure to technology, specifically social media, with the uses of these platforms continuously expanding. Bolton et al. (2013, p. 248) note that “research on social media broadly classifies consumer activities as either contribution (posting) or consumption (lurking or observing) activities (Schlosser, 2005; Shao, 2009). It suggests that most users consume rather than contribute to social media (Jones et al., 2004).”

## 2.2.2 User-Generated Content

User-Generated Content (UGC) or User-Generated Media (UGM) is understood as media that is uploaded to the internet by individuals (Hollenstein & Purves, 2013; Egger & Lang, 2013). UGC is elaborated on further by Krishnamurthy and Dou (2008) and Egger and Lang (2013), both concluding that information is expressed online through users’ discussions of thoughts, feelings, experiences, and opinions. Egger and Lang (2013) continue to say that UGC can lead to consumers searching for online discussions that can affect the perceptions of consumers and non-consumers, as well as having the potential to influence future consumers. UGC along with social media can be used as a tool to monitor and track the emergence of trends (Egger & Lang, 2013).

To date, it has been recorded by Egger and Lang (2013, p. 1) that “UGC is a rapidly growing phenomenon of social media.” Kaplan and Haenlein (2010, p. 61) support this by saying “User Generated Content (UGC) can be seen as the sum of all ways in which people make use of Social Media.”

### 2.2.3 Social Networking Sites

A Social Networking Site is an online space where users are given free rein to create their own profiles and connect with other users (Ellison, 2007).

Social Networking sites have been described as:

“applications that enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other. These personal profiles can include any type of information, including photos, video, audio files, and blogs.” (Kaplan & Haenlein, 2010, p. 63)

Ahn et al. (2007) come to the conclusion that the internet has been the primary vessel to expand people’s social networks, and define SNSs as a tool to provide users with an online private space to interact with other users on the internet. They continue to say that social networking sites play an important role in people’s communication and social structure.

Naaman et al. (2010) support this theory in their findings, which show that social networking sites facilitate communication and conversation in highly connected social spaces, where information is consumed, articulated and enabled through contact on social networks. This resulted in Shriver, Nair and Hofstetter’s (2013) work, where they conclude that social-networking sites are becoming more and more relevant in the online economy.

### 2.2.4 Microblogging

Microblogging is a form of social media that provides users with the opportunity to produce, spread and retrieve information (Vieweg et al. 2010). It has come to prominence in recent years through its popularity and public adoption speed (Vieweg et al. 2010; Bollen et al. 2011; Brown, 2012). Microblogs can be identified through their short lifecycle and rapid and repetitive production speed (Vieweg et al. 2010).

## 2.2.5 Twitter

It is common knowledge that Twitter is a microblogging site where users can follow people of whom they want to keep track, update their tweets, retweet other Twitter users, and communicate directly with other Twitter users (Bifet & Frank, 2010).

To date, Twitter has an impressive penetration rate; as of January 1<sup>st</sup> 2014 Twitter had 645,750,000 users, with 135,000 new users signing up per day, and 58 million tweets being posted per day (Statistic Brain, 2014). Brown (2012, p.36) states that “Twitter has become an important tool for businesses and individuals to communicate and share information.” Brown (2012, p.36) continues to say that “one of these communities has grown up around the area of the stock market where investors and traders share their thoughts on trade and investing ideas.”

Eirinaki et al. (2012) highlight that there is a large amount of information available on social networking sites, in the form of blogs, review sites and social networking applications. This increased amount of online accessible information would have an effect on trade, because news affects the market.

## 2.3 Sentiment

### 2.3.1 Sentiment Analysis or Opinion Mining

Sentiment Analysis and Opinion Mining, in correspondence with related academic terminology, has been the focus of many recent research reports, all of which come to the conclusion that Sentiment Analysis and Opinion mining are considered to be the same body of work (Su, Zhu, Swen & Yu, 2007; Ding, Liu & Yu, 2008; Pang & Lee, 2008; Paltoglou, Gobron, Skowron, Thelwall & Thalmann, 2010; Pak & Paroubek, 2010). Therefore, the remainder of the literature review will consider Opinion Mining and Sentiment Analysis as the same body of work and will use the terms interchangeably.

There are many variations in the way that Sentiment Analysis and Opinion Mining have been defined. Examples from the literature will be presented to highlight the aspects pertaining to Social Media and the Stock Market.

Pang and Lee (2008) produced an article “Opinion Mining and Sentiment Analysis” that is considered to be a seminal overview of the theories in question. In their work, Pang and Lee (2008) provide a very broad overview of Sentiment Analysis and Opinion Mining as a theory, and describe the existing approaches and techniques for the retrieval of opinion-oriented information. Pang and Lee state that sentiment analysis and opinion mining are of the same field of study, which is considered to be a sub-area of subjectivity analysis (Pang & Lee, 2008).

Pang and Lee (2008) cite Dave, Lawrence and Pennock (2003), to define the ideal opinion-mining tool to “process a set of search results for a given item, generating a list of product attributes (quality, features, etc.) and aggregating opinions about each of them (poor, mixed, good).” Pang and Lee continue to conclude that “Subsequent research self-identified as opinion mining fits this description in its emphasis on extracting and analysing judgments on various aspects of given items” (Pang & Lee, 2008).

Cambria, Schuller, Xia and Havasi (2013) define sentiment analysis and opinion mining as the extraction of perception through the monitoring of natural language. Cambria et al. (2013) go on to classify opinion mining and sentiment analysis as a research field that attempts to understand human emotion through the development of affect-sensitive systems and psychology. Paltoglou et al. (2010, p. 2) describe sentiment analysis as “the process of automatically detecting if a text segment contains emotional or opinionated content and extracting its polarity or valence, [which] is a field of research that has received significant attention in recent years, both in academia and in industry.”

In Brown’s (2012) study, the author identified that language processing and computational linguistics had surged in recent years, with an increase in researchers furthering sentiment analysis techniques and applications. The study went on to note the various areas which sentiment analysis had been used to predict sale and stock market movements (Brown, 2012).

### 2.3.2 Sentiment in the Case of Social Media:

Sentiment analysis or opinion mining is important in the case of news and information, with recent research suggesting that news is unpredictable and that early indicators may be extracted from online social media to predict changes in various economic and commercial indicators (Bollen et al. 2011). Bollen et al. (2011, p. 2) continues to note that news does influence stock market prices, where public mood states or sentiment plays an equally important role. Furthermore, psychological research shows that emotions and information play a significant role in the human decision making process (Bollen et al. 2011).

Eirinaki et al. (2012) found that social networking and e-commerce has led most people in search of product reviews on the internet, before the purchasing of products, as people are dependent on other users' experiences and opinions to inform their own decisions. Eirinaki et al. (2012) continue on to view people as wanting to stay updated with most political and social issues within their immediate micro environment and to the larger macro environment. A host of other authors (Su et al. 2007; Cambria et al. 2013), support the above view that consumers will search the web before purchasing decisions are made.

In a study conducted by O'Connor, Balasubramanyan, Routledge and Smith (2010), it is stated that text-based social media has risen dramatically over the past few years, allowing millions of people to express their opinions and views over a wide range of topics. It is therefore widely accepted that access to social media has an effect on consumers purchasing and spending patterns, as a large body of work supports this view (Su et al. 2007; Eirinaki et al. 2012; Cambria et al. 2013).

### 2.3.3 Word of Mouth (WOM) as Business Intelligence

Jansen et al. (2009) identify WOM as a process of conveying information from person to person, which has an impact on customer purchasing decisions. They continue to say that WOM consists of consumers' attitudes, opinions or reactions toward the sharing of information regarding business, products or services with other people. WOM marketing is considered to be influential, multifaceted and particularly difficult to



influence (Jansen et al. 2009, Gruen, Osmonbekov & Czaplewski, 2006). Two types of WOM exist, Negative WOM and Positive WOM, where the latter is considered to be a powerful marketing tool for companies to use to influence consumers (Jansen et al. 2009).

Communication for WOM functions on a base of trust, where consumers rely on family and friends in their social network to base their purchasing decisions (Jansen et al. 2009). Further research suggests that consumers are prone to trust the opinions, insights, attitudes and reactions of people who fall outside of their immediate social network of family and friends (Jansen et al. 2009).

WOM that takes place through the internet and online forums is known as online WOM (oWOM) or electronic WOM (eWOM). In this regard, the Internet has established itself as a source and as an outlet for eWOM communication to take place (Gruen et al. 2006). Recent studies indicate that eWOM has higher credibility, empathy and relevance to customers than marketer-created sources of information on the Web (Gruen et al. 2006). eWOM can therefore be described as a “statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet” (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004, p. 39). eWOM has a large reach which provides consumers with the ability to influence people’s perceptions and opinions.

Twitter is one form of eWOM marketing and communication as it a form of microblogging that uses the Web and social communication to reach large groups of people (Jansen et al. 2009). Davenport & Beck (2001) introduce the concept of the attention economy, which looks at the paradigm of studying the constant connectivity of modern social networking services in the commercial arena. They continue to say that in the attention economy, microblogging is a form of communication which users can use to describe things that interest them and express their attitudes in short posts (e.g. microblogs and Twitter). This form of microblogging has been seen to directly impact eWOM communication as it enables people to share their thoughts (sentiment) on almost any platform to anyone who has access to the internet (Jansen et al. 2009). The messages posted by users of microblogs (i.e., Twitter users) are non-invasive, as users can choose from whom they intend to receive updates. Messages are recorded and exist permanently, and are searchable through the internet and Web search engines by anyone who has a Web or internet connection (Jansen et al. 2009). In short, uploaded comments are omnipresent, instant and scalable, which provide user sentiment; insight

and reactions toward products during and after the decision-making and purchasing process (Jansen et al. 2009).

According to Bakshy et al. (2011) the Twitter ecosystem is ideal to the study of sentiment and influencers as its sole function is the broadcasting of information, in that users can follow and “listen” to whom they please. Users are limited to a certain number of characters when uploading information, which makes it easy to identify information themes. This allows people to track the diffusion patterns of information shared on Twitter. According to Bakshy et al. (2011) the reasons stated above address both the sampling and observability difficulties other microblogging sites have, making Twitter the ideal ecosystem for study. In this case influencers are defined as “individuals who disproportionately impact the spread of information or some related behaviour of interest” (Bakshy et al. 2011, p. 2). The definition and label as an influencer is ambiguous in many cases as individuals with varying backgrounds can be considered an influencer in differing circumstances (Bakshy et al. 2011). It is therefore important to note that influencers can exert their influence through numerous media platforms. For the purpose of this study we focus directly on comparing traders.

Jensen et al. (2009) conclude that consumers are increasingly prone to using new communication technologies as trusted sources of information, insights and opinions on which to base their purchasing decisions. They continue to state that microblogging services such as Twitter could develop into important applications in the attention economy as it provides an easy platform for consumers and companies to monitor brand sentiment, allowing microblogging to be a competitive intelligence source. Jensen et al. (2009) do however go on to state that microblogging sites are susceptible to forms of attack and false information such as spamming manoeuvres and brand hijacking, which can render some information obsolete or untrustworthy, This explains why information from social media is undervalued, and why research into the influence of social media is important.

### **2.3.4 Effect of Sentiment on the Stock Market:**

It has been proven that news and information influence prices on the stock market, where sentiment and public opinion play an important influential role, therefore it is important to track and monitor news when active on the stock market (Sprenger &

Welpe 2010; Bollen et al. 2011; Delort et al. 2012; Brown, 2012). Bollen et al. (2011, p. 1) state that “recent research also suggests that news may be unpredictable but that very early indicators can be extracted from online social media (blogs, Twitter feeds, etc.) to predict changes in various economic and commercial indicators.”

Recent studies have proven that sentiment analysis of tweets show consistent levels of correlation between Twitter sentiment and stock markets returns (Sprenger & Welpe 2010; Bollen et al. 2011; Brown, 2012). Furthermore, work done by Delort et al. (2012) around the effect information on online message boards has on financial markets, comes to the conclusion that stock markets are susceptible to the spread of information on online message boards. In the South African context one study was conducted by Watermeyer (2011), examining what impact SENS Announcements had on trading volumes of the JSE. Watermeyer came to the conclusion that news announcements did have an effect on the trading volumes at the JSE (Watermeyer, 2011).

## **2.4 Market**

### **2.4.1 Efficient Market Hypothesis**

As noted by Lo (2004) The Efficient Market Hypothesis (EMH) was first proposed by Paul Samuelson (1965) in his article “Proof that Properly Anticipated Prices Fluctuate Randomly”, and was subsequently built on by Roberts (1967) and Fama (1970) in Fama’s work “Prices Fully Reflect All Available Information.” The EMH is considered to be the basis of modern day financial theory and is often disputed by academics as it attempts to predict trends in the market through various forms of analysis (Malkiel, 2003).

The EMH believes that stock market efficiency is responsible for existing share prices to always reflect all relevant information, as stocks will always trade at a fair value on all stock exchanges. This makes it exceedingly difficult for investors or traders to sell stocks at inflated prices, or purchase stocks that are undervalued. In short, the EMH states that beating the market is impossible as stocks that are being traded on the market are already accurately priced. It is therefore theoretically impossible to make a profit off any trading strategy as one cannot predict future movements of stock prices (Timmermann & Granger, 2004).

It is accepted that, according to the EMH, stock prices and market prices are driven and reflective of all available information, and that news is unpredictable, so stock market prices follow a random walk pattern and cannot be predicted with more than 50% accuracy (Qian & Rasheed, 2007; Bollen et al. 2011). Lo (2004, p. 2) goes on to note that, “the more efficient the market, the more random the sequence of price changes generated by such a market, and the most efficient market of all is one in which price changes are completely random and unpredictable.” It has been postulated that where the ‘efficient market’ theory is asserted, given the available information, financial markets will always determine asset prices accurately (Wójcik, Kreston & McGill, 2013).

According to Watermeyer (2011, p. 6), EMH is underpinned by 3 main arguments: (1) Investors are assumed to make rational decisions, (2) Investors value security, and (3) Irrational decisions will be offset by other irrational decisions. If the irrational decisions do not set each other off, rational arbitrageurs will capitalize on the deviation present in the market and restore equilibrium (Watermeyer, 2011).

In the Bollen et al. (2011) study “Twitter mood predicts the stock market” it is noted that various studies indicate that stock market prices can to some degree be predicted and question the EMH’s basic conventions. They go on to state that news can be unpredictable but that early indicators can be taken from online social media, such as Twitter feeds, to predict changes in numerous commercial and economic indicators, and could also be the case for the stock market.

## 2.4.2 The Adaptive Market Hypothesis

As noted by Neely, Weller and Ulrich (2009) The AMH was first proposed by Lo (2004) and it attempts to modify the EMH’s view of the world. Lo (2004) created The AMH in a bid to combine the EMH and Behavioural Finance. The AMH is built upon the EMH, where investor behaviour is aligned to human behaviour, stating that the rational EMH is combined with the irrational behaviour exhibited in human behaviour. Brown (2012) goes on to assert that the AMH provides a modified approach to the EMH. Neely et al. (2009) state that AMH has modified the EMH by putting pressure on the market in order to drive ‘efficient’ pricing levels by asserting learning, competition and evolutionary selection. According to Lo (2004), Neely et al. (2009) and Brown (2012)

AMH is a mechanism of competition and learning to remove profit opportunities from the market. In essence, the AMH is an attempt to explain how the behavioural patterns of humans affect their trading decisions, using a trial and error based system to assert or reject trading decisions. Previous work compiled by Brown (2012), has used the AMH as a theoretical foundation to prove that Twitter is contributing to the process of learning and adding to competition in the market, which effectively drives prices.

### 2.4.3 Arbitrage

As noted by Shleifer and Vishny (1997), arbitrage is considered to be one of finance's fundamental concepts.

- Sharpe and Alexander (1990) define arbitrage as “the simultaneous purchase and sale of the same, or essentially similar, security in two different markets for advantageously different prices” (Shleifer & Vishny, 1997).
- Blake (1990, p. 9) considers arbitrageurs to be specialist traders who profit from deviations in stock prices (Watermeyer, 2011).
- Shleifer & Vishny (1997) go on to say that arbitrage is the purchase and sale of an asset at the same time in order to gain a profit from the difference in price from the two markets from which the assets were purchased and sold. The basic principle behind arbitrage is the exploitation of price differences between two markets.

Chen et al. (2012) note that rational arbitrageurs with relevant private information would keep that information to themselves until the market responded to a perceived true value. Conversely, Chen et al. (2012) found that investors are more open to the sharing of investment ideas with other traders as a means of receiving constructive feedback, accessing new ideas and attracting additional capital.

## 2.4.4 Algorithmic Trading

Hendershott & Riordan (2009, p. 2) define Algorithmic Trading (AT) as “the use of computer algorithms to automatically make trading decisions, submit orders, and manage those orders after submission.” Chaboud, Hjalmarsson, Vega & Chiquoine (2009) describe algorithmic trading as the process whereby computers are used to monitor the markets and manage the trading process at high frequencies. Chaboud et al. (2009) and Hendershott & Riordan (2009), both go on to state that, in recent years, algorithmic trading has become common amongst traders and financial institutions that operate in large financial markets.

Algorithmic trading can be attributed to two major technological changes that are significantly interrelated to investors: the first being investors’ use of computers to automate their trading processes, and the second being the reorganisation of markets themselves to fit the electronic limit order books (Hendershott & Riordan, 2009). These technological changes allowed for increases in quality and speed of access to the markets, which in turn encouraged the use of algorithmic trading (Hendershott & Riordan, 2009). In short, computers are being used to monitor news stories about company results, statistics and other news breaks to instantaneously feed into other computers, which perform trades on the uploaded and updated information. News stories are coded and uploaded in the form of complex algorithms which allow investors to attain the best price possible without negatively altering the stock price.

An important feature of algorithmic trading that has emerged through the literature is the advantage that algorithmic traders have over human traders in terms of speed (Chaboud et al. 2009). Chaboud et al. (2009) note, theoretically, that algorithmic traders are better informed than human traders and use market orders to exploit this information. They go on to state that well informed algorithmic traders who specialise in providing liquidity prevent arbitrage opportunities from occurring by posting quotes that reflect new information quickly.

Algorithmic trading can be linked specifically to Twitter with recent studies being conducted through the monitoring of news stories posted on Twitter, using computers to predict the stock markets’ movement. Hsu, Shiu, & Torczynski (2011) conducted a study to determine whether Twitter can be used to predict movement on the Dow Jones. Hsu et al. (2011) noted that online social media is creating large amounts of

data that can be analysed for the current state of the population, going on to note that Twitter would provide an ideal platform to find trends and characteristics that can be correlated to the movement of the Dow Jones. However, Hsu et al. (2011) noted that their study was inhibited by the method of data collection and that even though they were able to draw conclusions, the process was too convoluted to make accurate predictions.

## **2.5 The Importance of Emerging Markets in the Stock Exchange**

### **2.5.1 Emerging Markets**

Developing countries, also known as Emerging Markets or emerging economies, are characterised as low-income, rapid-growth countries that use economic liberalization as a primary engine for growth. Emerging Markets fall into one of two groups: the developing countries in Africa, Asia, Latin America and the Middle East, or transition economies in the former Soviet Union and China (Hoskisson et al. 2000).

Emerging Markets are also constituted as countries that are or have been reorienting their economies along market-orientated lines. They offer large amounts of wealth opportunities in FDI, trade and technology transfers (Li, 2013). According to Forbes (2013) countries considered to be emerging markets include South Africa, Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, Taiwan, Thailand, Turkey and Venezuela.

Emerging markets are important as they offer significant growth opportunities in the evolving economic world order, as their emergence has already caused a shift in MNCs investment strategies (Arnold & Quelch, 2012). This trend is supported by the continuous increases in FDI into developing countries between the period of 1992 (18%) to 1996 (33%) (Arnold & Quelch, 2012). MNCs and governmental institutions have had to develop new strategies to confront the broad scope and speed of political and economic change in emerging markets (Hoskisson et al. 2000). What makes emerging markets important to investment, development and trade are: they are

regional economic powerhouses with large markets, resources and populations, and they constitute the world's fastest growing economies (Li, 2013).

## 2.5.2 South Africa in the Context of Emerging Markets

South Africa is currently considered to be the most powerful emerging market in Africa (Nagar, 2013), while its recent admission into the economic coalition known as the BRICS (Brazil, Russia, India, China and South Africa) group gives the country a new economic position to work off in the global economic system. According to the WEF Global Competitiveness report, (Porter & Schwab, 2011) South Africa is the number one ranked country for its regulation of securities exchanges and strength in accounting and auditing standards. South Africa is also ranked in WEF's report highly for its high standards of corporate governance and boasts a sound banking sector, making it an attractive investment destination (Porter & Schwab, 2011).

Recent research shows that people in emerging markets are increasing their use of social networking sites, as access to the internet has become more widespread (JANA, 2013). The majority of people using Twitter and Facebook are based in developing countries, with users in emerging markets being more active on social networking sites than those based in developed nations (JANA, 2013). In the last year, Social Media has been playing an ever-increasing role in the day-to-day lives of South Africans with Facebook overtaking Mxit for the first time, and Twitter seeing the highest percentage growth among the major social networking sites, growing by 129% in 12 months (World Wide Worx, 2013).

## 2.6 Summary

The literature review shows readers that considerable amounts of research have been conducted in the areas pertaining to the use of social media to correctly predict the stock market. It introduces the importance of Social Networking, as it encompasses a wide range of important tools and technological advancements, including: social media, UGC, social networking sites, microblogging, and Twitter. The importance of UGC is



noted in this section of the literature review as it relates Social Networking to microblogging sites such as Twitter, and how individuals can freely upload information to the internet.

The literature review diverted attention to Sentiment, focusing on Sentiment Analysis, Opinion Mining and WOM. Sentiment analysis and Opinion Mining were introduced to follow on from the groundwork laid out through the Social Networking section, as Social Networking has allowed academics and business to monitor public perception through the observation of natural language. Sentiment Analysis was linked with WOM to further define the process, where WOM consists of consumers' attitudes, opinions or reactions toward the sharing of information with other people. The importance of WOM is fundamental the success of this study as it has emerged as the ideal ecosystem for academics to monitor Sentiment, as expressed through social media, more importantly Twitter.

The literature looked at the market independently, focusing on the EMH, AMH, Arbitrage, and Algorithmic Trading. EMH, AMH, and Arbitrage were focused in an attempt to explain how the market functions, and the various ways in which people have tried to predict the movement of stocks on the stock market. Algorithmic Trading was introduced to show the effect technology has had on the way people trade on the stock market, focusing on how computer algorithms are used to automatically make trading decisions based on available online information, such as Sentiment Analysis. Finally, the literature focused on the importance of Emerging Markets on the stock exchange. Giving background to the context in which the study would take place, looking closely at South Africa.

The literature review covered numerous aspects of the theories which have been put forward to account for the use of social media to correctly predict the stock market. However, from all the literature covered, a stance has not been taken from the market traders' perspective regarding their use of social media in the purchasing of stocks. In turn, this discovery highlights a "gap" in the literature that supports this research report's statement that Twitter's effect on the JSE stock market fluctuations needs to be explored.

**Figure 1: Consistency Matrix**

<u>Theme(s)</u>	<u>Propositions (Research Question)</u>	<u>Literature Review</u>	<u>Data Collection Tool</u>	<u>Analysis</u>
Twitter's Following Trend.  Access Market Information.	Do traders use Twitter to access new market information?	Brown. 2012; Chen et al. 2012.	Electronic Survey Questions: 5 – 7, and 8 – 10.	Determine the number of traders who have a Twitter account, and their ability to navigate and access Twitter throughout the trading day.  Determine the extent to which traders use Twitter to access market information.
Twitter's Penetration Rate.  Access Market Information.	Does information posted on Twitter influence the trading pattern of traders?	Bollen et al. 2011; Brown. 2012.	Electronic Survey Questions: 1 - 4 and, 8 - 10.	Determine whether traders follow notable news stations or individuals on Twitter.  Determine the extent to which traders use Twitter to access market information.
Posting as Market Influencers.  Twitter's Market Influence.	Do traders post information on Twitter that pertains to the stocks they trade?	Bollen et al. 2011; Chen et al. 2012; Vincent & Armstrong. 2010; Zhang, Li & Chen. 2012.	Electronic Survey Questions: 11 – 14, and 15 - 17.	Determine the extent to which traders are active on Twitter, through the posting and reposting of information.  Determine the extent to which traders believe Twitter has an influence in the market.
Twitter's Market Influence.	Do traders use Twitter to influence the market?	Bollen et al. 2011; Chen et al. 2012; Jansen et al. 2000; Zhang et al. 2012.	Electronic Survey Questions: 15 - 17.	Determine the extent to which traders believe Twitter has an influence in the market.

## Chapter 3: Research Questions

### 3.1 Introduction

Extensive research exists that relates market prediction to sentiment analysis, using the grounding of social media. However, limited research exists in the context of South Africa, which investigates the link between sentiment analysis, WOM and market prices as determined by traders.

To expand the limited research that exists on the influence social media has on trading patterns as perceived by traders, the research questions that this study will investigate can be stated as follows:

### 3.2 Research Questions and Hypothesis

#### 3.2.1 Do traders use Twitter to access new market information?

- **Q.1**\_Do you have a Twitter account? x **Q.8**\_Have you ever used Twitter to monitor and access news and market information?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

- **Q.8**\_Have you ever used Twitter to monitor and access news and market information? x **Q.9**\_ As a trader, have you ever used Twitter as a source of trading information?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

- **Q.8**\_Have you ever used Twitter to monitor and access news and market information? x **Q.17**\_Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

### **3.2.2 Does information posted on Twitter influence the trading pattern of traders?**

- **Q.1**\_Do you have a Twitter account? x **Q.10**\_Have you ever based a purchasing decision off a news feed (tweet) that you read off Twitter?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

- **Q.15**\_Twitter has emerged as a forum which traders use to base their purchasing decisions. x **Q.16**\_In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?

$H_0$ : There is no agreement.

$H_a$ : There is agreement.

### 3.2.3 Do traders post information on Twitter that pertains to the stocks they trade?

- **Q.1**\_Do you have a Twitter account? x **Q.11**\_Have you ever posted (tweeted) about the stocks you have traded?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

- **Q.1**\_Do you have a Twitter account? x **Q.13**\_Have you ever posted (tweeted) about new market trends that you have come across?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

### 3.2.4 Do traders use Twitter to influence the market?

- **Q.11**\_ Have you ever posted (tweeted) about the stocks you have traded? x **Q.17**\_Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

- **Q.10\_**Have you ever based a purchasing decision off a news feed (tweet) that you read off Twitter? x **Q.15\_**Twitter has emerged as a forum which traders use to base their purchasing decisions.

$H_0$ : There is no relationship between variables.

$H_a$ : There is a relationship between variables.

### 3.3 Scoring

Scoring for the survey were calculated and grouped into the following 5 themes:

- Questions 1 to 4 were grouped as the theme: **Twitter's Penetration Rate.**
- Questions 5 to 7 were grouped as the theme: **Twitter's Following Trend.**
- Questions 8 to 10 were grouped as the theme: **Access Market Information.**
- Questions 11 to 14 were grouped as the theme: **Posting as Market Influencers.**
- Questions 15 to 17 were grouped as the theme: **Twitter's Market Influence.**

## **Chapter 4: Research Methodology**

### **4.1 Research Method**

This study aims to define Twitter's effect on the fluctuation of the stock price on the JSE. The research design selected for the purposes of addressing this research was quantitative in nature. Page and Meyer (2000) view a quantitative approach as the traditional scientific approach to research, and is preferential in certain circumstances as it places greater value on information that can be meaningfully manipulated in its numerical form.

A descriptive, quantitative research approach was undertaken facilitated by 41 questionnaire surveys answered by registered traders on the JSE, via an electronic survey tool. The survey consisted of 18 structured research questions, of which 17 were multiple choice questions, and 1 was an open ended question. Of the 17 multiple choice questions, 13 were structured according to a YES or NO answering system, 2 were structured according to STRONGLY AGREE, AGREE, DISAGREE or STRONGLY DISAGREE answering system, 1 according to the YES, SOMEWHAT or NO answering system, and 1 according to the YES, NO or I AM UNAWARE answering system. The survey was sent out specifically to registered traders and trading houses who operated in South Africa on the JSE.

The results of the electronic survey that was distributed were collected using the online survey tool (SurveyMonkey). These results were then exported into Microsoft Excel 2010 where the data was cleaned and processed. Once clean, the data was uploaded to a statistics software package (IBM SPSS 21) where statistical tests were run and statistical output was created.

### **4.2 Design Chosen**

This study is descriptive in nature. The research seeks to explore the relationship between information posted on the social networking site Twitter and the trading of stocks on the JSE by registered traders. The researcher sent out questionnaire

surveys to registered traders in order to determine to what extent traders use Twitter to influence the market and the effect it has on their purchasing decisions.

### 4.3 Reasons for Choice

The reason why the researcher has chosen this research design is because it lends itself in allowing the researcher to gain an in-depth analysis of a specific area of research. The researcher is interested in gaining a deeper understanding of the relationship between information posted on Twitter and the trading of stocks on the JSE by registered traders. A descriptive study following a quantitative approach will assist the research process in exploring this relationship. The use of a quantitative approach allows the researcher to adopt the survey strategy, which enables the researcher to target registered traders on the JSE. The survey will yield a specific amount of data, targeted to the research questions posed. As the survey will only reach a targeted audience, the volume of responses will ensure the data retrieved will be reliable and valid. The researcher currently has no certainty as to what the outcome of the research will be. The research propositions are derived from the literature, and need to be explored in light of the unique research group and in a particular context. The depth of understanding of the topic and the answering of the research propositions is embedded in a quantitative, qualitative, and descriptive research design (Saunders & Lewis, 2012). The research will be relevant and provide insight into the trading patterns of traders operating on the JSE since the advent of social media sites, such as Twitter.

### 4.4 Research Design

A descriptive study has been adopted in conducting this research, as survey research is descriptive where the term *survey* is mostly associated with quantitative findings (Zikmund, Carr & Griffin, 2012). According to Saunders and Lewis (2012), a descriptive study is when research is designed to generate accurate representations of situations, events or persons. As the researcher undertook a descriptive study, the collection of measurable, quantifiable data was needed, so a questionnaire survey



was required (Saunders & Lewis, 2012). The survey constructed was made up primarily of quantitative question responses, with a single qualitative question being utilised at the end of the survey. Qualitative data was used to gain a greater understanding of the underlying reasons and motivations for the trader's choices, to uncover trends and themes that emerged throughout the research process, and to provide the researcher with insight of the problem (Saunders & Lewis, 2012).

The survey strategy is popular amongst management and business researchers as it is widespread and easy to understand (Saunders & Lewis, 2012, p. 115-6). Surveys are useful when conducting descriptive research and have provided the researcher with a cost-effective and time-efficient way of collecting data on the same topic from a large number of people (Saunders & Lewis, 2012, p. 116).

## 4.5 Population and Unit of Analysis

The population for this research has consisted of all traders who participate in the trading of stocks in emerging markets. Out of convenience, the author used the context of South Africa, more specifically the JSE, when conducting his study. The size of this population is uncertain, as the exact size of the population of registered traders on the JSE changes on a monthly basis depending on the resignation of authorised users or the approval of new applicants (Johannesburg Stock Exchange, 2013). The unit of analysis was the individual traders who were registered with the JSE.

## 4.6 Sampling Method and Size

The exact size of the sample has not been determined, as the exact number of registered traders on the JSE changes on a monthly basis depending on the resignation of authorised users or the approval of new applicants (Johannesburg Stock Exchange, 2013). To date, there are currently 56 authorised user firms that have been approved for trading (Johannesburg Stock Exchange, 2013). The sample size is based on statistical needs and/or availability and does not necessarily bear

any relationship to the size of the entire population. For the purpose of conducting this research, the minimum number of responses to the survey will be limited to 30 (Weiers, 2011). The survey response has to be greater than 30 respondents, as The Central Limit Theorem states that if the research uses a random sample and the sample size is greater than 30, then the sample mean will follow a normal distribution (Weiers, 2011).

Traders who were sampled were approached and notified to the intent of the research by means of an email. The JSE was the stock exchange that the research extracted its information from, so permission was asked for from the leaders of the companies, and whether there were objections from the participation in this study. Traders who did not wish to participate in the study were able to do so by opting out and by not responding to the survey.

The sampling technique used was the “snowball sampling” technique (Saunders & Lewis, 2012, p. 139). Snowball sampling is a type of non-probability sampling whereby the researcher selects the first sample member and subsequent members are identified by earlier sample members (Saunders & Lewis, 2012, p. 139). The researcher sampled traders from a list of traders registered with the JSE by means of online communication. Of the surveys that were sent out and forwarded the researcher was able to obtain a total of 41 respondents.

## 4.7 Research Instruments

### i. Electronically-administered questionnaire

The research adopted an electronically-administered questionnaire (SurveyMonkey) based on: dichotomous questions (Yes or No), a 4 point Likert scale (to acquire responses on a continuum of Strongly Disagree, Disagree, Agree and Strongly Agree), and an open-ended question. The researcher used an electronic approach to administer the questionnaire, as it provided a cheaper means to gather the data. The electronic questionnaire enabled the researcher to: administer the survey across a large geographic location, administer the questionnaire to a select sample group, and allowed for quick and convenient access to all involved in answering the survey.

Sentiment analysis was used to gather the information required to investigate the research questions. Within sentiment analysis lies a field dedicated to sentiment classification, which investigates whether to classify a review document as positive, negative, or neutral (Ding et al. 2008). Su et al. (2007, p. 138) and Ding et al. (2008) support the understanding of sentiment analysis or opinion mining as being the process of identifying the sentiment orientation in a series of review texts, spotting trends and classifying whether the reviews are positive or negative. The use of the above groupings of sentiment was chosen to identify traders opinions regarding social media and Twitter in the context of the stock exchange.

The questionnaire comprised of six sections. The questions that were asked in the questionnaire were based on the research questions stated in Chapter 3: Research Propositions, with each section containing specific questions related to each research question.

The research instrument used for this research was a quantitative survey.

ii. Microsoft Excel 2010

Microsoft Excel 2010 was used to code and clean the data received through the electronically-administered questionnaire, before being imported into the statistics software package (SPSS).

iii. IBM SPSS Statistics 21

A statistics software package was used for the statistical analysis. It enabled the researcher to administer the statistical tests needed for analysing the survey respondents.

## 4.8 Data Collection Process

Surveys were sent out electronically, by means of email, to the selected sample group. Information was then collected electronically and independently from participants for temporary storage before it was processed cumulatively.

Recipients were asked to fill out the survey, and their responses were collected using an online survey tool (SurveyMonkey). The responses were then accessible to the researcher, who compiled the responses to formulate the data set.

### 4.8.1 Section 1 [Questions 1 – 4]

The first section of the questionnaire asked questions related to Twitter's penetration rate within the trading community. It asked whether traders had and/or used Twitter, and whether their company allowed them to freely access and engage Twitter during their daily trading hours.

### 4.8.2 Section 2 [Questions 5 – 7]

The second section of the questionnaire asked questions related to Twitter's following trend within the trading community. It asked whether their companies had monitoring or tracking systems in place to monitor Twitter, and whether they or their company followed notable news stations and market sources on Twitter.

### 4.8.3 Section 3 [Questions 8 – 10]

The third section of the questionnaire asked questions related to the traders use of Twitter as a means to access market information. It asked whether they, as traders, had ever used Twitter to monitor and access news, market information and trading information, and whether they had ever made a purchasing decision off a news feed they had read off Twitter.

#### **4.8.4 Section 4 [Questions 11 – 14]**

The fourth section of the questionnaire asked questions related to traders' use of Twitter, through the posting and reposting of information, to influence the market. It asked whether they had ever tweeted about the stocks they had traded, news stories they had come across, and new market trends. It also asked whether they had reposted (retweeted) any market related news and new trends they had come across while on Twitter.

#### **4.8.5 Section 5 [Questions 15 – 17]**

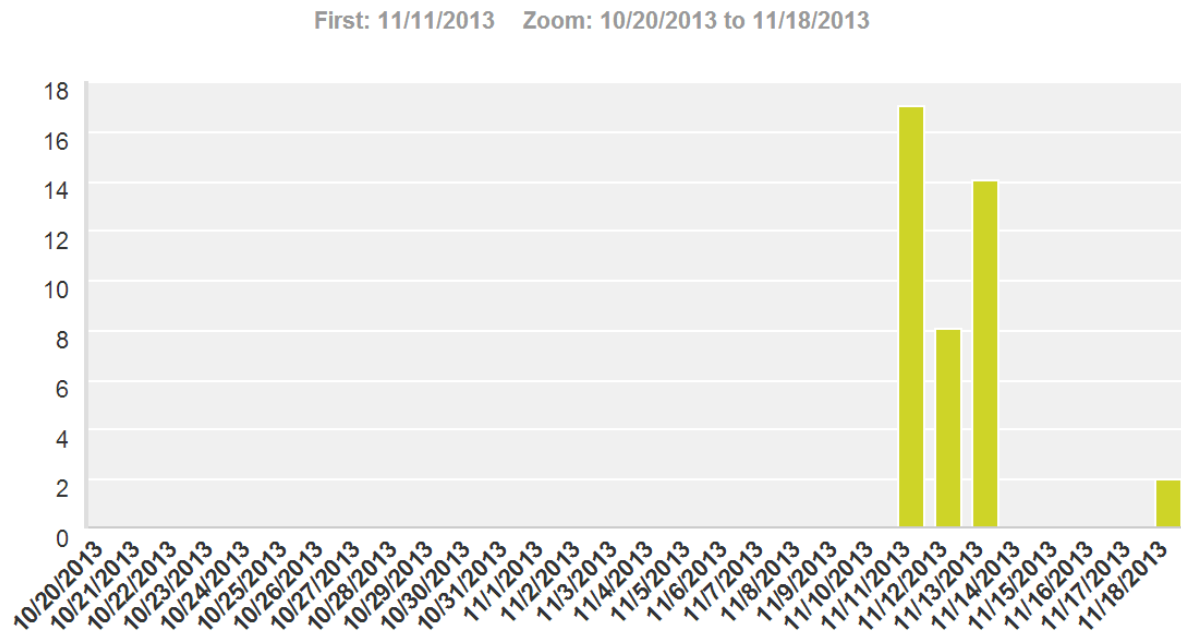
The fifth section of the questionnaire asked questions related to the traders opinions as to whether Twitter is used to influence the trading of stocks on the stock market. It asked whether they believed Twitter had emerged as a forum which traders use to inform their purchasing decisions, whether they felt Twitter has influenced trading decisions, and if they believed traders use Twitter to influence the trading of stocks on the stock market.

#### **4.8.6 Section 6 [Question 18]**

The sixth section of the questionnaire asked an open-ended question. The question asked the traders their opinions about the extent to which they believe Twitter has influenced the trading of stocks on the stock market.

## 4.9 Initial Responses and Data Distribution

**Figure 2: Initial Responses and Data Distribution**



On the 11<sup>th</sup> of November 2013 the researcher contacted around 75 individuals via email requesting them to complete and pass on the survey. The contacted individuals were sent a link to the survey accompanied by a letter of consent. Between the 11<sup>th</sup> of November 2013 and the 14<sup>th</sup> of November 2013 the majority of the respondents were reached, with 39 (95%) respondents participating in the survey. The remaining 2 (5%) respondents participated in the survey on the 18<sup>th</sup> of November 2013.

## 4.10 Data Analysis Approach

Before running any statistical tests, all data entries were checked for completeness. Of the 41 respondents who did participate in the survey, 3 did not complete the survey. The 3 respondents were kept in the sample due to the small sample size.

The research adopted the following techniques to analyse the data which was collected:

- Descriptive statistics analysis.
  - Using Frequencies and Descriptives (Pallant, 2007).
- Scoring.
  - Using Frequencies and Descriptives (Pallant, 2007).
- Reliability analysis using Normality and Correlations.
  - Using the Kolmogorov-Smirnov test, and
  - The Shapiro-Wilk test (Pallant, 2007).
- Correlation analysis.
  - Using Cross Tabulation (Pallant, 2007),
  - Chi-Squared Tests:
    - looking at the Pearson Chi-Square for non 2X2 comparisons (Pallant, 2007),
    - and the Fishers Exact Test for 2X2 comparisons) (Pallant, 2007),
  - Symmetric Measures (looking at Phi for 2X2 comparisons and Cramer's V for non 2X2 comparisons) (Pallant, 2007),
  - Marginal Hegemony test (Pallant, 2007), and
  - a McNemar test (Pallant, 2010).

## 4.11 Assumptions

The following assumptions were made regarding the research process:

- The researcher assumed that traders who trade on the JSE are a representative sample of the sample population, and the data gathered from them would fairly represent the entire population.
- The researcher assumed that an electronic tool was the best method to elicit information from traders registered on the JSE.

## 4.12 Research Limitations

The research that was undertaken had, *inter alia*, the following limitations:

- **Time constraints** were a limiting factor during the process of the research report. The time available to conduct this study only allowed for the analysis of traders and neglected other parties which might act as an influential variable.
- **Geographical area** was a limitation to the scope in which the research was conducted, as the research has been limited to South Africa, specifically the Johannesburg area. The results obtained from this study could, therefore, be influenced by the characteristics unique to the geographic area of study. This provides a further limitation, as the study aims to obtain results that are representative of emerging market traders in general, regardless of their geographic location.
- **Focus on traders** was a limitation to the research, as other operators/employees might play an influential role in the production and consumption of information that could have an impact on the share prices of the JSE.
- **Sample Size** was a limitation to the research, as only 41 respondents participated in the survey. A larger sample size would increase the chance of



the research's significance, making its findings more reliable to reflect the population's mean. A small sample size might not be entirely reflective of the population of traders who participate in the trading of stocks on the JSE.

## **Chapter 5: Results**

### **5.1 Introduction**

Chapter 4 presented the research design of the study which included the methods, measuring instruments, research procedures, and data analysis methods. Chapter 5 intends to review and describe the results and findings of the research.

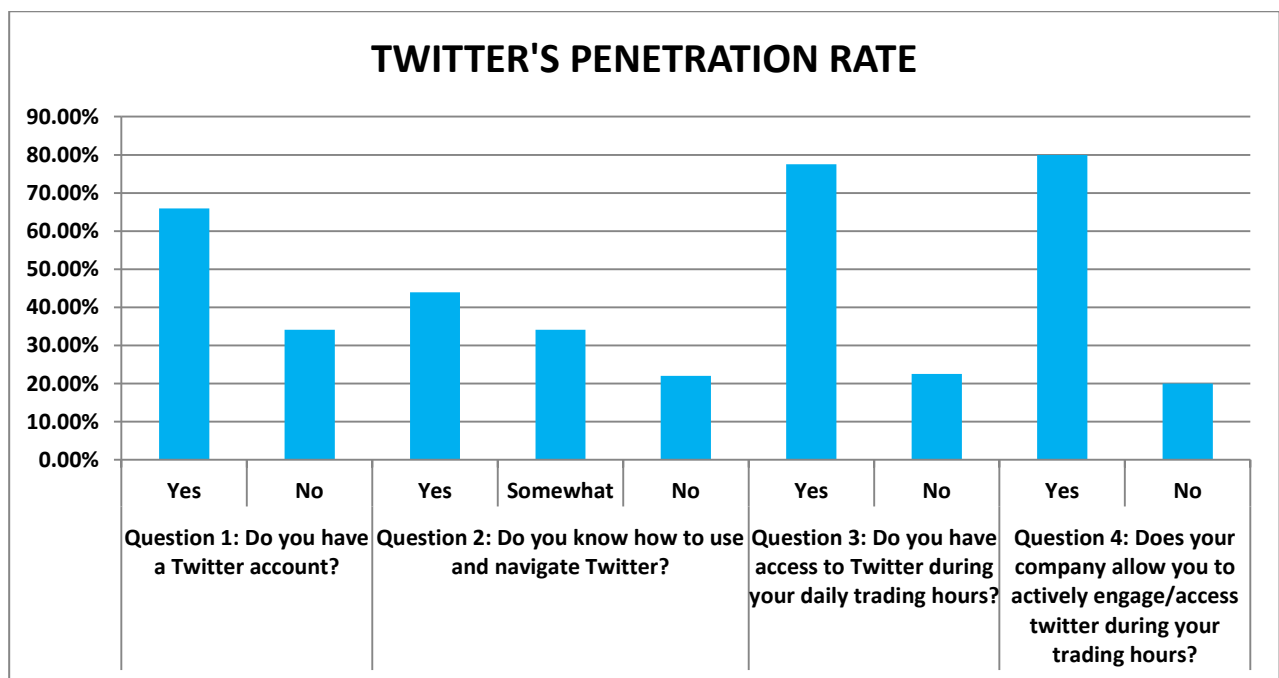
The following results and findings will be presented in two stages. The first stage will focus on the descriptive results that have been gathered by conducting the research, including the descriptive statistics of the measurements. The second stage focuses on the testing of the hypothesis using Cross-tabulations, Chi-Square Tests, Symmetric Measures and the Marginal Hegemony Test.

The research has been structured in such a way as to guide the reader through the various steps taken in processing the results. The descriptive results are introduced first to give the reader an overall view of the results obtained, describing the main features of the data and summarising the sample. The descriptive statistics introduce the reader to the findings and define the emergence of trends. The hypothesis testing results are presented second, so as to answer the specific research questions posed in Chapter 3. This stage of the research will be used to draw conclusions about the data obtained through the research process. The purpose of this section is to either accept or reject the hypotheses stated in Chapter 3. Each hypothesis will be tested, with a table showing the accumulated results at the end of the chapter.

## 5.2 Stage 1: Descriptive Analysis

### 5.2.1 Tables: Frequencies and Descriptives

Figure 3: Frequencies of Twitter's Penetration Rate



From the output shown above for Question 1: “Do you have a Twitter account?” and the information represented in Appendix A: Table 1, we know that of the 41 respondents who answered the survey questionnaire 14 (34.1%) said that they do not have a Twitter account, while 27 (65.9%) said that they do have a Twitter account.

Referring to the output presented in Appendix A: Table 2.1, the information the researcher requested for each of the variables is summarised. The range for responses varies from 0 (No) to 2 (Yes), with a mean of 1.22 and a standard deviation of .791. This shows that the responses are negatively skewed, with the majority of the respondents varying between 1 (Somewhat) and 2 (Yes).

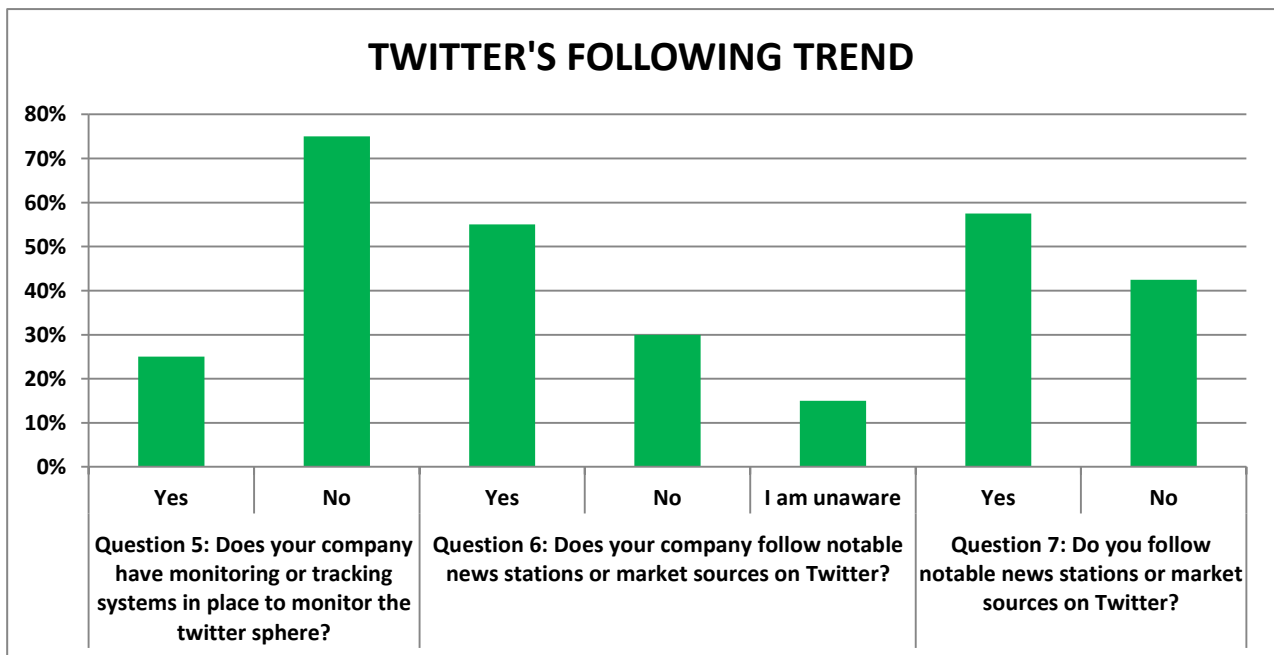
From the output shown above for Question 2: “Do you know how to use and navigate Twitter?” and the information represented in Appendix A: Table 2.2, we know that 41

respondents answered this question with no missing responses. 9 (22%) respondents indicated that they do not know how to navigate Twitter, 14 (34.1%) respondents indicated that they have some understanding of how to navigate Twitter, and 18 (43.9%) respondents indicated that they do know how to navigate Twitter.

From the output shown above, referring to Question 3: “Do you have access to Twitter during your daily trading hours?” and the information represented in Appendix A: Table 3, we know that of the 41 people that answered the survey, only 40 responded to this question. Of the 40 respondents, 9 (22.5%) said that they do not have access to Twitter during their daily trading hours, while the remaining 31 (77.5%) respondents said that they do have access to Twitter during their daily trading hours.

Question 4: “Does your company allow you to actively engage/access Twitter during your trading hours?” and the information represented in Appendix A: Table 4, reveals that the total response rate was 40. The results indicate that 8 (20%) respondents are not allowed to access Twitter during their trading hours, with the remaining 32 (80%) respondents saying that they are allowed to access Twitter during their trading hours.

**Figure 4: Frequencies of Twitter's Following Trend**

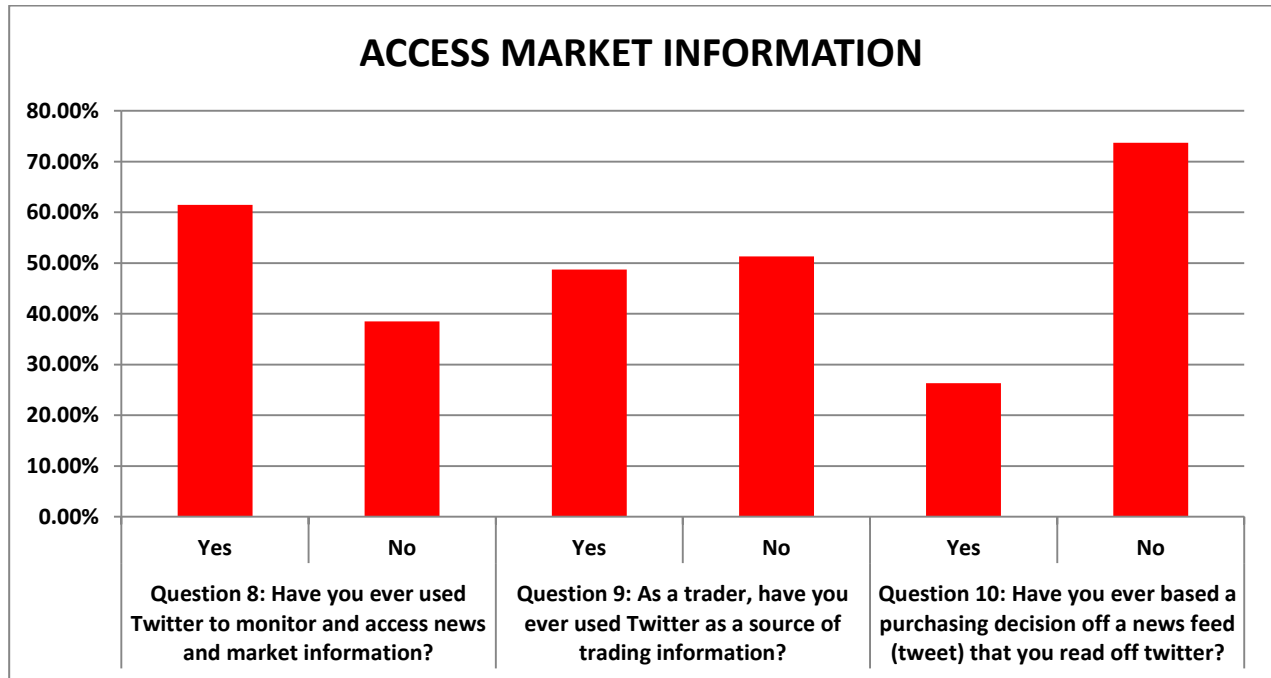


From the output shown above for Question 5: “Does your company have monitoring or tracking systems in place to monitor the Twittersphere?” and the information represented in Appendix A: Table 5, we know that 40 respondents answered this survey question. Of the 40 respondents: 30 (75%) respondents indicated that their companies do not have any monitoring or tracking systems in place to monitor the Twittersphere, while 10 (25%) respondents indicated that they do have monitoring or tracking systems in place to monitor the Twittersphere.

The output represented by Question 6: “Does your company follow notable news stations sources or market sources on Twitter?” and the information represented in Appendix A: Table 6 reveals that 40 respondents answered this survey question. Of the 40 respondents: 12 (30%) said that their company does not follow notable news station or market sources on Twitter, 22 (55%) said that their company does follow notable news station or market sources on Twitter, and 6 (15%) said that they were unaware of their company following notable news station or market sources on Twitter.

Question 7: “Do you follow notable news stations or market sources on Twitter?” and the information represented in Appendix A: Table 7 reveals that 40 respondents answered this survey question. Of the 40 respondents: 17 (42.5%) said that they, personally, do not follow notable news station or market sources on Twitter, while 23 (57.5%) said that they do follow notable news station or market sources on Twitter.

**Figure 5: Frequencies of Access to Market Information**



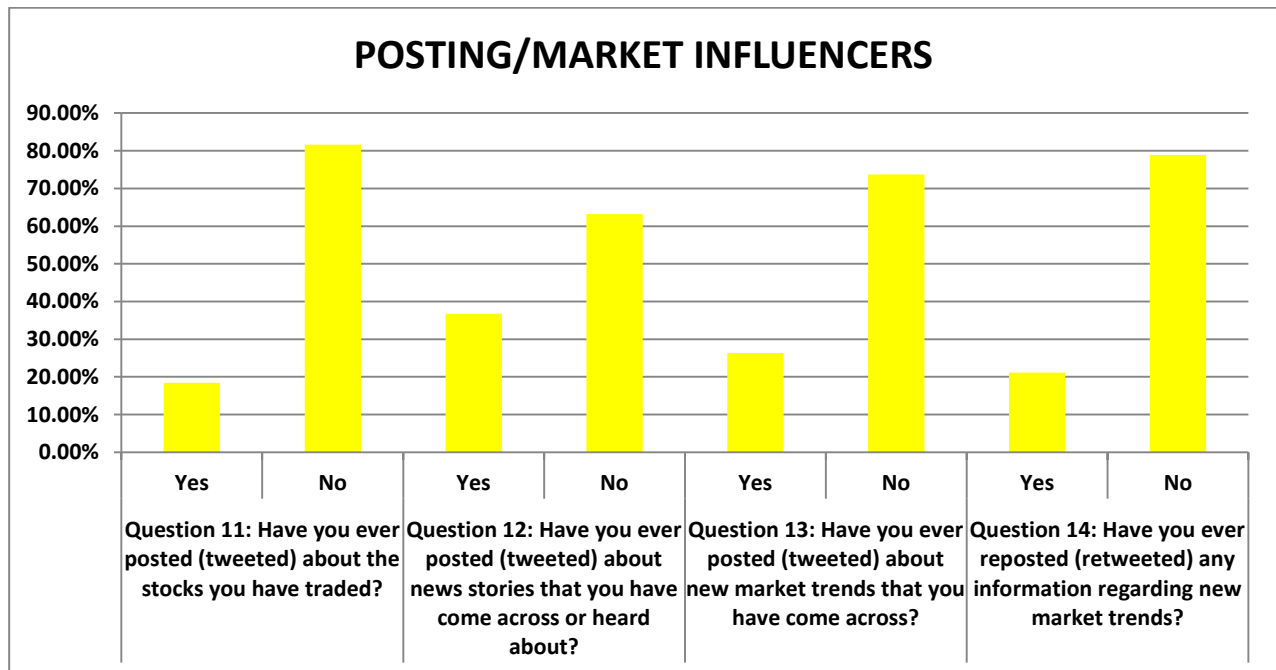
The output shown above for Question 8: “Have you ever used Twitter to monitor and access news and market information?” and the information represented in Appendix A: Table 8 reveals that 39 respondents answered this survey question. Of the 39 respondents: 15 (38.5%) indicated that they have not used Twitter to monitor and access news and market information, while 24 (61.5%) indicated that they have used Twitter to monitor and access news and market information.

Question 9: “As a trader, have you ever used Twitter as a source of trading information” and the information represented in Appendix A: Table 9 reveals that 39 respondents answered this survey question. Of the 39 respondents: 20 (51.3%) respondents said that they have not used Twitter as a source of trading information, while 19 (48.7%) respondents said that they have used Twitter as a source of trading information.

The output represented by Question 10: “Have you ever based a purchasing decision off a news feed (tweet) that you read of Twitter?” and the information represented in Appendix A: Table 10 shows that 38 respondents answered this survey question. Of the 38 respondents: 28 (73.7%) indicated that they have not based a purchasing decision on a news feed (tweet) that they had read off Twitter, while 10 (26.3%)

indicated that they have based a purchasing decision off a news feed (tweet) that they had read off Twitter.

**Figure 6: Frequencies of Posting/Market Influencers**



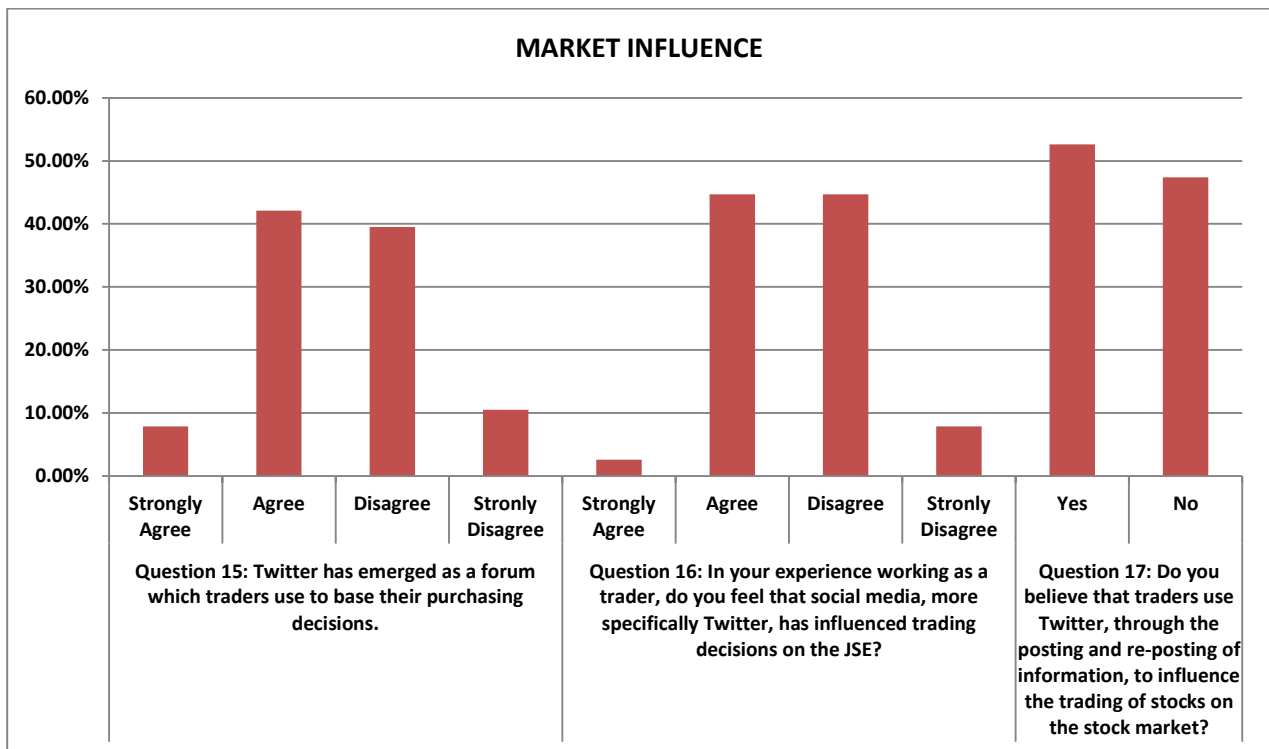
The output represented by Question 11: “Have you ever posted (tweeted) about the stocks you have traded?” and the information represented in Appendix A: Table 11 reveals that 38 respondents answered this survey question. Of the 38 respondents: 31 (81.6%) said that they have not posted (tweeted) about the stocks they traded, while 7 (18.4%) said that they have posted (tweeted) about the stocks they have traded.

From the output shown above for Question 12: “Have you ever posted (tweeted) about news stories that you have come across or heard about?” and the information represented in Appendix A: Table 12 reveals that 38 respondents answered this survey question. Of the 38 respondents: 24 (63%) respondents said that they have not posted (tweeted) about news stories they have come across or heard about, while 14 (36.8%) respondents said that they have posted (tweeted) about news stories they have come across or heard about.

The output for Question 13: “Have you ever posted (tweeted) about new market trends that you have come across?” and the information represented in Appendix A: Table 13 reveals that 38 respondents answered this survey question. Of the 38 respondents: 28 (73.7%) said that they have not posted (tweeted) about new market trends that they had come across, while 10 (26.3%) said that they have posted (tweeted) about new market trends that they had come across.

Question 14: “Have you ever reposted (retweeted) any information regarding new market trends?” and the information represented in Appendix A: Table 14 indicated that 38 respondents answered this survey question. Of the 38 respondents: 30 (78.9%) said that they have not reposted (retweeted) any information regarding new market trends, while 8 (21.1%) said that they have reposted (retweeted) any information regarding new market trends.

**Figure 7: Frequencies of Market Influence**



The output shown above for Question 15: “Twitter has emerged as a forum which traders use to base their purchasing decisions” and the information represented in



Appendix A: Table 15 revealed that 38 respondents answered this survey question. Of the 38 respondents: 3 (7.9%) strongly agreed that “Twitter has emerged as a forum which traders use to base their purchasing decisions”, 16 (42.1%) agreed that “Twitter has emerged as a forum which traders use to base their purchasing decisions”, 15 (39.5%) disagree that “Twitter has emerged as a forum which traders use to base their purchasing decisions”, and the remaining 4 (10.5%) strongly disagree that “Twitter has emerged as a forum which traders use to base their purchasing decisions.”

Question 16: “In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE” and the information represented in Appendix A: Table 16 revealed that 38 respondents answered this survey question. Of the 38 respondents: 1 (2.6%) felt strongly about social media (Twitter) being influential over the trading decisions on the JSE, 17 (44.7%) felt that social media (Twitter) was influential over the trading decisions on the JSE, 17 (44.7%) felt that social media (Twitter) is not influential over the trading decisions on the JSE, and the remaining 3 (7.9%) felt strongly against social media (Twitter) being influential over the trading decisions on the JSE.

Referring to Appendix A: Table 17, the information the researcher requested for each of the variables is summarised.

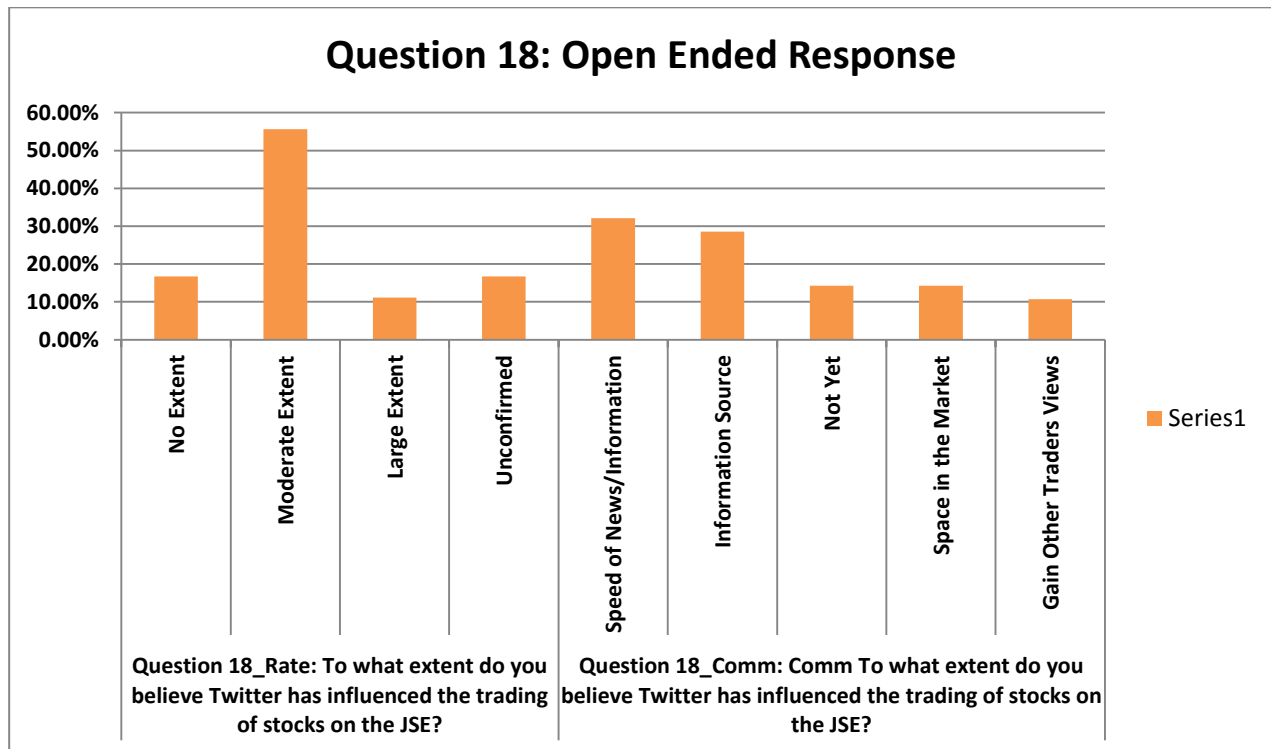
For Q.15: “Twitter has emerged as a forum which traders use to base their purchasing decisions.” The range for responses varies from 1 (Strongly Agree) to 4 (Strongly Disagree), with a mean of 2.53 and a standard deviation of .797. This shows that the responses are negatively skewed, with the majority of the respondents varying between 2 (Agree) and 3 (Disagree).

For Q.16: “In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?” The range for responses varies from 1 (Strongly Agree) to 4 (Strongly Disagree), with a mean of 2.58 and a standard deviation of .683. This shows that the responses are negatively skewed, with the majority of the respondents varying between 2 (Agree) and 3 (Disagree).

The output represented above by Question 17: “Do you believe that traders use Twitter, through the posting and reposting of information, to influence the trading of stocks on the stock market?” and the information represented in Appendix A: Table 18 reveals that 38 respondents answered this survey question. Of the 38 respondents: 18

(47.4) said that they do not believe that traders use Twitter to influence the trading of stocks on the stock market, while 20 (52.6%) said that they do believe that traders use Twitter to influence the trading of stocks on the stock market.

**Figure 8: Frequencies of Open Ended Respondents**



Referring to the output presented in Appendix A: Table 19.1, the information the researcher requested for each of the variables is summarised, with 15 of the 41 respondents answering this question, excluding the 3 respondents who conformed to response 4 (Unconfirmed). Q.18\_Rate is the scoring rate for the open-ended question that featured at the end of the survey, calculating the overall response for question 18 after the responses were coded and scored. The range for responses for Q.18\_Rate varies from 1 (No Extent) to 3 (Large Extent), indicating that no respondents allocated a response for option 4 (Unconfirmed). The results show that the mean of the responses was 1.93, with a standard deviation of .594, indicating that the results were predominantly between 1 (No Extent) and 2 (Moderate Extent) lying extremely close to response 2 (Moderate Extent). This indicates that the data is positively skewed.

The output represented by Question 18\_Rate: “To what extent do you believe Twitter has influenced the trading of stocks on the JSE?” and the information represented in Appendix A: Table 19.2 shows that 18 respondents answered this survey question. Of the 18 respondents: 3 (16.7%) respondents indicated that there is no extent to which Twitter influences the trading of stocks on the JSE, 10 (55.6%) respondents indicated that Twitter influences the trading of stocks on the JSE by a moderate extent, 2 (11.1%) respondents indicated that Twitter has influenced the trading of stocks on the JSE by a large extent, while 3 (16.7%) respondents indicated that it was unconfirmed whether Twitter has influenced the trading of stocks on the JSE.

### 5.2.2 Multiple Response

The output presented in Appendix A: Table 20 - the information the researcher requested for each of the variables - is summarised. The case summary compiles all responses gathered that pertain to Q.18\_Comm, which relates to the open-ended responses gathered through question 18 that do not relate to the rate. Of the 41 respondents who began the survey only 14 contributed to Q18\_Comm, indicating that 34.1% of the respondents contributed to this question.

From the output presented by Question 18\_Comm: “To what extent do you believe Twitter has influenced the trading of stocks on the JSE?” and the information represented in Appendix A: Table 21, the researcher can deduce that the 14 respondents who answered question 18 contributed 28 comments to Q.18\_Comm, meaning there were multiple points raised, with some respondents indicating that there are multiple influences acting on Twitter. Of the 28 comments made: 9 (32.1%) indicated that Twitter was influential because of the speed at which it enables news and information to travel; 8 (28.6%) indicated that Twitter was influential as it acts as an information source for traders; 4 (14.3%) indicated that there is a space in the market for Twitter as an influencer over the trading of stocks; 3 (10.7%) indicated that traders use Twitter to gain other traders’ views on the market and certain stocks; while 4 (14.3%) indicated that Twitter has not yet emerged as an influential entity over the trading of stocks on the JSE.

### 5.2.3 Descriptives of Scores Overall

Figure 9: Overall Scores

Statistics								
	N		Mean	Median	Mode	Std. Deviation	Minimum	Maximum
	Valid	Missing						
<b>Twitter's Penetration Rate</b>	41	0	29.51	35.00	40	12.458	4	40
<b>Twitter's Following Trend</b>	40	1	15.38	12.00	12	8.072	3	30
<b>Access Market Information</b>	39	2	15.23	12.00	3	10.217	3	30
<b>Posting/Market Information</b>	38	3	13.24	4.00	4	14.112	4	40
<b>Market Influence</b>	38	3	16.42	18.00	24	7.632	3	27

The use of scoring was implemented for the purpose of identifying and monitoring trends that emerged through the data collection process. Twitter's Penetration Rate is represented by questions 1 to 4 with a maximum score of 40 and a minimum score of 4, and is indicated by the light blue colouring. Twitter's Following Trend is represented by questions 5 to 7 with a maximum score of 30 and a minimum score of 3, and is indicated by the dark green colouring. Access Market Information is represented by questions 8 to 10 with a maximum score of 30 and a minimum score of 3, and is indicated by the colour red. Posting/Market Information is represented by questions 11 to 14, with a maximum score of 40 and a minimum score of 4, and is indicated by the colour yellow. Market Influence is represented by questions 15 to 17 with a maximum score of 30 and a minimum score of 3, and is indicated by the shaded light red colour.

Twitter's Penetration Rate was answered by all 41 respondents with a mean score of 29.51, a median of 35 and a standard deviation of 12.458. This aggregated score indicates that most respondents scored highly in terms of Twitter's Penetration Rate, with the responses being negatively skewed.

Twitter's Following Trend was answered by 40 of the 41 respondents with a mean score of 15.38, a median of 12 and a standard deviation of 8.072. This aggregated score indicates that responses are mixed, with responses being positively skewed.

Access Market Information was answered by 39 of the 41 respondents with a mean score of 15.23, a median of 12 and a standard deviation of 10.217. This aggregated score indicates a nearly flat histogram.

Posting/Market Information was answered by 38 of the 41 respondents with a mean score of 13.24, a median of 4 and a standard deviation of 14.112. This aggregated score indicates that responses are positively skewed.

Market Influence was answered by 38 of the 41 respondents with a mean score of 16.42, a median of 18 and a standard deviation of 7.632. This aggregated score indicates that responses skewed positively.

## 5.3 Stage 2: Hypothesis Testing

Stage 2 focuses on the testing of the hypothesis using Cross-tabulations, Chi-Square Tests, Symmetric Measures and a Marginal Hegemony Test. The purpose of this section is to either accept or reject the hypotheses stated in Chapter 3. Each hypothesis will be tested, with a table showing the cumulated results at the end of the chapter.

### 5.3.1 Cross-Tabulation, Chi-Square Tests & Symmetric Measures

#### Question 1 x Question 8

Comparing “Q1\_Do you have a Twitter account?” to “Q8\_Have you ever used Twitter to monitor and access news and market information?”

**Figure 10: Cross Tabulation of Question 1 by Question 8**

Crosstab Q1 x Q8		Q8		Total
		No	Yes	
Q1	No	78.6%	21.4%	100.0%
	Yes	16.0%	84.0%	100.0%
Total		38.5%	61.5%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 22, the researcher can deduce that: of the 14 respondents who said that they do not have a Twitter account, 11 (78.6%) indicated that they have not used Twitter to monitor and access news and market information, while 3 (21.4%) indicated that they have, despite not having a Twitter account. Of the 25 respondents who said that they do have a Twitter account, 21 (84%) indicated that they have used Twitter to monitor and access news and market information, while 4 (16%) indicated that they have not despite having a Twitter account.

**Figure 11: Fisher's Exact Test of Question 1 by Question 8**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.000	.000
N of Valid Cases	39				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.38.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is .000, meaning that the effect is significant because it is < (less than) 0.05. This finding indicates that there is a difference between groups and no relationship between variables.

**Figure 12: Phi Test of Question 1 by Question 8**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.617	.000
N of Valid Cases		39	

Phi tests the strength of association, where the chi-square co-efficient depends on the sample size and strength of the relationship. Phi therefore eliminates the sample size and can vary from 0 to 1, where Phi is the mean percent difference where either side is considered as causing the other. Higher values of Phi indicate strong levels of association between two variables, and lower variables indicating weak levels of association.

From the output represented above, the researcher can see that the strength of association between the variables is .617. The .617 level of association is considered as a large effect, using Cohen’s criteria of .50 as a large effect, .30 as a medium effect, and .10 as a small effect (Pallant, 2007).

### Question 1 x Question 10

Comparing “Q.1\_Do you have a Twitter account?” to “Q.10\_Have you ever based a purchasing decision off a news feed (tweet) that you have read off Twitter?”

**Figure 13: Cross Tabulation of Question 1 by Question 10**

Crosstab Q1 x Q10		Q10		Total
		No	Yes	
Q1	No	84.6%	15.4%	100.0%
	Yes	68.0%	32.0%	100.0%
Total		73.7%	26.3%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 25, the researcher can deduce that: of the 13 respondents who said that they do not have a Twitter account, 11 (84.6%) indicated that they have not based a purchasing decision off a news feed that they have read off Twitter, while 2 (15.4%) indicated that they have, despite not having a Twitter account. Of the 25 respondents who said they do have a Twitter account, 8 (32%) indicated that they have based a purchasing decision off a news feed that they read off Twitter, while 17 (68%) indicated that they have not based a purchasing decision off a news feed that they read off Twitter despite having a Twitter account.

**Figure 14: Fisher's Exact Test of Question 1 by Question 10**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.441	.242
N of Valid Cases	38				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.42.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is .441, meaning that the effect is not significant because it is > (greater than) 0.05. This finding indicates that there is no difference between groups and no relationship between variables.

### **Question 1 x Question 11**

Comparing "Q.1\_Do you have a Twitter account?" to "Q.11\_Have you ever posted (tweeted) about the stocks you have traded?"



**Figure 15: Cross Tabulation of Question 1 by Question 11**

Crosstab Q1 x Q11		Q11		Total
		No	Yes	
Q1	No	100.0%	0.0%	100.0%
	Yes	72.0%	28.0%	100.0%
Total		81.6%	18.4%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 27, the researcher can deduce that: of the 13 respondents who said that they do not have a Twitter account, all 13 (100%) indicated that they have not posted (tweeted) about the stocks they have traded. Of the 25 respondents who said they do have a Twitter account, 7 (28%) indicated that they have posted about the stocks they have traded while 18 (72%) indicated that they have not posted about the stocks that they have traded.

**Figure 16: Fisher's Exact Test of Question 1 by Question 11**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.072	.038
N of Valid Cases	38				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.39.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is .072, meaning that the effect is not significant because it is > (greater than) 0.05. This finding indicates that there is no difference between groups and no relationship between variables.

**Figure 17: Phi Test of Question 1 by Question 11**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.343	.035
N of Valid Cases		38	

From the output represented above, the researcher can see that the strength of association between the variables is .343. The .343 level of association is considered as a medium effect using Cohen's criteria of .50 as a large effect, .30 as a medium effect, and .10 as a small effect (Pallant, 2007).

### Question 1 x Question 13

Comparing "Q.1\_Do you have a Twitter account?" to "Q.13\_Have you ever posted (tweeted) about news stories that you have come across or heard about?"

**Figure 18: Cross Tabulation of Question 1 by Question 13**

Crosstab Q1 x Q13		Q13		Total
		No	Yes	
Q1	No	100.0%	0.0%	100.0%
	Yes	60.0%	40.0%	100.0%
Total		73.7%	26.3%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 30, the researcher can deduce that: of the 13 respondents who said that they do not have a Twitter account, all 13 (100%) indicated that they have not posted (tweeted) about news stories that they have come across or heard about. Of the 25 who do have Twitter accounts, 10 (40%) indicated that they have posted about (tweeted) about news

stories that they have come across or heard about, while 15 (60%) indicated that they have not.

**Figure 19: Fisher's Exact Test of Question 1 by Question 13**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.008	.007
N of Valid Cases	38				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.42.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is .008, meaning that the effect is significant because it is < (less than) 0.05. This finding indicates that there is a difference between groups and no relationship between variables.

**Figure 20: Phi Test of Question 1 by Question 13**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.431	.008
N of Valid Cases		38	

From the output represented above, the researcher can see that the strength of association between the variables is .431. The .431 level of association is considered as a medium effect using Cohen's criteria of .50 as a large effect, .30 as a medium effect, and .10 as a small effect (Pallant, 2007).

**Question 8 x Question 17**

Comparing “Q.8\_Have you ever used Twitter to monitor and access news and market information?” to “Q.17\_Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?”

**Figure 21: Cross Tabulation of Question 8 by Question17**

Crosstab Q8 x Q17		Q17		Total
		No	Yes	
Q8	No	64.3%	35.7%	100.0%
	Yes	37.5%	62.5%	100.0%
Total		47.4%	52.6%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 33, the researcher can deduce that: of the 14 respondents who said that they have not used Twitter to monitor and access news and market information, 9 (64.3%) indicated that they do not believe traders use Twitter to influence the trading of stocks on the stock market, while 5 (35.7%) indicated that they do believe traders use Twitter to influence the trading of stocks on the stock market. Of the 24 respondents who said that they have used Twitter to monitor and access news and market information, 15 (62.5%) said they do believe traders use Twitter to influence the trading of stocks on the stock market, while 9 (37.5%) believe that traders do not use Twitter to influence the trading of stocks on the stock market.

**Figure 22: Fisher's Exact Test of Question 8 by Question 17**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.179	.104
N of Valid Cases	38				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.63.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is .179, meaning that the effect is not significant because it is > (greater than) 0.05. This finding indicates that there is no difference between groups and no relationship between variables.

### **Question 8 x Question 9**

Comparing "Q.8\_Have you ever used Twitter to monitor and access news and market information?" to "Q.9\_As a trader, have you ever used Twitter as a source of trading information?"

**Figure 23: Cross Tabulation of Question 8 by Question 9**

Crosstab Q8 x Q9		Q9		Total
		No	Yes	
Q8	No	86.7%	13.3%	100.0%
	Yes	29.2%	70.8%	100.0%
Total		51.3%	48.7%	<b>100.0%</b>

From the output presented above and the information represented in Appendix A: Table 35, the researcher can deduce that: of the 15 respondents who said that they have not used Twitter to monitor and access news and market information, 13 (86.7%) indicated that, as traders, they have not used Twitter as a source of trading information, while 2 (13.3%) indicated that they had. Of the 24 respondents who said that they have used Twitter to monitor and access news and market information, 17 (70.8%) indicated that they have used Twitter as a source of trading information, while the remaining 7 (29.2%) indicated that they had not.

**Figure 24: McNemar Test of Question 8 by Question 9**

Chi-Square Tests		
	Value	Exact Sig. (2-sided)
McNemar Test		.180 <sup>a</sup>
N of Valid Cases	39	
a. Binomial distribution used.		

From the output presented above, the Exact Sig. (2-sided) or p-value is .180<sup>a</sup>. The p-value is >0.05, indicating that there is no significant change in the proportion of people who said yes in question 9 when compared with the proportion of question 8. It can be seen that there is no difference between the way that question 9 was answered when compared to question 8.

### **Question 10 x Question 15**

Comparing “Q.10\_ Have you ever based a purchasing decision off a news feed (tweet) that you have read off Twitter?” to “Q.15\_ Twitter has emerged as a forum which traders use to base their purchasing decisions.”

**Figure 25: Cross Tabulation of Question 10 by Question 15**

Crosstab Q10 x Q15		Q15		Total
		No	Yes	
Q10	No	32.1%	67.9%	100.0%
	Yes	100.0%	0.0%	100.0%
Total		50.0%	50.0%	<b>100.0%</b>

From the rerecorded output presented above and the information represented in Appendix A: Table 37, the researcher can deduce that: of the 28 respondents who said that they have not based a purchasing decision off a news feed (tweet) that they read off Twitter, 19 (67.9%) indicated that they disagree to strongly disagree that Twitter has emerged as a forum which traders use to base their purchasing decisions, while 9 (32.1%) indicated they agree to strongly agree that Twitter has emerged as a forum which traders use to base their purchasing decisions. Of the 10 respondents who said that they have based a purchasing decision off a news feed (tweet) that they read off Twitter, all 10 (100%) indicated they agree to strongly that Twitter has emerged as a forum which traders use to base their purchasing decisions.

**Figure 26: Fisher's Exact Test of Question 10 by Question 15**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				.000	.000
N of Valid Cases	38				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.00.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher’s Exact Test revealed that the Exact Sig. (2-sided) or p-value is .000, meaning that the effect is significant because it is < (less than) 0.05. This finding indicates that there is a difference between groups and no relationship between variables.

**Figure 27: Phi Test of Question 10 by Question 15**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.598	.000
N of Valid Cases		38	

From the output represented above, the researcher can see that the strength of association between the variables is -.598. The -.598 level of association is considered as a small effect using Cohen’s criteria of .50 as a large effect, .30 as a medium effect, and .10 as a small effect (Pallant, 2007).

**Question 11 x Question 17**

Comparing “Q.11\_Have you ever posted (tweeted) about the stocks you have traded?” to “Q.17\_ Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?”

**Figure 28: Cross Tabulation of Question 11 by Question 17**

Crosstab Q11 x Q17		Q17		Total
		No	Yes	
Q11	No	48.4%	51.6%	100.0%
	Yes	42.9%	57.1%	100.0%
Total		47.4%	52.6%	100.0%



From the output presented above and the information represented in Appendix A: Table 40, the researcher can deduce that: of the 31 respondents who said they have not posted (tweeted) about the stocks they have traded, 15 (48.4%) indicated that they do not believe that traders use Twitter to influence the trading of stocks on the stock market, while 16 (51.6%) indicated that they do believe traders use Twitter to influence the trading of stocks on the stock market. Of the 7 respondents who said they have posted (tweeted) about the stocks they have traded, 3 (42.9%) indicated that they do not believe traders use Twitter to influence the trading of stocks on the stock market, while 4 (57.1%) indicated that they do believe traders use Twitter to influence the trading of stocks on the stock market.

**Figure 29: Fisher's Exact Test of Question 11 by Question 17**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test				1.000	.563
N of Valid Cases	38				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.32.					
b. Computed only for a 2x2 table					

From the output presented above, the (Chi-Squared) Fisher's Exact Test revealed that the Exact Sig. (2-sided) or p-value is 1.000, meaning that the effect is not significant because it is > (greater than) 0.05. This finding indicates that there is no difference between groups and no relationship between variables.

### Question 15 x Question 16

Comparing “Q.15\_Twitter has emerged as a forum which traders use to base their purchasing decisions.” to “Q.16\_In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?”

**Figure 30: Cross Tabulation of Question 15 by Question 16**

Crosstab Q15 x Q16		Q16				Total
		Strongly Agree	Agree	Disagree	Strongly Disagree	
Q15	Strongly Agree	0.0%	66.7%	33.3%	0.0%	100.0%
	Agree	6.3%	81.3%	12.5%	0.0%	100.0%
	Disagree	0.0%	13.3%	86.7%	0.0%	100.0%
	Strongly Disagree	0.0%	0.0%	25.0%	75.0%	100.0%
<b>Total</b>		2.6%	44.7%	44.7%	7.9%	100.0%

From the output presented above and the information represented in Appendix A: Table 42, the researcher can deduce that: of the 3 respondents who strongly believe that Twitter has emerged as a forum which traders use to base their purchasing decisions, 2 (66.7%) agree that Twitter influences trading decisions on the JSE, while 1 (33.3%) disagrees that Twitter influences trading decisions on the JSE.

Of the 16 respondents who believe that Twitter has emerged as a forum which traders use to base their purchasing decisions, 1 (6.3%) strongly agrees that Twitter influences trading decisions on the JSE, 13 (81.3%) agrees that Twitter influences trading decisions on the JSE, and 2 (12.5%) disagree that Twitter influences trading decisions on the JSE.

Of the 15 respondents who believe that Twitter has not emerged as a forum which traders use to base their purchasing decisions, 2 (13.3%) agree that Twitter influences trading decisions on the JSE, while 13 (86.7%) disagree that Twitter influences trading decisions on the JSE.

Of the 4 respondents who believe that Twitter has not emerged as a forum which traders use to base their purchasing decisions, 1 (25%) disagrees that Twitter influences trading decisions on the JSE, while 3 (75%) strongly disagrees that Twitter influences trading decisions on the JSE.

**Figure 31: Marginal Homogeneity Test for Question 15 by Question 16**

Marginal Homogeneity Test	
Q15 & Q16	Asymp. Sig. (2-tailed)
	<b>.564</b>

The Marginal Homogeneity Test tests if the majority of cases are on the diagonal. The p-value for the Marginal Homogeneity Test is .564, and is  $>0.05$  which indicates that there is no significant change in the proportion of people who said yes in question 15 when compared with the proportion of question 16. It can be seen that there is no difference between the way that question 15 was answered when compared to question 16.

**Figure 32: Hypotheses**

<u>Comparing:</u>	<u>Hypothesis:</u>	<u>Result:</u>
Question 1 X Question 8	H <sub>0</sub> : There is no relationship between having a Twitter account and using Twitter to monitor and access news and market information	Reject
Question 1 X Question 10	H <sub>0</sub> : There is no relationship between having a Twitter account and basing purchasing decisions of news that you have read off Twitter.	Accept
Question 1 X Question 11	H <sub>0</sub> : There is no relationship between having a Twitter account and tweeting about the stocks you have traded.	Accept
Question 1 X Question 13	H <sub>0</sub> : There is no relationship between having a Twitter account and tweeting about new market trends.	Reject
Question 8 X Question 17	H <sub>0</sub> : There is no relationship between using Twitter to monitor and access news and market information and believing that traders use Twitter to influence the trading of stocks on the stock market.	Accept
Question 8 X Question 9	H <sub>0</sub> : There is no relationship between using Twitter to monitor and access news and market information and using Twitter as a source of trading information.	Accept
Question 10 X Question 15	H <sub>0</sub> : There is no relationship between basing a purchasing decision off a tweet and Twitter emerging as a forum which traders use to base their purchasing decisions.	Reject
Question 11 X Question 17	H <sub>0</sub> : There is no relationship between tweeting about the stocks you have traded and believing that traders use Twitter to influence the trading of stocks on the stock market.	Accept
Question 15 X Question 16	H <sub>0</sub> : There is no agreement between Twitter emerging as a forum which traders use to base their purchasing decisions and Twitter being an influential factor regarding trading decisions on the JSE.	Accept

## Chapter 6: Discussion of Results

### 6.1 Introduction

Chapter 6 interprets and discusses the results obtained in the previous chapter, consolidating the statistical analysis and qualitative responses collected through the survey. In this chapter, the researcher will discuss the various research questions and hypotheses in greater depth, in light of the findings set out in chapter 5. The interpretation of the results will be compared to the literature, which will be presented under headings that pertain to each of the research questions, to ensure that all questions, propositions and hypotheses are addressed.

The initial research questions laid out in chapter 3 were:

- **Question 1:**  
Do traders use Twitter to access new market information?
- **Question 2:**  
Does information posted on Twitter influence the trading pattern of traders?
- **Question 3:**  
Do traders post information on Twitter that pertains to the stocks they trade?
- **Question 4:**  
Do traders use Twitter to influence the market?

The research questions mentioned above gave rise to nine hypotheses that were tested. Each hypothesis was tested and related to the specific research question. The relevant data will be discussed later on in the chapter. Thereafter conclusions will be drawn.

## 6.2 Findings – Research Objective 1

To determine whether traders use Twitter to access new market information.

### 6.2.1 Traders' Access to Market Information

The researcher's expectations were based on the findings found within the following Chen et al. (2012, p.22) article "Customers as Advisors: The Role of Social Media in Financial Markets" which states that "the Internet has become increasingly popular both as a venue to place trades and as a source of information." They go on to note that investors have the option to seek investment advice from their peers through the use of social-media sites. In their final conclusion, Chen et al. (2012, p.22) state that their findings "point to the growing role of social media and peer-based advice in financial markets. Exploring implications of peer-based advice and, more generally, using social media outlets as a laboratory to investigate the effects of social interactions on investment behaviour." The expectations for the findings were to indicate that the majority of traders do use Twitter to access market information.

The overall results obtained through the scoring of the survey, when questions 8, 9 and 10 were grouped, with a maximum score of 30 and a minimum score of 3, indicate that the data is positively skewed. The above information reveals that traders do not access Twitter for trading information. However, the mean of the data, 15.23, indicates that respondents' scores are slightly favouring the use of Twitter as an information source. In this regard, the results are inconclusive, as there is not enough evidence to significantly support or reject whether or not traders use Twitter to access market information. More information will be sought from individual question responses that relate specifically to the research question.

Question 8's respondents indicated that the majority of traders, 61.5%, use Twitter to monitor and access news and market information. The above finding supports the assumption that the majority of traders do use Twitter as a source of information.

Question 9 indicated that respondents were split almost evenly by a 51.3% to a 48.7% margin when asked whether they had ever used Twitter as a source of trading

information. The 51.3% sat in favour of respondents indicating that they had not used Twitter as a source of trading information. The statistical information gathered does not significantly support the expectation that the majority of traders use Twitter as a source of information. However it must be noted that there is a slight preferential majority of traders who do support the expected result.

Comparing question 8 to question 9 revealed that: of the 38.5% of respondents who said that they have not used Twitter to monitor and access news and market information, 86.7% of the 38.5% indicated that they have not used Twitter as a source of trading information, while 13.3% of the 38.5% indicated that they had. Of the 61.5% respondents who said that they have used Twitter to monitor and access news and market information, 70.8% of the 61.5% indicated that they have used Twitter as a source of trading information, while the remaining 29.2% indicated that they had not. The comparison also revealed in the hypothesis testing that the p-value was greater than 0.05, showing that there is no difference between the way that question 9 was answered when compared to question 8. The above results confirm the assumption that the majority of traders do use Twitter as a source of information.

Comparing question 1 to question 8 revealed that: of the 25 respondents who said that they do have a Twitter account, 21 (84%) indicated that they have used Twitter to monitor and access news and market information, while 4 (16%) indicated that they have not, despite having a Twitter account. What should also be noted is that: of the 14 respondents who said that they do not have a Twitter account, 3 (21.4%) indicated that they do use Twitter to monitor and access news and market information, despite not having a Twitter account. The above findings indicate that the majority of traders who do have Twitter accounts use it as a means to access market information, while a small percentage of traders who do not own Twitter accounts still use the microblogging site as a means to access market information.

The above findings are representative of the expected outcome, where traders do use Twitter as a means to access market information. These findings are representative of the literature put forward by Chen et al. (2012), and are also in line with Brown's (2012) findings. Brown (2012) found that Twitter had emerged as an important tool for individuals and businesses to share information and communicate.

## 6.3 Findings – Research Objective 2

To determine whether information posted on Twitter influences the trading pattern of traders.

### 6.3.1 Twitter as a Market Influencer

The researcher's expectations were based on the following findings within the literature: Brown (2012, p.40) noted that "Twitter sentiment is driven by the internal happenings of the stock market" and that "Twitter sentiment is driving movement of the stock market and can be used as a predictive tool for decision support for investing decisions." In his conclusion, Brown (2012, p.40) indicates that Twitter can be used to "determine and report sentiment in near real-time to allow investors and traders to decide which stocks or sectors should be invested in throughout the trading day." The expectations for the findings were to indicate that information posted on Twitter does influence the trading pattern of traders.

The overall results obtained through the scoring of the survey; where questions 15, 16 and 17 were grouped; with a maximum score of 30 and a minimum score of 3; indicate that respondents to this section express bimodal distribution, with the majority of respondents favouring Twitter as an element that influences the market, shown by the mean being 16.42. The above information reveals that traders believe that Twitter does influence the trading of stocks by traders on the stock market. The extent to which the data obtained from the above result is skewed indicates that traders do believe that information posted on Twitter influences the trading pattern of traders, yet there is a group of traders who expressed the belief that it does not influence the trading pattern of traders. The above result indicates that the findings are in line with the expected result, yet due to the bimodal peak, further information will be sought from individual question responses that relate specifically to the research question.

Question 10 indicates that the majority of respondents, 73.7%, have not based a purchasing decision off a tweet that they had read off Twitter. The above result indicates that even though traders use Twitter as a source of trading information, the majority of them do not use the information as a basis to make their purchasing



decisions. This finding is contrary to the expectations of the researcher as it indicates that traders do use Twitter as an information source, but do not base their purchasing decisions off the information received through the site.

Comparing question 1 to question 10 revealed that: of the 25 respondents who said they do have a Twitter account, 8 (32%) indicated that they have based a purchasing decision off a news item that they read off Twitter, while 17 (68%) indicated that they have not based a purchasing decision off a news item that they read off Twitter despite having a Twitter account. The information above reveals that the majority of traders who do subscribe to Twitter do not base their purchasing decisions on information that they view on Twitter. The finding is contrary to the expectations of the researcher as it indicates that traders do not base their purchasing decisions off the information received through the site.

Question 15 indicated that the majority of respondents, 42.1%, agree that Twitter has emerged as a forum which traders use as a basis for their purchasing decisions, while 39.5% of respondents disagree. When the results are compounded into two sets, agree and disagree, the results indicate that respondents are split 50/50.

Question 16 displayed similar results to that of question 15, with results being split almost evenly when the results were compounded into two sets: agree and disagree. The results show that the majority of respondents, 52.6%, indicate that they disagree that social media has influenced trading decisions, while the remaining 47.3% indicate that they agree.

Comparing question 15 to question 16; when the groups were compounded into two sets, agree and disagree; revealed that the number of respondents were split evenly at 50/50. Of the 19 respondents who believe Twitter has emerged as a forum which traders use to inform their purchasing decisions, 16 (84.2%) agreed that Twitter influences trading decisions while the remaining 3 (15.8%) respondents disagree. Of the 19 respondents who do not believe Twitter has emerged as a forum which traders use to inform their purchasing decisions, 2 (10.5%) agreed that Twitter influences trading decisions with the remaining 17 (89.5%) respondents disagreeing. The results indicate that the traders who believe Twitter has emerged as a forum which traders use as a basis for their purchasing decisions also believe that Twitter influences trading decisions. Traders who do not believe Twitter has emerged as a forum which traders use to influence their purchasing decisions also do not believe that Twitter influences

trading decisions. No definitive conclusion can be made when analysing the above results, as responses are evenly distributed.

Question 17 indicated that the majority of respondents, 52.6%, believe that traders do use Twitter to influence the trading of stocks on the stock market, while the remaining 47.4% indicate that they do not believe traders use Twitter to influence the market.

Comparing question 8 to question 17 revealed that of the 14 respondents who said that they have not used Twitter to monitor and access news and market information, the majority of respondents (64.3%) indicated that they do not believe traders use Twitter to influence the trading of stocks on the stock market. Of the 24 respondents who indicated that they have used Twitter to monitor and access news and market information, the majority (62.5%) indicated that they do believe traders use Twitter to influence the trading of stocks on the stock market. The results above indicate that, depending on their use of Twitter: traders who have not used Twitter to monitor and access news and market information believe traders do not use Twitter to influence the trading of stocks on the stock market, while traders who have used Twitter to monitor and access news and market information believe that traders do use Twitter to influence the trading of stocks on the stock market. This indicates that traders believe that their use of Twitter is the predominant use for the site by all traders.

The findings represented above indicate that the majority of traders do not use Twitter as a basis for their purchasing decisions, yet the majority of traders do believe that Twitter does influence the market and the trading pattern of traders. The above results indicate a disparity between the perception in the market and the actual results obtained. This reveals that traders believe that other traders in the market use Twitter as an information source on which to base their purchasing decisions, yet the results indicate that the majority of traders do not base their purchasing decisions off Twitter. The above findings reveal that there is a perception in the market that does not translate to the evidence obtained.

The above findings are not representative of the expected outcome, which states that information posted on Twitter does influence the trading pattern of traders. The information above represents traders' views regarding information posted on Twitter and its influence on the trading pattern of traders. Some of the findings indicate that the majority of traders who do own Twitter accounts make their purchasing decisions based on information they view on Twitter. These findings are contrary to the expectations of the researcher as it indicates that traders do not base their purchasing

decisions off the information received through the site. The other outcomes presented in the research above indicate that traders' opinions are split regarding the use and effect Twitter has on influencing the trading patterns of traders. These findings are contrary to the literature as Bollen et al. (2011) states that the United States stock markets are affected by individuals from all over the world. They go on to note, in their findings, that public mood and sentiment changes match the shifts experienced by the Dow Jones Industrial Average (DJIA) 3 to 4 days later. The expectation was largely based on Bollen et al. (2011, p. 7) findings that "information can with great ease and at very short time-scales travel along the ties in an online social networking environment thereby exerting an equalizing effect on investment strategies (and mood) of individual and professional traders alike." This corresponds with their assumption that "the public mood and sentiment can drive stock market values as much as news" (Bollen et al. 2011, p. 7).

## **6.4 Findings – Research Objective 3**

To determine whether traders post information on Twitter that pertains to the stocks they trade.

### **6.4.1 Traders Posting on Twitter as Market Influencers**

The researcher's expectations were based on the following findings within the literature. Bollen et al. (2011) research states that "US stock markets are affected by individuals worldwide." This information asserts the notion that traders posting and sharing of information has an effect on stock markets around the world. These findings contribute to the debate that has arisen in practice as to whether e-commerce firms should permit consumers to share uncensored views, and how much information they should be allowed to post (Zhang, Li & Chen, 2012). The notion was confirmed as the Twitter Wave has been found as a useful tool for high frequency traders, allowing them to scan over the break-points and improve their profits (Vincent & Armstrong, 2010). Further confirmation to this trend is supported by Chen et al. (2012, p. 1), in which they note that consumers are increasingly turning to their fellow customers when deciding

amongst products, showing that “opinions of fellow consumers disseminated through social media play a crucial role in purchasing decisions across a wide range of products.” A link was found between the views expressed on a stock market news site (*Seeking Alpha*) and subsequent stock returns. Chen et al (2012, p.2) found that “views expressed on SA also predict earnings surprises, suggesting that this form of peer-based advice not only affects investor behaviour, but also provides meaningful information.” The above findings point to the importance of peer-based advice and social media in financial markets, where “social-media outlets specializing in financial markets may eventually mirror the development of other peer-based information sources” (Chen et al. 2012, p.2). This body of work is supported by a recent issue that has arisen with bloggers having gained considerable influence within the investor population and thereby creating a rivalry with professional sell-side analysts (Chen et al. 2012). As social media and bloggers are gaining prominence with the investor population, the researcher expected to see traders posting information on Twitter that pertained to the stocks they traded.

The overall results obtained through the scoring of the survey; where questions 11, 12, 13 and 14 were grouped, with a maximum score of 40 and a minimum score of 4; indicate that the majority of respondents are positively skewed. The above information reveals that the majority of traders indicated that they do not post and repost information about the market and trades. Furthermore, the findings reveal that the majority of traders do not post information on Twitter that pertains to the stocks they trade. The above findings are not in line with the expected results.

Question 11’s respondents indicated that the majority of traders, 81.6%, have not tweeted about the stocks that they have traded. The above findings do not support the assumption that the majority of traders post information on Twitter that pertains to the stocks they trade.

Question 12’s respondents indicated that the majority of traders, 63.2%, have not tweeted about news stories that they have come across or heard about. The above findings do not support the assumption that the majority of traders post information on Twitter that pertains to the stocks they trade.

Question 13’s respondents indicated that the majority of traders, 73.7%, have not tweeted about new market trends that they have come across. The above findings do not support the assumption that the majority of traders post information on Twitter that pertains to the stocks they trade.

Question 14's respondents indicated that the majority of traders, 78.9%, have not retweeted any information regarding new market trends. The above findings do not support the assumption that the majority of traders post information on Twitter that pertains to the stocks that they trade.

Comparing question 1 to question 11 revealed that of the 25 respondents who indicated that they do have a Twitter account, 28% said that they have posted about the stocks they have traded. The remaining 72% of traders who do have Twitter accounts said that they have not posted about the stocks they have traded. The above information reveals that the majority of traders who do have Twitter accounts do not post information on Twitter that pertains to the stocks they trade. The above findings are not in line with the researchers expected findings, it does however not indicate that traders do not post information on Twitter that pertains to the stocks they trade as 28% of traders do post.

The above findings are not representative of the expected outcome, where traders post information on Twitter that pertains to the stocks they trade. The information above represents the outcome extracted from the survey and indicates that the majority of traders do not post information on Twitter that pertains to the stocks they trade. However, the findings do not completely rule out the expected outcome that traders do post information about the stocks they trade, as a small percentage of traders did indicate that they have and do post about the stocks which they trade.

## 6.5 Findings – Research Objective 4

To determine whether traders use Twitter to influence the market.

### 6.5.1 Market influence & Market Influencers

The researcher's expectations were based on the following findings within the literature. Bollen et al. (2012) work indicates that Twitter feeds offer a fast, free, automatic and large scale addition to a monitoring toolkit that can be optimised to measure a variety of dimensions of public sentiment. The use of this toolkit can be

used to test “whether public sentiment, as expressed in large-scale collections of daily Twitter posts, can indeed be used to predict the stock market” (Bollen et al. 2011, p.1). The above literature gives rise to the thought that, using Twitter, information can be gathered through the tracking of online sentiment to predict the stock market. In light of this, it should then be plausible that people and traders can post information through the expression of their sentiment to influence the stock market. This school of thought can have positive and negative effects on the stock market. Sentiment and WOM through the use of Twitter to influence the market can be seen in a similar way to that which Bollen et al. (2012) described. Bollen et al. (2012, p. 7) stated that “rumours and misleading information can spread with equal if not greater efficiency across the same social networking ties as demonstrated by the prevalence of so called “astroturfing” and “Twitter bombing” campaigns.” The above information leads the reader to expect information posted on Twitter to have an influencing effect over other traders or persons in similar fields. This notion is further supported by the literature presented in the reasoning behind the third research question, where Zhang et al. (2012) commented on the debate surrounding whether e-commerce firms allow consumers to post uncensored reviews. It is further supported by Chen et al. (2012), where they mention the increasing amount of power bloggers have within the investor population and the rivalry emerging between them and professional sell-side analysts. The above examples solidify the expectation that information on Twitter could be used to influence the trading of stocks on the stock market. This expectation is further substantiated by Jansen et al. (2009, p.2186) who state “perceptions and purchasing decisions appear increasingly influenced by Web communications and social networking services” where consumers are using “communication technologies for trusted sources of information, insights, and opinions.” The views of Jansen et al. (2009) are confirmed by the findings of Chen et al. (2012) which record a link between views expressed on a stock market news site, and concurrent and ensuing stock returns. From the above information the researcher expected the results to indicate that traders do use Twitter to influence the market.

The overall results obtained through the scoring of the survey, where questions 11, 12, 13 and 14 were grouped, with a maximum score of 40 and a minimum score of 4; indicate that the majority of respondents are positively skewed. The above information reveals that the majority of traders indicated that they do not post and repost information about the market and trades. Furthermore, the findings reveal that traders do not post and repost information about the market and trades, which is not to say all

traders follow this trend. The majority of responses present in the findings indicate that traders do not use Twitter to influence the market by posting and reposting information. The above findings are contrary to what the researcher intended to find as it indicates that traders do not use Twitter to influence the market.

The overall results obtained through the scoring of the survey, when questions 15, 16 and 17 were grouped, with a maximum score of 30 and a minimum score of 3; express a bimodal distribution, with the majority of respondents favouring Twitter as an element that influences the market, as the mean is 16.42. The above information reveals that traders believe that Twitter does influence the trading of stocks by traders on the stock market. The extent to which the above results are skewed indicates that traders do believe that information posted on Twitter influences the trading pattern of traders, yet there is a group of traders who expressed the belief that it does not influence the trading pattern of traders. The above result indicates that the findings are in line with the expected result, yet due to the bimodal peak further information will be sought from individual question responses that relate specifically to the research question.

By means of observation, a disparity is evident between the two scoring groups. Posting as Market Influencers scoring found that traders do not use Twitter to influence the market, where the Market Influence scoring indicated that traders do use Twitter to influence the market. An answer to this disparity can be sought by individual question responses, as seen below.

Question 15 indicated that the majority of respondents, 42.1%, agree that Twitter has emerged as a forum which traders use to inform their purchasing decisions, while 39.5% of respondents disagree. When the results are compounded into two sets, agree and disagree, the results indicate that respondents are split 50/50.

Question 16 displayed similar results to that of question 15, with results being split almost evenly when the results were compounded into two sets, agree and disagree. The results show that the majority of respondents 52.6% indicating that they disagree that social media, more specifically Twitter, has influenced trading decisions, while the remaining 47.3% indicating that they agree.

Question 17 indicated that the majority of respondents, 52.6%, believe that traders do use Twitter to influence the trading of stocks on the stock market. The remaining 47.4% indicate that they do not believe traders use Twitter to influence the market.

Question 18 revealed that the majority, 72.3%, of respondents who participated in the open-ended question believe, to a moderate and large extent, that Twitter has influenced the trading of stocks. 16.7% of respondents indicated that to no extent has Twitter has influenced that trading of stocks.

Comparing question 11 to question 17 revealed that of the 31 respondents who said that they have not posted about the stocks they have traded, 48.4% indicated that they do not believe traders use Twitter to influence the trading of stocks on the stock market, while 51.6% indicated that they do believe traders use Twitter to influence the trading of stocks on the stock market. The above findings indicate that the respondents are divided almost evenly, whereby the majority believes traders use Twitter to influence the trading of stocks on the stock market. However, there is not enough evidence to support or disprove whether traders use Twitter to influence the trading of stocks on the stock market.

The findings represented above indicate that the majority of traders do not use Twitter as a means to inform their purchasing decisions, and do not post and repost information regarding their purchases, yet the majority of traders do believe that Twitter does influence the market and the trading pattern of traders. The results obtained indicate that there is a perception amongst traders who Twitter does influence the market. However, feedback obtained through the use of the survey contradicts the above perception. The survey revealed that the majority of traders do not post or repost information regarding the stocks they trade or market information. The survey went on to identify that traders do not make their purchasing decisions from news and information that they have gathered from Twitter. The above information reveals that the majority of traders do not use Twitter as a means to influence the market as the evidence suggests that the number of traders who base their purchasing decisions off news found on Twitter, nor is there a large enough group of traders who post and repost market information. The conclusion that traders do not use Twitter to influence the market can be drawn. The conclusion indicates that the findings are not in line with expected results as traders do not use Twitter to influence the market.

The researcher's understanding from analysing the results leads him to consider the reason behind the disparity of results as being related to trader sentiment, where traders feel that Twitter has emerged as an influencing factor yet do not post or repost information as to confirm their belief. The consideration makes note of traders' beliefs that other traders are using Twitter as a market source and a means to influence the



market, where the results indicate that only a minority of traders are using Twitter for that purpose.

## 6.6 Summary

In this chapter the findings for the research study were discussed in line with the research questions as set out in Chapter 3. The results obtained revealed that: the expected outcome for the first research question – “do traders use Twitter to access new market information?” – was representative of the expected outcome retrieved from the literature, in that traders do use Twitter to access new market information. However, the expected outcomes for the second question – “does information on Twitter influence the trading pattern of traders?” –, the third question - “do traders post information on Twitter pertaining to the stocks the trade?” – and the fourth research question – “do traders use Twitter to influence the market? – were not representative of the expected outcome retrieved from the literature. The results showed a negative response to the questions posed, indicating that Twitter does not have such a far-reaching effect on the Market. The following chapter will discuss the summary of results, recommendations and the ideas for future research.

## **Chapter 7: Conclusion**

### **7.1 Introduction**

The purpose for this research study was to investigate the link between sentiment analysis and WOM, as expressed through the social media site Twitter, to market prices as determined by traders. The research intended to expand on the limited research that exists on the influence social media has on trading patterns as perceived by traders.

The aim of this research was to identify the extent to which traders and analysts operating on the JSE use social media, more specifically Twitter, for information and as a means to influence the market. The researcher wanted to establish the extent to which traders and analysts use Twitter as a means to access market information and influence their purchasing decisions.

The value of the study added to the academic debate, as to confirm or reject the validity of Twitter (and its role in the production and consumption of information) as an influential factor over traders' perceptions and actions in the functioning of South Africa's stock market: the JSE.

The findings in this study do not completely correspond with the trends and expectations present in the literature studies researched. The expected outcome for the first research question was representative of the expected outcome retrieved from the literature, yet the expected outcomes for the second, third and fourth research questions were not representative of the expected outcome retrieved from the literature. However, the study does provide insight into the uses of Twitter by traders and the effects sentiment, WOM and perception has on the stock market.

### **7.2 Key Findings**

The main finding to emerge from the study pertains to the perception evident in the market, where traders believe that Twitter does influence the market and the trading

pattern of traders. What is interesting to note is the fact that the results obtained by means of the survey questionnaire indicate that the majority of traders do not use Twitter as a basis to inform their purchasing decisions. The results therefore indicated a disparity between the perception in the market and the actual results obtained. It revealed that traders believe that other traders in the market use Twitter as an information source when making their purchasing decisions, yet the results indicate that the majority of traders do not base their purchasing decisions on information found on Twitter. Another possible explanation for the outcomes disparity between results can be linked to traders in the market not wanting to inform the researcher as to what shapes their purchasing decisions, as well as viewing Twitter as a non-reliable information source.

Furthermore, important discoveries were made throughout the research process which impacted the final result. It is important for the researcher to state the specific findings for each research question asked, as to address the results singularly.

The key findings for question 1 “Do traders use Twitter to access new market information?” revealed that traders do use Twitter to access new market information. The outcome was representative of what the researcher was intending to discover. It supports the discoveries made Chen et al. (2012), as well as the discoveries made by Brown (2012). It supports Brown’s (2012) findings that Twitter has emerged as an important tool for individuals and businesses to share information and communicate. The finding expands on the literature put forward by Brown (2012) and Chen et al. (2012), but includes a study on traders in the vast network of business, as well as individuals that use Twitter and social media as a tool to communicate, share and access information. It is important to note that this discovery was made in an emerging market, with the researcher specifically conducting the research in the context of South Africa and gaining the insights of traders who operate and trade on the JSE. The discovery was made within the specific context of South Africa’s JSE. Results for similar tests could vary depending on the context and stock exchange from which the results are gathered.

The key findings for question 2 “Does information posted on Twitter influence the trading pattern of traders?” revealed that information posted on Twitter does not influence the trading pattern of traders. The outcome was not representative of what the researcher intended to discover. The key finding to question 2 revealed the disparity between perception and action on the stock exchange, as Twitter does not

play a large enough influencing factor to affect the trading pattern of traders. The findings contradict Bollen et al. (2012) assertions that information travelling large distances in short time periods can affect investment strategies of individual and professional traders. The results obtained through this study indicate that traders do use Twitter as an information source but do not base their purchasing decisions on this information, indicating that it does not largely affect the trading strategies of professional traders. The results for similar tests could vary depending on the sample size, context of the study and stock exchange monitored.

The key findings for question 3 “Do traders post information on Twitter that pertains to the stocks they trade?” revealed that traders do not post information on Twitter that pertains to the stocks they trade. The outcome was not representative of what the researcher expected to discover. The key finding to question 3 revealed that traders operating on the JSE do not post information on Twitter that pertains to the stocks they trade. The findings presented in this study are contrary to the literature put forward by Chen et al. (2012), where they conclude that fellow consumer opinions expressed through social media play a crucial role in purchasing decision. Chen et al. (2012) support this discovery with information posted on stock market news sites and subsequent stock returns and investor behaviours. The findings from this study indicate that traders use Twitter to access market information, yet do not base their purchasing decisions on this information, and that traders do not post (or disseminate) this information on Twitter. The study therefore makes note that the majority of traders operating on the JSE do not post or repost information on Twitter regarding the stocks they trade and do not base their purchasing decisions on news they read off Twitter.

The key findings for question 4 “Do traders use Twitter to influence the market?” revealed that that the majority of traders do not use Twitter as a means to influence the market. The outcome was not representative of what the researcher expected to discover. The key finding in question 4 further revealed and supported the disparity between perception and action on the stock exchange. It identified that there is not a large enough number of traders who base their purchasing decisions on news found on Twitter, nor is there a large enough group of traders who post and repost market information. The findings are contrary to the literature put forward by Bollen et al. (2012), stating that sentiment expressed using Twitter posts can be used to predict the stock market. The literature gave rise to the thought that views expressed (sentiment and WOM) on Twitter could be used to influence the market. This thought was supported by Bollen et al. (2012, p.7) work that stated “rumours and misleading

information can spread with equal if not greater efficiency across the same social networking ties as demonstrated by the prevalence of so called “astroturfing” and “Twitter bombing campaigns”, which in turn could be used by traders to influence the market. However, the findings disproved this notion, revealing that traders do not use Twitter to influence the market.

It should be noted that not all results were conclusive, which leaves a small section of traders who do use Twitter for the above stated research questions. This group of respondents did not however make up the majority of the sample size, which in turn led the research to draw the above conclusions.

### **7.3 Recommendations**

Recommendations to stakeholders, specifically novice investors and traders, would be to join a trading or investment forum on Twitter. The forum should be used in conjunction with other analytical tools in the purchasing and selling of shares, or investment decisions. The forum would allow stakeholders to access information through Twitter, which would be used as an additional source of information when making purchasing decisions. Twitter should therefore be viewed as an additional investment tool as opposed to being an exclusively social tool.

The perception in the market leads the researcher to suggest that stakeholders use Twitter as an information source and separate analytical tool when making their purchasing decisions. Traders should reassess their trading strategy when accessing information from Twitter, as the results suggest that the perception in the market is that Twitter does influence the market, whereas the results indicate that it does not. The trading strategy should follow the guideline to only use Twitter as an information source in conjunction with other trading tools when making decisions.

## 7.4 Limitations

Limitations the researcher came across while completing the study included:

- Sample size – Too small. A larger sample size would have allowed the researcher to gain greater insight and clarity when answering the research questions.
- People in the industry do not want to reveal what they base their purchasing decisions on.
- It is difficult to survey registered traders who work for financial institutions because the institutions did not allow the researcher to gain access to their traders.
- Access to traders is seen as a sensitive area to operations.

The limitations mentioned above provided a hindrance to the series of events and analysis when conducting the research study.

## 7.5 Ideas for Future Research

Further research is needed in the area surrounding Twitter as an information source and the effect it has on the stock exchange. It would be beneficial to the research for developments to be made surrounding social media's influence on the stock market.

Methods for future research include the following:

- Event study. The purpose of an event study in the case of this research is to reveal important information about how a news break on Twitter is likely to affect the stock prices on a particular stock exchange. It could be used to determine whether or not information posted on Twitter can have a positive or negative effect on the value of stocks. The event study would also provide the researcher with insight into the prediction of how stocks are likely to react given different circumstances or news breaks.
- Qualitative study. The purpose of conducting qualitative research is to determine the effect Twitter has had on the market since its inception. Qualitative research will allow the researcher to gain a greater and more in-

depth understanding of human behaviour, and what effects Twitter has on human behaviour when operating on the stock exchange. It will assist the researcher in uncovering the how and why of decision making in trade, expanding on the research conducted in this study.

Expanding on the research conducted by this study, a scholar could adapt the research questions to another microblogging site which is thought to have influence over the purchasing decisions of traders. Further adaptations could be made to the use of social media sites, expanding the scope to include Facebook and other high-traffic social networking sites.

As a comparative study, future research could be conducted in another emerging market or developed markets, using the same study to determine whether Twitter has a similar or contrasting effect in different geographic regions.

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## 9. Appendices

### 9.1 Appendix A: Tables

**Table 1: Descriptives & Frequencies for Question 1**

Q.1: Do you have a Twitter account?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	14	34.1	34.1	34.1
	Yes	27	65.9	65.9	100.0
	Total	41	100.0	100.0	

**Table 2.1: Descriptives & Frequencies for Question 2**

Statistics							
Q.2: Do you know how to use and navigate Twitter?							
N		Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Valid	Missing						
41	0	1.22	1.00	2	.791	0	2

**Table 2.2: Descriptives & Frequencies for Question 2**

Q.2: Do you know how to use and navigate Twitter?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	22.0	22.0	22.0
	Somewhat	14	34.1	34.1	56.1
	Yes	18	43.9	43.9	100.0
	Total	41	100.0	100.0	

**Table 3: Descriptives & Frequencies for Question 3**

<b>Q.3: Do you have access to Twitter during your daily trading hours?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	22.0	22.5	22.5
	Yes	31	75.6	77.5	100.0
	Total	40	97.6	100.0	
Missing	System	1	2.4		
Total		41	100.0		

**Table 4: Descriptives & Frequencies for Question 4**

<b>Q.4: Does your company allow you to actively engage/access twitter during your trading hours?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	19.5	20.0	20.0
	Yes	32	78.0	80.0	100.0
	Total	40	97.6	100.0	
Missing	System	1	2.4		
Total		41	100.0		

**Table 5: Descriptives & Frequencies for Question 5**

<b>Q.5: Does your company have monitoring or tracking systems in place to monitor the twitter sphere?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	30	73.2	75.0	75.0
	Yes	10	24.4	25.0	100.0
	Total	40	97.6	100.0	
Missing	System	1	2.4		
Total		41	100.0		

**Table 6: Descriptives & Frequencies for Question 6**

Q.6: Does your company follow notable news stations or market sources on twitter?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	12	29.3	30.0	30.0
	Yes	22	53.7	55.0	85.0
	I am unaware	6	14.6	15.0	100.0
	Total	40	97.6	100.0	
Missing	System	1	2.4		
Total		41	100.0		

**Table 7: Descriptives & Frequencies for Question 7**

Q.7: Do you follow notable news stations or market sources on twitter?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	17	41.5	42.5	42.5
	Yes	23	56.1	57.5	100.0
	Total	40	97.6	100.0	
Missing	System	1	2.4		
Total		41	100.0		

**Table 8: Descriptives & Frequencies for Question 8**

Q.8: Have you ever used Twitter to monitor and access news and market information?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	36.6	38.5	38.5
	Yes	24	58.5	61.5	100.0
	Total	39	95.1	100.0	
Missing	System	2	4.9		
Total		41	100.0		

**Table 9: Descriptives & Frequencies for Question 9**

<b>Q.9: As a trader, have you ever used Twitter as a source of trading information?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	20	48.8	51.3	51.3
	Yes	19	46.3	48.7	100.0
	Total	39	95.1	100.0	
Missing	System	2	4.9		
Total		41	100.0		

**Table 10: Descriptives & Frequencies for Question 10**

<b>Q.10: Have you ever based a purchasing decision off a news feed (tweet) that you read off twitter?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	28	68.3	73.7	73.7
	Yes	10	24.4	26.3	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 11: Descriptives & Frequencies for Question 11**

<b>Q.11: Have you ever posted (tweeted) about the stocks you have traded?</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	31	75.6	81.6	81.6
	Yes	7	17.1	18.4	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 12: Descriptives & Frequencies for Question 12**

Q.12: Have you ever posted (tweeted) about news stories that you have come across or heard about?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	24	58.5	63.2	63.2
	Yes	14	34.1	36.8	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 13: Descriptives & Frequencies for Question 13**

Q.13: Have you ever posted (tweeted) about new market trends that you have come across?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	28	68.3	73.7	73.7
	Yes	10	24.4	26.3	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 14: Descriptives & Frequencies for Question 14**

Q.14: Have you ever reposted (retweeted) any information regarding new market trends?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	30	73.2	78.9	78.9
	Yes	8	19.5	21.1	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 15: Descriptives & Frequencies for Question 15**

Q.15: Twitter has emerged as a forum which traders use to base their purchasing decisions.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	7.3	7.9	7.9
	Agree	16	39.0	42.1	50.0
	Disagree	15	36.6	39.5	89.5
	Strongly disagree	4	9.8	10.5	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 16: Descriptives & Frequencies for Question 16**

Q.16: In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	2.4	2.6	2.6
	Agree	17	41.5	44.7	47.4
	Disagree	17	41.5	44.7	92.1
	Strongly disagree	3	7.3	7.9	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
Total		41	100.0		

**Table 17: Descriptives & Frequencies Summarised for Question 15 and Question 16**

	Statistics							
	N		Mean	Median	Mode	Std. Deviation	Minimum	Maximum
	Valid	Missing						
Q.15: Twitter has emerged as a forum which traders use to base their purchasing decisions.	38	3	2.53	2.50	2	.797	1	4
Q.16: In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?	38	3	2.58	3.00	2 <sup>a</sup>	.683	1	4



**Table 18: Descriptives & Frequencies for Question 17**

Q.17: Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	18	43.9	47.4	47.4
	Yes	20	48.8	52.6	100.0
	Total	38	92.7	100.0	
Missing	System	3	7.3		
	Total	41	100.0		

**Table 19.1: Descriptives & Frequencies for Question 18\_Rate**

Statistics							
Q.18_Rate: To what extent do you believe Twitter has influenced the trading of stocks on the JSE? Rate							
N		Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Valid	Missing						
15	26	1.93	2.00	2	.594	1	3

**Table 19.2: Descriptives & Frequencies for Question 18\_Rate**

Q.18_Rate: To what extent do you believe Twitter has influenced the trading of stocks on the JSE? Rate					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No extent	3	7.3	16.7	16.7
	Moderate extent	10	24.4	55.6	72.2
	Large extent	2	4.9	11.1	83.3
	Unconfirmed	3	7.3	16.7	100.0
	Total	18	43.9	100.0	
Missing	System	23	56.1		
Total		41	100.0		

**Table 20: Case Summary for Question 18\_Communication**

Case Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Q.18_Comm <sup>a</sup>	14	34.1%	27	65.9%	41	100.0%

a. Group

**Table 21: Communication Frequencies for Question 18**

Q.18_Comm Frequencies				
		Responses		Percent of Cases
		N	Percent	
Q.18_Comm To what extent do you believe Twitter has influenced the trading of stocks on the JSE? <sup>a</sup>	Speed of news/information	9	32.1%	64.3%
	Information source	8	28.6%	57.1%
	Not yet	4	14.3%	28.6%
	Space in the market	4	14.3%	28.6%
	Gain other traders views	3	10.7%	21.4%
Total		28	100.0%	200.0%

a. Group

**Table 22: Descriptive of Overall Scores**

Statistics								
	N		Mean	Median	Mode	Std. Deviation	Minimum	Maximum
	Valid	Missing						
Twit_PenetRate Twitter's Penetration Rate	41	0	29.51	35.00	40	12.458	4	40
Twit_FollTrends Twitter's Following Trend	40	1	15.38	12.00	12	8.072	3	30
Acc_MarkInfo Access Market Information	39	2	15.23	12.00	3	10.217	3	30
Post_MarkInfluen Posting/Market Information	38	3	13.24	4.00	4	14.112	4	40
Mark_Influence Market Influence	38	3	16.42	18.00	24	7.632	3	27

**Table 23: Cross Tabulation for Question 1 by Question 8**

Crosstab					
			Q8		Total
			No	Yes	
Q1	No	Count	11	3	14
		% within Q1	78.6%	21.4%	100.0%
	Yes	Count	4	21	25
		% within Q1	16.0%	84.0%	100.0%
Total		Count	15	24	39
		% within Q1	38.5%	61.5%	100.0%

**Table 24: Chi-Square Tests for Question 1 by Question 8**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.845 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	12.319	1	.000		
Likelihood Ratio	15.438	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	14.464	1	.000		
N of Valid Cases	39				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.38.  
b. Computed only for a 2x2 table

**Table 25: Symmetric Measures for Question 1 by Question 8**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.617	.000
	Cramer's V	.617	.000
N of Valid Cases		39	

**Table 26: Cross Tabulation for Question 1 by Question 10**

Crosstab					
			Q10		Total
			No	Yes	
Q1	No	Count	11	2	13
		% within Q1	84.6%	15.4%	100.0%
	Yes	Count	17	8	25
		% within Q1	68.0%	32.0%	100.0%
Total	Count	28	10	38	
	% within Q1	73.7%	26.3%	100.0%	

**Table 27: Chi-Square Tests for Question 1 by Question 10**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.218 <sup>a</sup>	1	.270		
Continuity Correction <sup>b</sup>	.512	1	.474		
Likelihood Ratio	1.296	1	.255		
Fisher's Exact Test				.441	.242
Linear-by-Linear Association	1.186	1	.276		
N of Valid Cases	38				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is

b. Computed only for a 2x2 table

**Table 28: Cross Tabulation for Question 1 by Question 11**

Crosstab					
			Q11		Total
			No	Yes	
Q1	No	Count	13	0	13
		% within Q1	100.0%	0.0%	100.0%
	Yes	Count	18	7	25
		% within Q1	72.0%	28.0%	100.0%
Total		Count	31	7	38
		% within Q1	81.6%	18.4%	100.0%

**Table 29: Chi-Square Tests for Question 1 by Question 11**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.462 <sup>a</sup>	1	.035		
Continuity Correction <sup>b</sup>	2.793	1	.095		
Likelihood Ratio	6.659	1	.010		
Fisher's Exact Test				.072	.038
Linear-by-Linear Association	4.345	1	.037		
N of Valid Cases	38				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is

b. Computed only for a 2x2 table

**Table 30: Symmetric Measures for Question 1 by Question 11**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.343	.035
	Cramer's V	.343	.035
N of Valid Cases		38	

**Table 31: Cross Tabulation for Question 1 by Question 13**

Crosstab					
			Q13		Total
			No	Yes	
Q1	No	Count	13	0	13
		% within Q1	100.0%	0.0%	100.0%
	Yes	Count	15	10	25
		% within Q1	60.0%	40.0%	100.0%
Total		Count	28	10	38
		% within Q1	73.7%	26.3%	100.0%

**Table 32: Chi-Square Tests for Question 1 by Question 13**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.057 <sup>a</sup>	1	.008		
Continuity Correction <sup>b</sup>	5.145	1	.023		
Likelihood Ratio	10.151	1	.001		
Fisher's Exact Test				.008	.007
Linear-by-Linear Association	6.871	1	.009		
N of Valid Cases	38				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.42.

b. Computed only for a 2x2 table

**Table 33: Symmetric Measures for Question 1 by Question 13**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.431	.008
	Cramer's V	.431	.008
N of Valid Cases		38	

**Table 34: Cross Tabulation for Question 8 by Question 17**

Crosstab					
			Q17		Total
			No	Yes	
Q8	No	Count	9	5	14
		% within Q8	64.3%	35.7%	100.0%
	Yes	Count	9	15	24
		% within Q8	37.5%	62.5%	100.0%
Total		Count	18	20	38
		% within Q8	47.4%	52.6%	100.0%

**Table 35: Chi-Square Tests for Question 8 by Question 17**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.545 <sup>a</sup>	1	.111		
Continuity Correction <sup>b</sup>	1.584	1	.208		
Likelihood Ratio	2.570	1	.109		
Fisher's Exact Test				.179	.104
Linear-by-Linear Association	2.478	1	.115		
N of Valid Cases	38				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is

b. Computed only for a 2x2 table

**Table 36: Cross Tabulation for Question 8 by Question 9**

Q8 * Q9 Crosstabulation					
			Q9		Total
			No	Yes	
Q8	No	Count	13	2	15
		% within Q8	86.7%	13.3%	100.0%
	Yes	Count	7	17	24
		% within Q8	29.2%	70.8%	100.0%
Total		Count	20	19	39
		% within Q8	51.3%	48.7%	100.0%

**Table 37: Chi-Square Tests for Question 8 by Question 9**

Chi-Square Tests		
	Value	Exact Sig. (2-sided)
McNemar Test		.180 <sup>a</sup>
N of Valid Cases	39	

a. Binomial distribution used.

**Table 38: Cross Tabulation for Question 10 by Question 15**

Q10 x rQ15 Crosstabulation					
			rQ15		Total
			Strongly agree to Agree	Disagree to Strongly disagree	
Q10	No	Count	9	19	28
		% within Q10	32.1%	67.9%	100.0%
	Yes	Count	10	0	10
		% within Q10	100.0%	0.0%	100.0%
Total		Count	19	19	38
		% within Q10	50.0%	50.0%	100.0%

**Table 39: Chi-Square Tests for Question 10 by Question 15**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.571 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	10.993	1	.001		
Likelihood Ratio	17.514	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.214	1	.000		
N of Valid Cases	38				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.00.  
b. Computed only for a 2x2 table

**Table 40: Symmetric Measures for Question 10 by Question 15**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.598	.000
	Cramer's V	.598	.000
N of Valid Cases		38	



**Table 41: Cross Tabulation for Question 11 by Question 17**

Q11 * Q17 Crosstabulation					
			Q17		Total
			No	Yes	
Q11	No	Count	15	16	31
		% within Q11	48.4%	51.6%	100.0%
	Yes	Count	3	4	7
		% within Q11	42.9%	57.1%	100.0%
Total		Count	18	20	38
		% within Q11	47.4%	52.6%	100.0%

**Table 42: Chi-Square Tests for Question 11 by Question 17**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.070 <sup>a</sup>	1	.791		
Continuity Correction <sup>b</sup>	0.000	1	1.000		
Likelihood Ratio	.070	1	.791		
Fisher's Exact Test				1.000	.563
Linear-by-Linear Association	.068	1	.794		
N of Valid Cases	38				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is					
b. Computed only for a 2x2 table					

**Table 43: Cross Tabulation for Question 15 by Question 16**

Q15 * Q16 Crosstabulation							
			Q16				Total
			Strongly agree	Agree	Disagree	Strongly disagree	
Q15	Strongly agree	Count	0	2	1	0	3
		% within Q15	0.0%	66.7%	33.3%	0.0%	100.0%
	Agree	Count	1	13	2	0	16
		% within Q15	6.3%	81.3%	12.5%	0.0%	100.0%
	Disagree	Count	0	2	13	0	15
		% within Q15	0.0%	13.3%	86.7%	0.0%	100.0%
	Strongly disagree	Count	0	0	1	3	4
		% within Q15	0.0%	0.0%	25.0%	75.0%	100.0%
Total		Count	1	17	17	3	38
		% within Q15	2.6%	44.7%	44.7%	7.9%	100.0%

**Table 44: Marginal Homogeneity Test for Question 15 by Question 16**

Marginal Homogeneity Test							
	Distinct Values	Off-Diagonal Cases	Observed MH Statistic	Mean MH Statistic	Std. Deviation of MH Statistic	Std. MH Statistic	Asymp. Sig. (2-tailed)
Q15 & Q16	4	9	19.000	20.000	1.732	-.577	.564

## 9.2 Appendix B: Questionnaire

1. Do you have a Twitter account?  
(YES/NO)
2. Do you know how to use and navigate Twitter?  
(YES/NO/SOMEWHAT)
3. Do you have access to Twitter during your daily trading hours?  
(YES/NO)
4. Does your company allow you to actively engage/access Twitter during your trading hours?  
(YES/NO)
5. Does your company have monitoring or tracking systems in place to monitor the Twittersphere?  
(YES/NO)
6. Does your company follow notable news stations or market sources on Twitter?  
(YES/NO/I AM UNAWARE)
7. Do you follow notable news stations or market sources on Twitter?  
(YES/NO)
8. Have you ever used Twitter to monitor and access news and market information?  
(YES/NO)
9. As a trader, have you ever used Twitter as a source of trading information?  
(YES/NO)

10. Have you ever based a purchasing decision off a news feed (tweet) that you read off Twitter?  
  
(YES/NO)
11. Have you ever posted (tweeted) about the stocks you have traded?  
  
(YES/NO)
12. Have you ever posted (tweeted) about news stories that you have come across or heard about?  
  
(YES/NO)
13. Have you ever posted (tweeted) about new market trends that you have come across?  
  
(YES/NO)
14. Have you ever reposted (retweeted) any information regarding new market trends?  
  
(YES/NO)
15. Twitter has emerged as a forum which traders use to base their purchasing decisions.  
  
(Strongly Agree/Agree/Disagree/Strongly Disagree)
16. In your experience working as a trader, do you feel that social media, more specifically Twitter, has influenced trading decisions on the JSE?  
  
(Strongly Agree/Agree/Disagree/Strongly Disagree)
17. Do you believe that traders use Twitter, through the posting and re-posting of information, to influence the trading of stocks on the stock market?  
  
(YES/NO)
18. To what extent do you believe Twitter has influenced the trading of stocks on the JSE?  
  
(Open ended question).

## 9.3 Appendix C: Ethical Clearance



Dear Chad,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards,

Shirls

**Shirlene Smits**  
*Full-time MBA Programme Manager*  
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## 9.4 Appendix D: Letter of Consent

### LETTER OF CONSENT



### **Full time MBA 2013/2014**

Twitter's effect on share price movements of the  
Johannesburg Stock Exchange (JSE) (Working Title)

By:

Chad Gussenhoven

Phone Number: 0795266438

E-mail address: [cgussenhoven@gmail.com](mailto:cgussenhoven@gmail.com)

**Informed Consent:** I am conducting research on the topic of social media, specifically focusing on Twitter, and the effects it has had on the purchasing decisions of traders operating in emerging markets. Through my research I am also looking to establish whether traders use Twitter to access new market information and influence the market. I have chosen to conduct my research within the parameters of registered traders operating on the Johannesburg Stock Exchange (JSE).

Your participation in this study is completely voluntary and would be greatly appreciated. The information gathered from this survey will be stored both electronically and physically. All personal information will be kept completely confidential. If you have any concerns, or questions, please don't hesitate to contact either myself or my supervisor. Please note that participation is voluntary and that your information is kept anonymous at all times.

By completing the survey you are acknowledging the above.

**Contact Details:**

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