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Security Risks/Threats & Rewards in Social Media

University of Oulu
Department of Information Processing
Science
Master's Thesis
Vikesh Punjabi
17.11.2014

Abstract

In the last decade, without any doubt, social media i.e. social network platforms that are mainly created in order to interact with each other such as Facebook, Twitter, LinkedIn, Google +, Tumblr, Instagram, Flickr, Myspace, Blogs, YouTube, or any user generated content websites gained huge access in public daily life including individuals and organizations. These social network platforms, especially Facebook, Twitter, YouTube, were grown in such fast pace manner that even the big companies including Microsoft, Google, etc. has changed their strategies, and adapted social network platforms very well. That was the time when people, and small organizations who did not have platform for user generated content, had to pay fee to upload their content over Internet. Most of small companies were using privately purchased platform to distribute and share their content; whereas, individuals were limited to post their contents; Emails & IMs were used frequently to share their text, pictures, videos, etc.

By the year 2004, freely/ free social network platforms became so common/easy to use and were hugely successful. Platforms were able to provide users to share content quite easily. Small businesses started using social network to promote their business. Veterans were easily connected with their users & followers to provide help & information they are looking for. Upon such rapid growth of these social media platforms; benefits, rewards & opportunities are uncountable, however, it also came with risks and security issues.

This research is limited, however it provides valuable information presented in scientific articles in digital libraries. There was total of 214 articles found related to research topic. By refining results, number of articles were reduced to 30 which were selected for actual research using SLR steps.

The results were summarized in tabular format and answers the research question in discussion chapter which can be helpful to existing social network platforms, their operators and users.

Keywords

Systematic literature review, Social media, social networks, security risks, threats, rewards, benefits, opportunities, & challenges

Foreword

This thesis was written in completion to the Master's Degree in Information Processing Science, at University of Oulu. Firstly, I would like to say writing of this Master's Thesis has been both challenging & inspiring. Firstly I would like to thank Dr. Raija Halonen who is my first supervisor; I received lot of help and suggestion from her in whole process of writing my master thesis. As writing the thesis was a great learning opportunity for me, and at the same time, it was a great experience to work along with my supervisor remotely. The thesis writing process went through lots of ups and downs because I was way from University, but encouragement gained from my supervisor made me able to learn and finish my thesis.

Also, I am grateful to the University of Oulu who provided me an opportunity to learn in a diversified environment with the international education standard. Living away from my own country, yet gaining such multicultural exposure was really an overwhelming experience and a great step towards my career ahead.

Last, but not least, I want to thank my family who constantly supported me to remain positive throughout my thesis work, Asheesh Nigam (PhD, Information Processing Science, University of Oulu) and my wife Anamika who supported in technical things.

Vikesh Punjabi
Oulu, November 2014

Abbreviations

SRCM	Security risks in social media
RSM	Rewards in social media
SLR	Systematic literature review
ASA	Advertising Standards Authority
SMS	Social Media Services
SNS	Social networking sites

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1. Introduction

Social media and its influence have big impact on global population including individual and organizations in last decade. According to Ashford, more of individual and businesses are taking advantage of social media to reach the masses and connect globally. With such advantages, there are also increasing security challenges and risks to the users of social media. Most of these threats linked with social networking are privacy concerns and spreading of false information. Apart from individual personal life privacy, business privacy concern makes the organization more vulnerable; as employees can disclose the organization's private information on social media. In support of this claim, Cisco 2013 Annual Security Report suggests that the highest concentration of online security threats is on mass audience sites, including social media. The report further revealed that online advertisements are 182 times more likely to deliver malicious content than pornography sites. (Ashford, 2013)

Ashford further stated that sharing information with an audience, and connecting globally is at the heart of the particular challenge that social media presents to businesses, because this way they give away the power to disseminate commercially sensitive information. The other drawback of social media is that it gives similar power to spread false information, which can be just as damaging. This claim is further supported by World Economic Forum in its Global Risks 2013 report, according to the report, the rapid spread of false information through social media is among the emerging risks. The report's author draws the analogy of shouting "Fire" in a crowded cinema. Within minutes, people can face near death experience before a correction can be made to the message. Another example given by the author suggests that a fake tweet by someone impersonating the Russian interior minister, claiming that the Syrian president had been killed or injured, caused crude prices to rise by over \$1 before common traders realized the news was false. Therefore, there are many such reported incidents over past years where false information transmitted on the internet has had serious consequences. (Ashford, 2013).

Moreover, Ashford further asserted that companies cannot afford to ignore the unmatched reach of social media, because of the positive and negative effect it can have on the business. Organizations need to understand that they no longer can hold back the flow of social media, so instead of placing policies of prohibiting use of social media, it is better to put policies and technologies in place to manage it and to monitor for any immoral, illegal, offensive content, and be able to stop it immediately if it occurs. (Ashford, 2013).

In this thesis research, literature review has been conducted to demonstrate security threats in social media platforms and their avoidance to maximize the rewards over disadvantages.

1.1 Motivation and background

Cosoi suggested that growth of social networking sites has developed several social forum and communication methods for individuals and organizations. However, with such creative avenues, there is a dramatic increase in volume and speed of organized cyber-threats. (Cosoi, 2011).

In this regard, Rosenblum showed that the net generation that includes individual and business people; social networking (private & public sites) has become the preferred trendy forum for social interactions and common way of sharing knowledge and online stuff, business and marketing promotions, etc. However, in such public forums, there is a potential privacy threat, because such forums are relatively easy to access, and posted content can be easily seen and reviewed by anyone with an interest in the user's personal information. (Rosenblum, 2007).

Furthermore, According to Hutchings, businesses are potential in cyber exploitation, because they are increasingly learning to exploit popular social media forums such as Facebook, LinkedIn and Twitter for marketing and growth. Business growth is rapid by the use of the new media to commercially promote business. It gives companies the opportunity to convey information, promote brands or products, or make a sales pitch in a far more reliable and subtle manner than traditional marketing. This may result in viral spread by willing consumers of successful concepts and messages contained by campaigns. Such positive customer response is a definite result of effective social media campaigns. On the other hand, there are many evidently legal risks with these beneficial marketing campaigns, but use of some of the underlying legal and regulatory principles will prevent or limit the risk of problems developing in social media forums. (Hutchings, 2012).

In addition to this, Rose warned that there are greater chances of private information becoming public which opens users to serious security risk, as the information is easily transferred between social media sites. In addition, Rose mentioned that over-sharing of information by SNS users increase vulnerability of location-based information, which can also be a threat to their private life. (Rose, 2011)

Everett examined where the situation stands today, how quickly the threat is growing and how well the average organization understands the challenges involved in tackling it. She also explores why social media is growing in appeal and what this scenario is likely to mean for information security professionals and best practice advice on what enterprises should consider doing to try and guard against this potential threat. (Everett, 2010)

Therefore, the purpose of this thesis research was to accumulate the data which presents rewards & opportunities against security threats of social media. During this whole process, important literature was reviewed, analyzed and summarized, so that it became useful information to individual and small businesses & organizations, and use possible ways to get benefits without affecting privacy and other issues faced by social media platforms and their operators.

1.2 Research Question

There was lot of literature available on social media security risks & rewards, so it was essential to explore and summarize the important literature because social media has become main component of internet of things, which is not only used for personal communication, but also became main channel of communication for organizations. Therefore, goal of this thesis was to understand the security risks & rewards and answer research question given below:

What are the main security risks/threats against opportunities/rewards recognized in social media so far?

Research question was produced to answer main rewards & opportunities against challenges such as security risk and threats faced by social media. Initial step was to find out available literature and select appropriate articles to answer question.

1.3 Research Method

There has already been huge research done on social media, its privacy and security issues. Quite of enough literature is available in computer science libraries. Research done was through qualitative, empirical research, case studies of individual organizations, design science research and so on. Therefore, in this research, we have done systematic literature review on available literature which seems to be very important to summarize benefits of social network platforms against security risks and challenges. In Chapter 2, research method has been described in detail.

1.4 Thesis Structure

The thesis structure is divided into five chapters. The chapters are Introduction, Research method, Findings, Discussion and Conclusion. Below the chapters are briefly described.

Chapter 1 includes the introduction, background and motivation for doing this research; research question, and the research method used in this research. Chapter 2 was solely dedicated in describing the research method i.e. systematic literature review. Chapter 3 is main chapter, which are actual finding of research done using the SLR. Chapter 4 and 5 are discussion and conclusion, which summarize the finds and answer the research question.

2. Research Method

In this chapter, detailed overview of research method is provided, and how this method was used in social media security issues and its rewards.

2.1 Understanding Systematic Literature Review

Traditional review methods such as narrative review and meta-analysis methods used for analysis of research material were supplemented by the introduction Systematic Literature Review since 1990s. This method was initiated by medical research. It is the amalgamation of traditional methods with the element of systematic analysis, which makes it much more reliable to previous methods.

As the name suggests systematic literature review is an organized and coherent search of available literature on a given research area or question. It first identify all the online databases, papers and other sources which are related to the proposed question, then assess the information for quality search, and summarize and synthesize all the information at the end. By identifying the available literature systematically, one may not only realize what information is already available regarding particular research question, but also see any missing elements or gaps that can be filled out, in order to advance current research and suggest areas for further investigation.

Kitchenham has rightly pointed out SLR as,

"A systematic literature review (often referred to as a systematic review) is a means of identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or phenomenon of interest."(Kitchenham, 2007, p.9)

2.1.1 The need of Systematic literature review

A systematic literature review is helpful in research analysis due to several reasons. It provides us an archetype for summarizing literature for future research and it also helps in identifying any missing gaps to suggest further improvement. Thus, it actually provides building blocks for a research that may take place in future.

2.2 Approaching systematic literature review

According to Kitchenham, SLR can be approached in following steps:

2.2.1 Formulating question

Kitchenham indicated that literature review involves planning and proposing question is the first and foremost step. Before the actual implementation of literature review, it involves the specification of a clear and structured question that needs to be addressed by the review. This research question is actually formulated in review protocol. This predefined protocol is essential to sustain the objectivity of the researcher and it contains all the pre-implementation details of SLR. (Kitchenham, 2007)

2.2.2 Finding relevant Data

Kitchenham proposed that after formulating research question, multiple resources should be checked out which are relevant to the proposed question. For this all the available electronic databases and sources, such as journals, research registers and reference lists, obtained from primary studies are thoroughly searched. This search is also done to foresee if there are already some literature reviews that answer the formulated question. Objective publication strategy should be maintained, which make sure that all positive, negative and null results must be included. This complete search process is bias free as it is documented in its entirety. This way research done shall remain clear and indisputable for future analysis. (Kitchenham, 2007)

2.2.3 Evaluating quality of selected material

According to Kitchenham, after identifying data relevant to the research question, evaluating the quality of the selected material is processed. For this inclusion and exclusion criteria is used which is based on the issues like language, subjects, authors, settings, participants, journals, research design, sampling method, publication issue date etc. This quality assessment process also uses quality measurement tool to evaluate primary studies on the basis of three criterions which are bias, internal validity and external validity.

The quality is further assessed by the refined process of data extraction which is performed through primary and secondary analysis of available material. During the initial phase of analysis, appropriate research papers relevant to the proposed question are obtained. This filtering stage is quickly processed by only reading the abstracts of different papers, this makes it easy to decide if further reading would provide some relevant material to the proposed question or not. The second phase of analysis is performed, once the initial analysis has provided sufficient clues and hits about the rest of the research paper. This second phase provides deep analysis and adequate insight into the research paper by further analyzing the paper like heading, subheading and all the material relevant to the proposed question. (Kitchenham, 2007)

2.2.4 Summarizing the data

Kitchenham and Charters indicated that the synthesis of extracted data gives the answer to the proposed research question by summarizing the results. All the extracted material here is synthesized in order to present results of primary studies. Final answer may results from multiple studies done with the help of a chart, graph, or any theoretical proof. This summary is presented by using several techniques like forest and funnel plot etc. While all the sources from which this final answer is deducted, must be referenced and specified for future research. In this regard, there are various types of data synthesis used, such as Descriptive synthesis, quantitative synthesis and meta-analysis. (Kitchenham & Charters, 2007)

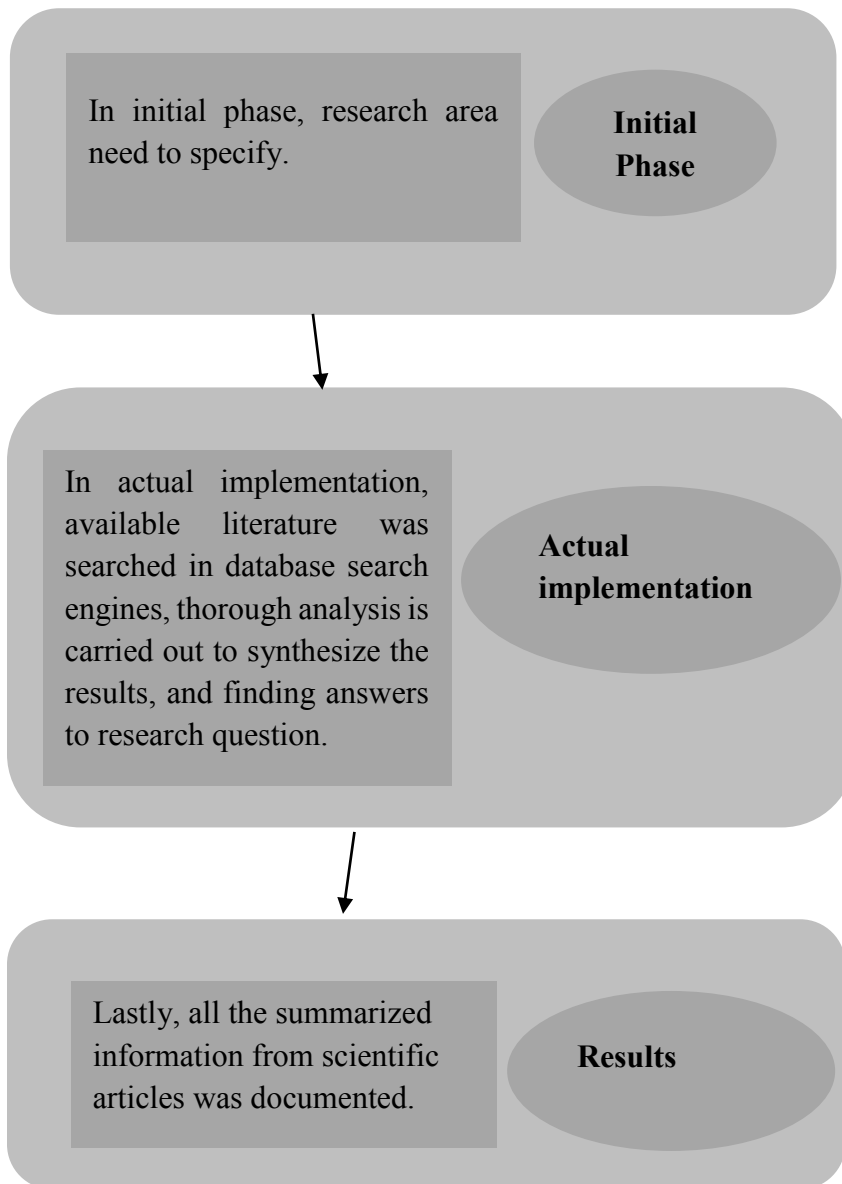
2.2.5 Interpreting results

Systematic literature review is resolved by interpreting and accurately reporting all the results deducted and defined through systematic literature review. However, reporting of accurate results is the primary necessity of this stage.

2.3 Literature Review

To analysis the SLR more in detail, and to ease the understanding of method, figure was drawn. Figure 1 shows the steps of proceeding of literature review research.

Figure 1. Systematic review steps



To carry out actual research, steps were designed to smooth the flow of thesis research according to Kitchenham guidelines which is shown in Figure 1.

2.3.1 Initial phase

During the initial phase, topic was thoroughly searched on different databases and Internet as

well to get overall view of research topic. And from this analysis, question was generated from the thesis topic and search results summary.

Table 1 Research Question

Question
What are main opportunities/rewards & security risks/threats recognized in social media so far?

2.3.2 Actual implementation

In following steps, whole research has been described and how it was carried. To carry out research, firstly question was generated from thesis topic, given in Table 1.

Analysis of Keywords

By analyzing the question, most important keywords were formed for search purpose from the question given above. Initially, it was difficult to form one or two keywords as the topic of was versatile so therefore, there were different combinations were taken to get high quality research evidence and literature. Table 2 shows different the number of combination of search keywords by using different order, and synonyms as well.

Table 2. Number for search keywords

Combination 1	Combination 2
“Social media security risks ”	“Security risks in social media”
“Social media security threats”	“Security threats in social media”
“Social media security issues”	“Security issues in social media”
“Social media challenges”	“Challenges in social media”
“Social media rewards”	“Reward in social media”
“Social media benefits”	“Benefits of social media”
“Social media opportunities”	“Opportunities in social media”

Test Search

Due to high number of keywords, test search was applied to limit available literature. It was mandatory to conduct the test search to find out main articles as the results were abundant. It was difficult to go through all articles. Therefore, test search results were formed to get primary articles

for literature review. This test search were performed on Google Scholar and Microsoft Academics and few other electronics databases such as IEEEXplore, Web of Science. During the test search, results were compared with each database and it was amazing to notice that Microsoft Academics & Google Scholar shows variety of articles to topic keywords compare to other digital library databases. It was obvious that the Google Scholar and Microsoft Academics were more efficient due the intelligent algorithms. However, other digital databases such as ACM, IEEEXplore and web of science were helpful as well because primary articles were taken from these databases.

Actual Search

After performing the test search, it was mandatory to do the actual search with limited keywords to select most important articles related to topic and available within dates due to thesis requirements. Table 3 shows the results from search keywords.

Table 3. Search results

Search Results	Microsoft Academics	Google Scholar	IEEEXplore	Science Direct	ACM
Publications	234	295	15	19	8
Conferences	67	98	7	9	7
Journals	44	64	5	7	4
Internet articles	16	12			
White paper	4	6			
Books	32	10			

Selection of Primary Literature

One of the hardest part of this research was to find out primary and quality evidence available in scientific database. Therefore, strategy was formed to get required papers according to guidelines given by Dybä & Torgeir. Initially, data was extracted from number of articles to find out the main goal of research articles, type of research, abstract, discussion and conclusion. This process was time consuming, however results were reduced to 39, which seems to primary main articles for this research. Each of article was related to topic, however it was difficult to find answer to research question at this stage. Therefore list of article were further processed so that each of paper could answer to some part of question.

Data Accumulation

According to Dybä & Torgeir, this step of SLR process involves data accumulation which would answer the research question defined earlier. Such accumulation of data is presented in descriptive form with summarization.

2.3.3 Writing results

Finally, the results of the study were noted down to write actual thesis writing which is thorough analysis using steps discussed in this chapter.

3. Findings

More than 30 studies on Social media considering mainly risks & rewards were identified which cover many aspects of social media. Types of studies used are scientific articles, reports, empirical studies, case study, survey, white paper etc. Each study was reviewed by analyzing the context of the study, research questions, and empirical confirmation of the result. The studies cover a range of research topics with social media platforms and were conducted with a multitude of research methods. Firstly, this systematic study is divided into main categories.

- Social media introduction & Adoption
- Rewards & benefits.
- Risks and security threats
- Comparative studies

These categories are further divided into different parts of social media called as a unit which covers multiple aspects of risks and rewards.

- Privacy concerns
- Legal Polices, Regulations & their implications
- Social media data and security
- Communication platform for business
- Other risks, challenges and threats
- Other benefits, Opportunities and rewards

Next section defines the attributes of studies found in digital libraries.

3.1 Literature attributes

Number of papers used for research were published during year 2004-2013, it was observed that more of articles were found after year 2006. And most papers were found in year 2011 and 2012.

Types of research literature were also important, and it was carefully seen that all the types of articles should be included in this research such as Empirical research, industry reports, surveys, case studies, and other Internet article which are written by professionala. In this research, it was noted that more of empirical research is involved in social media issues.

3.2 Analysis and Summarization of Studies

In this section, all research from 2004-2013 are studied thoroughly to analyze and summarize individually and combined in summarize table.

3.2.1 Analysis of security risks & rewards aspects in Social media (units)

To provide a summary of the included articles, several units of “security issues & rewards” in social media” were identified. These units serve as the basis for the analysis. The formation of

units of analysis was done by identifying the theme emerging from each selected study. Each article's title, abstract, keywords, research methods, and conclusion were studied to depict the main focus of the study; which finally intended to define the particular unit of analysis of the reviewed research paper.

The identified units including its subcategories are shown below:

- A. Privacy Concerns
 - a. Disclosure of Personal/private information
 - b. Cyber bullying
 - c. Misuse of individual private data
 - d. Health care professional and patient issues
 - e. Teenagers, adolescents risks
 - f. Disclosure of company's confidential information

- B. Communication platform for business
 - a. Marketing & Sales campaign
 - b. Promote brands and products
 - c. Semantic Advertisement
 - d. Social media commercial usage

- C. Legal Policies, Regulations and their implications
 - a. Advertisement standard rules & regulations
 - b. Obstacles in applying compulsory regulation

- D. Other risks, Challenges and threats

- E. Social media data and security
 - a. Data travel over insecure networks
 - b. Encryption and Decryption of data
 - c. Social network architectures
 - d. Client web browsers attacks
 - e. Data server machines security attacks
 - f. Malicious content

- F. Other benefits, Opportunities and rewards
 - a. Personal Platform
 - b. Enhanced/fastest communication method
 - c. Social media use in the government & agencies

3.2.2 Summary of Research studies

These 30 studies were analyzed based on units of analysis and organized into tables for complete review.

A. Privacy Concerns

Top most risks of social media platforms are privacy issues and most of research papers found elaborates the privacy problems and their solutions. In this research, around 37 papers found on privacy concerns, in which important were chosen. They mainly discussed disclosure of personal/private information, cyber bullying, misuse of individual private data, healthcare professional and patient issues, teenagers and adolescents risk. Table 4 summarizes the analysis of papers.

Table 4. Unit of Analysis - Privacy Concerns

Study topic/area (summary)	Research approach	Type, Ref
Privacy threats, distrust of Social Media, strategies to address privacy threats, disclosure of personal information	Empirical	Paper, (Boyd, 2011)
Facebook depression, online harassment, sexting, lack of privacy, sharing too much information, position false information about themselves or others	Empirical studies	Report, (O'Keeffe & Clarke, 2011)
Privacy implications for both employees and employers, inappropriate disclosure of private and confidential information, human rights complaint, criminal charges with respect to obscene or hate materials, workplace grievance under a collective agreement or unfair labor practice, damage to the employer's reputation and business interests, defamation. discrimination, Harassment and invasion of privacy.	Case Studies	Article, (Clark, 2010)
Misuse of status messages, vulnerability of data from third party applications, Spam hoaxes, URL shortening (obfuscation)	Empirical research	Paper, (Dinerman, 2011)
Adding unknown people in friend list, third-party malicious social network applications, War machines - e-threats targeted at social networks e.g. Koobface worm, Lifejacking, highly addictive, growing threats on mobile platforms (Android, etc.)	Industry experience	Article, (Cosoi, 2011)
Oversharing, information aggregation, risks through direct disclosure, social network design risks	Empirical	Journal article, (Rose, 2011)
Blurring the public/private line, hybrid nature of Net culture, Net speech and broad dissemination, Unauthorized use by third parties, Prospective employers danger, Corporate opportunists, organizational issues	Industry experience /Case study	Article, (Rosenblum, 2007)
Teen privacy and autonomy, transparency, parents are unfamiliar with technology, controlling teens over and wrong usage of social media	Survey	Conference article, (Yardi et al., 2011)

B. Communication platform for business

Communication is main part of the businesses, which includes branding, sales strategies, advertisements, etc. Due to arrival of social media platforms, marketing has been become tougher as well as beneficial to companies. Tougher in sense, it became complicated for old style companies to use online marketing strategies as they requires new skills, resources and money as well. There is no doubt, online social marketing is so much rewarding that is worth to spend money and efforts and also mandatory to excel in market. This new type of social marketing gives opportunities to reach masses unlike traditional print media marketing based on user interested content and semantic advertisement. Considering the social media marketing benefits, other issues and implications comes with that. In this research, around total of 13 articles found and few of important articles are discussed. Table 5 summarize the analysis of papers

Table 5. Unit of Analysis - Communication platform for business

Study topic/area (summary)	Research approach	Type, Ref
<p>Rewards: Medium for marketing and developing a company, effective and powerful business tool, promote brands or products</p> <p>Risks: Rules & Regulations from Advertising Standards Authority, misuse of social media in the contexts of advertising, obstacles to compulsory regulation</p>	Case Study	Article, (Hutchings, 2012)
<p>Rewards: Customer service (connects people with professionals e.g. doctors, trainers, etc.), Small business growing opportunities to compete in market.</p> <p>Risks: Caveats - Too many social media platforms, targeted audience, required skills to achieve goals, cost, time consuming and regular maintenance</p>	Industry experience	Article (Gerber, 2010)
<p>Rewards: Platforms for influence, social media marketing ecosystem, Monitoring and analyzing online, social media conference & discussions, Identify and track key performance indicators.</p> <p>Challenges: Still relying on traditional media, double cost and efforts, skills required to maintain social media campaign</p>	Experimental evaluation	Journal article, (Hanna et al., 2011)

C. Legal Policies, Regulations and their implications

Due to rise of advertisement and marketing through social platform, it became complicated to impose the legal policies and regulations that also applied traditional media. It is costly and requires skillset to censor and control social media stuff. Following table summarize the papers related to social media policies and complications.

Table 6. Legal Policies, Regulations and their implications

Study topic/area (summary)	Research approach	Type, Ref
Rules & Regulations from Advertising Standards Authority, misuse of social media in the contexts of advertising, obstacles to compulsory regulation	Case Study	Article, (Hutchings, 2012)
Good implementation strategy needed to realize these benefits and to avoid risks; social media highlights the importance of updating laws and regulations, and of promoting changes in government culture and organizational practices, lack of digital literacy, Difference in communication styles, Inappropriate use of social networks, Degree of government openness, Freedom of information regulations and practices, Lack of a regulatory framework for the activities related to social networks, Repetition of content in several platforms, reliability of the platform, blocking of social networks by government	Empirical studies	Journal article, (Picazo-Vela et al., 2012)
Access and social inclusion, Privacy, security, accuracy, and archiving, Governing and governance	Experimental evaluation	Journal article, (Bertot et al., 2011)

D. Other risks, Challenges and threats

Table 7. Unit of Analysis – Other risks, challenges and threats

Study topic/area (summary)	Research approach	Type, Ref
Anonymity- phishing scams by malicious individuals (e.g. malware tiny links and URLs), data leakage is more common things done by individuals, employees, and business & organization, legal problems for employees and organizations, tackling the new kinds of problems	Industry experience	Article, (Everett, 2010)
Misused of status messages, vulnerability of data from third party applications, Spam hoaxes, URL shortening (obfuscation)	Empirical studies	Paper, (Dinerman, 2011)
Challenges - Choosing carefully social media platform, pick the application or make your own, Ensure activity alignment, media plan integration, access for all/few	Case studies	Article, (Kaplan & Haenlein, 2012)
War machines, e-threats targeted at social networks e.g. Koobface worm, Lifejacking, highly addictive, growing threats on mobile platforms (Android, etc.)	Industry experience	Article, (Cosoi, 2011)
Lack of digital literacy, Difference in communication styles, Inappropriate use of social networks, Degree of government openness, Freedom of information regulations and practices, Lack of a regulatory framework for the activities related to social networks, Repetition of content in several platforms, Reliability of the platform, Blocking of social networks by government	Empirical	Journal article, (Picazo-Vela et al., 2012)
Challenges - Access and social inclusion, Privacy, security, accuracy, and archiving, governing and governance.	Empirical research	Journal article, (Bertot et al., 2011)
Still relying on traditional media, double cost and efforts, skills required to maintain social media campaign	Experimental evaluation	Journal article, (Hanna et al., 2011)

Table 8 continues with summarizing risks, challenges, and threats.

Table 8 (cont.) other risks, Challenges and threats

Study topic/area (summary)	Research approach	Type, Ref
Social media impacts on military operations, developing the combine strategy using social medial, ways of moving information through social media, speed and transparency of information, ability to understand the environment, communicate more effectively		Article, (Mayfield & T. D, 2011)
Security and confidentiality of patient's information, difference of social data and health data, and the importance of the truth of information and the credibility of users that involved in health community.	DSR	Conference article, (Ibnuaim et al., 2012)
Trust, security and privacy issues are major security concerns in multimedia social platform such as photo and video sharing when handling personal media objects in the long-term perspective. Users are doubtful to rely on these platforms, their operators and as well other users considering the lifetime availability, access control & usage policies, metadata security, and overall issues.	Empirical research	Article, (Fritsch et al., 2008)
Privacy management tools are difficult to understand and used by novice users correctly, lack of usability and user experience in privacy tools can void the privacy of SNS members, successful design of privacy tools in social media platforms.	Empirical, DSR	Article, (Dwyer et al., 2008)
Significant usage of SNS at workplace, impacts on employee's behavior and his performance, unrealistic and hastily post effects on future life, peer pressure to disclose information, unintentional social undermining.	SLR	Conference article, (Wang et al., 2009)

E. Social media data and security

Table 9. Social media data and security

Study topic/area (summary)	Research approach	Type, Ref
Attacks on webservice/server machine/client browsers, attacks result from a fundamental flaw in the design of social networking Web sites, too much freedom is given to Web users, techniques to restrict malicious content.	Experimental evaluation	Article, (Ur et al., 2009)
Social network data transmission architecture, data encrypting and decryption, legal framework for privacy protection	Design Science Research	Article, (Lucas & Borisov, 2008)
Anonymity- phishing scams by malicious individuals (e.g. malware tiny links and URLs), data leakage is more common things done by individuals, employees, and business & organization, legal problems for employees and organizations, tackling the new kinds of problems	Industry experience	Article, (Everett, 2010)
Vulnerability of data from third party applications, Spam hoaxes, URL shortening (obfuscation)	Industry experience	Paper, (Dinerman, 2011)
Third-party malicious social network applications, War machines - e-threats targeted at social networks e.g. Koobface worm, Lifejacking, highly addictive, growing threats on mobile platforms (Android, etc.)	Industry experience	Article, (Cosoi, 2011)

F. Other benefits, Opportunities and rewards

Table 10. Other benefit, Opportunities and rewards

Study topic/area (summary)	Research approach	Type, Ref
Children and Adolescents enhancing communication, broadening social connections, and learning technical skills.		Report, (O'Keeffe & Clarke, 2011)
Fastest communication service		Article, (Everett, 2010)
User generated content, web 2.0 - social networking (collaborative projects, blogs, content communities, social networking sites), virtual worlds (virtual game worlds, and virtual social worlds)		Article, (Kaplan & Haenlein, 2012)
Advertising and self-promotion, Users and friends (You can meet person in world, musician, artist, etc.), Social predators, Site operator responses.		Article, (Rosenblum, 2007)
Interactivity, transparency, and openness of public sector entities and to promote new forms of accountability, Blogs, Wikis, Social networks, YouTube, LinkedIn Career communications,	Case Study	Article, (Bonsón et al., 2012)
Improved communication between citizen and Governments through social media participation, more transparency, and transfer of best practices among government agencies.	Empirical	Journal article, (Picazo-Vela et al., 2012)
Democratic participation and engagement, Co-production, crowdsourcing solutions and innovations.		Journal article, (Bertot et al., 2011)
Communication between doctor and patient, easy and frequent way to discuss the patient issues, alternative to solve communication problem in health sector, quality and frequent communication is helpful to patient recovery.	DSR	Conference article, (Ibnualim et al., 2012)
Easy way of connecting with co-workers, getting to know other employees, short break for using Social networking site (SNS) and leisure Internet browsing may help to refresh employees, awareness of colleagues and build professional relationship to excel in career.	SLR	Conference article, (Wang et al., 2009)

4. Discussions

This section discusses the answers found to the research question defined in the earlier chapter.

RQ. What are the main security risks/threats against opportunities / rewards recognized in social media so far?

The purpose of this research question is to identify the currently known risks/threats to social media platforms which in terms of benefits/advantages are impossible to avoid. Social media is a topic that had been a part of Internet quite a long ago, so therefore in this literature review, we limited our research from 2004-2013, period of ten years which has been crucial period for social media as there have been so many social media network platforms, launched by small, mid-size companies and as well individual developer vendors. To answer this question, there are 30 papers altogether in this research which discusses the crucial security risks, opportunities etc., and are common to both individual and businesses as well.

Boyd's analysis of the extracted data revealed that most of the papers in this scope mainly focused on privacy threats, malicious content and attacks on user and server machine. This search started with privacy issues, and further examined one by one. The main results of this study came out that, over a 10 year period between 2004 and 2013, issues of privacy concerns and distrust of Social Media Sites increased significantly, while their disclosure of personal information and willingness to connect with new online friends decreased significantly. Boyd further examined the issue by interviewing some of the respondents, where they believed these changes as an indication of users developing ad-hoc risk mitigation strategies to address privacy threats. (Boyd, 2011).

McBride argued that Adolescents and teenagers have many advantages of social media which are broadening of communication networks and social connections, and attaining variety of technical skills if used correctly but it can also expose them to the darker side of social media, such as cyber bullying, "Facebook depression," and "sexting and other personal health issues that includes Internet addiction and concurrent sleep deprivation, depression, & fear. (McBride, 2011) McBride further believed that Cyber bullying is a common phenomenon; according to a survey conducted by Common Sense Media, 19% of teens complain that they have been harassed online or cyber bullied, and 38% know of someone else who has been which can lead these teens to darker aspects of their life such as anxiety, depression, and suicide. (Common Sense Media, 2009) Sexting is also common in teen community. Examples of sexting are widespread distribution of such photos via cell phones and computers that may result in emotional distress, school suspension, and many legal problems. Sharing too much of one's information and giving false information about themselves or others are some of the privacy issues. McBride also coined the term "digital footprint" which is the collective, ongoing history or record of one's web activity. When users visit several websites, they leave behind record of which sites they have visited. (McBride, 2011)

Clark acknowledged the fact that the explosion of social and professional networking sites such as Facebook and LinkedIn; media-sharing sites such as Flickr and YouTube; blogging sites such as Blogger and WordPress; and even forum sites such as Flightweb and JustHelicopters has created a magnificent cycle for both voluntary as well as accidental dissemination of damaging, and possibly illegal information on the World Wide Web. Clark mentions that a two-sided conundrum

exists in such case. First are the issues faced by employers which are the failure of policy and appropriate education for employees to move in accordance with the rapid growth of social networking media? Second is the issue of employees identifying and understanding their increased dimension of responsibility in our digitally driven world. (Clark, 2010)

Clark also suggested that employees should take precaution while sending inappropriate postings. They can self-check the postings and make it a non-issue so that it may not result in any kind of defamation, discrimination, harassment, and invasion of privacy. They can make out a positive shift from such firing issues by taking a leap of knowledge, because knowledge is the only powerful tool that can be used by employees to post positively. They may take the advantage of opportunities offered by social media but with certain responsibility to avoid liabilities involved. (Clark, 2010)

Dinerman mentioned the security implications that should be kept in mind while using social networking sites. There is no denying of the fact that Facebook, Twitter and LinkedIn can be used for professional networking and job searches, they can also be utilized to increase sales revenue and as a tool to keep the public informed of safety related issues or as a way to reconnect with friends from around the globe. However, keeping in mind the security implications, one must remember that these tools come with security concerns which can put your information systems and/or personal data at risk. The common risks involved are status message being misused and allowing third party applications may take most of private/friends data that can be misused, and can also be used in spam hoaxes. (Dinerman, 2011).

Furthermore, there are some other privacy issues that may be a threat to personal use of social media for example adding unknown people in friend list, third-party malicious social network applications, and War machines- e-threats targeted at social networks, Koobface worm, Likejacking. They are the very recent issues discussed in public forums these days, because family and employers are equally affected by social network platforms. Therefore employers are trying to tackle overuse of social platforms during work hours.

Rose pointed out other serious security issues, which are easily transferred information between different social media sites; information that should be private often becomes public and opens the users to multiple venues of serious security threats. In addition, there is a bombardment of over-shared information by the users of these sites, combined with location-based information which would be ultimately aggregated, and can cause unavoidable risks and unintended consequences for users. (Rose, 2011)

In this regard, Rosenblum also indicated the disappearance of line that separates public from private because easy to access posted content can be reviewed by anyone with an interest in the users' personal information, resulting in loss of privacy. This indicates the hybrid nature of Net culture, net speech and broad dissemination. (Rosenblum, 2007)

Here Clarks suggested further concerns, such as privacy or human rights complaint, a workplace grievance under a collective agreement or unfair labor practice complaint, criminal charges with respect to obscene or hate materials, or damage to the employer's reputation and business interests, defamation, discrimination, harassment, and invasion of privacy (Clark, 2012).

On the other hand Lucas & Borisov mentioned some other issues, such as “legal issues and risks, attacks on webserver/server machine/client browsers using multimedia HTML/script content, military operations risks, travelling of data without encrypting and decrypting sensitive data over vast networks, social network platform architecture design & policy issues, other caveats can be making online strategy, targeted audience, cost and human resource need to delegate social media activities, SEO, which involve skills and high level maintenance to get advantages of social media.” (Lucas & Borisov, 2008 p. 9)

In this regard, Hutchings further elaborated that sometimes legal issues becomes very important for employer and its business. He gave an example of ASA (Advertising Standards Authority), where rules & regulations applies the traditional polices on advertisements that applies on Print media which can affect way social media provide Advertisement system. He also mentions some of the other Employer concerns which are misuse at work, commercials value of followers list, that employee who has built up a substantial list of followers through a company Twitter account, departs the business and seeks to take the followers to a new account and gain benefits for his personal use. (Hutchings, 2012)

HTML tags that were considered as dangerous can be used maliciously to launch distributed denial of service attacks, as a channel to deliver command and control to bot-infected computers and to cause denial of service and extremely high memory usage on resource constrained browsing devices. While these attacks can be detected and identified, and also prevented reactively using previously-developed techniques, it can be argued that the attacks result from a fundamental flaw in the design or making of social networking Web sites; too much freedom is given to Web users on the profiles and pages of other, much more popular, users. It is therefore concluded that social networking Web sites must apply some techniques to restrict content posted by arbitrary Web users on the profiles of other users in order to decrease the possibility of the attacks (Ur et al., 2011).

Mayfield & T. D further suggested that with the increase in speed and transparency of information, social media and new media are changing the ways information moves around the world. A successful adaptability to such changes will result when one becomes the commander. One needs to develop certain strategies to take advantage of the changes and deny the enemy exclusive rights to the same. Some innovative strategies that incorporate the lessons already learned in the social media environment will allow the Armed Forces to improve their ability to understand the environment, communicate and respond more effectively, and generate unity of effort throughout this great battlefield of information overloaded. However, due to disinformation on social things can tell a bitter truth and portray the wrong side of story. During recent middle war crisis, social media played huge part of role, lies and disinformation had been passed through out people. (Mayfield & T. D, 2011)

Advantages of social media considering security challenges

Social Media Services (SMS) are significant players in the Web 2.0 environment, transforming communication practices, opening new spaces and processes of socialization and impacting upon traditional social structures. These effects are particularly relevant for the most frequent users of SMS who are mostly young people. This new environment poses certain challenges, and like any setting for social interaction has some implicit risks. However, this research verifies that these

challenges and risks have been over-emphasized in recent years both in popular media and social research.

As McBride informed the advantage of social media by pointing out that today all young people and adolescents develop the skills to critically understand, analyses and create media content due to increased internet and media literacy. The negative consequences can be overcome and risks can be mitigated by realizing many benefits associated with use of SMS. In other words, by maximizing the benefits of SMS, whether it be their role in delivering educational purposes, or facilitating supportive relationships, health care support, identity formation and increase of self-esteem, or a sense of belonging and resiliency. Through the realization of such exclusive benefits, many of the risks of online interaction, such as cyber -bullying, privacy breaches and predation can be minimized. (McBride, 2011) For this more research should be undertaken to ensure that emerging practices and effects of SMS are understood and responded well to the risks and opportunities they present.

Possible ways to avoid security risk/threats social media

Despite their advantages to workers and business processes, many organizations are still hesitant to adopt social media technologies because of major security concerns. Over half of organizations worldwide prohibit the use of social media in the office. But today more workers are demanding to be allowed to use these technologies to conduct business and form business collaborations with coworkers. When organizational policies prohibit the use of these technologies, workers simply ignore the policies.

Organizations feel powerless to prevent this behavior. Moreover, at the same time, companies cannot continue to ignore the clear benefits that social media provide in productivity and worker morale, particularly as more of their competitors start adopting social media in their business processes. Such organizations need to change their view towards social media and security. Instead of developing new policies specifically for each new technology, organizations can develop and implement proper security policies and end-user training programs that are broadly applicable. The same general behaviors that protect end-users in when using the traditional Internet and email are effective in mitigating major social media threats as well.

Additionally, Maxwell also suggested that organizations need to empower their policies by putting an investment in upgrading security tools that are well suited for the social media environment. (Maxwell, 2011) Some of the important ways to avoid security threats are desktop security i.e. lock their computers when the users walk away, password security, which means everyone should avoid using weak password, instead it should be combination of different characters. Phishing attacks are very common, and unfortunately often very effective. Security awareness training should provide examples of phishing attacks and emphasize proper precautions (e.g. disregard and delete suspicious electronic messages and avoid clicking on links provided in e-mail and other communications). Brodie and Cindy suggested the idea of having users take a phishing IQ test. (Brodie & Cindy 2009)

According to Brodie and Cindy, to safeguard malware, training of prevention, identification, containment, and eradication of malware and a malware infection is given to employee and individual during their studies. (Brodie & Cindy 2009). For example, employees should ensure up-

to-date antivirus and antispymware. During the employment process, Internet policy should be given before sign in their contract and this policy should be carefully designed by organization and companies.

Moreover, McBride claimed that it is important to increase knowledge of digital technology in children, adolescent, and young people for the safety and beneficial usage of social media. Such educated frame of reference will aid in providing timely anticipatory media guidance and diagnosing media-related issues should they arise. Other security laps can be avoided by introducing the sufficient authentication controls, safely handling the messages, good privacy policy, and safe browsing. For example, health care workers with Web sites or blogs can also create a section with guided resources for parents and children about these issues where they can educate them, and suggest a list of links to social media sites that are appropriate for different age groups. (McBride, 2011)

5. Conclusions

The thesis advances a systematic review of literature on Security Risks/Threats & Rewards in Social Media. The aim of work was to find out known opportunities/benefits/rewards and challenges to social media platforms. During this process, available literature between 2004 and 2013 was thoroughly reviewed. It was identified social network platforms and usage that has tremendously grown so fast at both individual and organization level, considering the threats and security risks. So therefore, this literature found the important security lapse which is causing the social media troubles in individual life and organization level. This thesis research can be useful to certain level of people who are part of building of social media platforms and also research purpose.

The review was conducted by following the guidelines of Kitchenham and Charters. (Kitchenham & Charters, 2007) It fulfilled all the requirements of standard systematic review. The defined search strategy identified 412 articles, of which 30 papers, published between years 2004-2013, were included in the review as primary study papers.

This thesis answered research question which is defined in the review protocol and achieved the set aims and objectives. The results of the review were presented in several stages. Initially, the studies were identified, and analyzed into categories/units and subcategories that includes Opportunities/Rewards & Social benefits, privacy concerns, social media commercial usage, legal obligations & issues, user (client) and server machine risks, data protection and information security risks, impacts of social media on modern world and warfare. Quantitative data presentation showed year wise distribution of published papers and types of studies based on the used research method. In the following stage, these units were studied from available list of papers and a summary of the included articles was presented in finding chapter in tabular format. In the last stage, data extraction and synthesis was carried out in order to find answer to the research question.

The results of review showed most concern aspects of social media. They were mainly privacy issues which were both problems for individuals and organizations. Privacy concerns found in papers were distrust of social media, identity theft & misuse, disclosure of personal/company information, issues related to teenagers and adolescents, e.g. Cyberbullying, too much sexting, Facebook depression, lack of privacy, sharing too much information, position false information about themselves or others, transparency, parenting concerns. Apart from family & individual privacy, it was main issue of corporate world where employee and employers were continuously concerned. For example, inappropriate disclosure of private and confidential information, human rights complaint, criminal charges with respect to obscene or hate materials, workplace grievance under a collective agreement or unfair labor practice, damage to the employer's reputation and business interests, defamation, discrimination, harassment, and invasion of privacy.

Other issues has been analyzed which are kind of technical issues of social media platforms which were avoided gradually as social media platforms started growing. For example, policies of social media for individual and businesses, level of privacy, its authentication and authorization, marketing & promotion policies, social network data transmission architecture, data encrypting and decryption, legal framework for privacy protection, unauthorized access, etc.

Appropriate trainings & policies can be applied to avoid these issues and gain most of social media platforms.

5.1 Limitation of Study

During the thesis writing process, hindrance and limitation were identified and discussed in following section. Considering the whole research process, main limitation were nature of research method i.e. SLR, selections of keywords and refining during process, selecting digital libraries for search, different results with different keywords, number of papers available in between 2004 and 2013 and their selection, accessibility and data extraction process. SLR is process of analyzing and finding the results from available literature. Limitation occurred due to SLR in which only research articles should be included, book chapters were avoided, and research protocol should be used.

Considering the topic i.e. Security risks/threats and rewards of social media, selection of keywords were cumbersome, and produced different results in different digital libraries. Each time, every keyword with different combination was tried to search accurate and related available literature. Therefore, in keywords selection and refining process, there is possibility of exclusion of research articles. However, search was tried with every combination to get best possible results.

After searching good number of papers, it was very time consuming process to select primary papers of studies and data extraction through all papers. Since the review was conducted by an individual researcher, there is potential chances of comparison with review conducted by several researches. In order to tackle this biasness, the author carried out some tasks twice to ensure the quality of the work. For example, reading the abstract was conducted twice to minimize possible mistakes by author. However, to minimize the study due to research time and number of articles limitation, there were chances to exclude some articles which can be directly or indirectly related to topic of research.

Another issue found was publication biases that mostly likely and cited articles were included, as there were hundreds of research papers found in search results. Articles, which were less cited and came in end of results were excluded because of the time limitation as it was not possible to analyze every article present in this time period.

5.2 Future Work

Although results were quite comprehensive and review provided social media risks and rewards as whole, some suggestions for further research have been provided in order to enhance the review results.

First of all, due to the limitation and research done by individual researcher, it was not possible to provide the comprehensive literature on social media risks and rewards. Therefore, it is possible to research each of major social media platforms individually and combine the results. The review covered risks and rewards, not individual social media platform issues. For example, major social media platform which gained lot of attention are Facebook, Twitter, Google+, Blogs platforms,

etc. These platforms can be studied separately, and their literature can be combined and synthesized together to understand risks & rewards.

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Appendix

Appendix A

Table 13. Literature Review Steps

	Steps
1.	Understanding the topic background
2.	Find out research question
3.	Search keywords a. Finding out main keywords b. Combination of search keywords
4.	Search a. Test Search b. Actual Search
5.	Articles Selection a) Finding primary articles b) Related to topic and answers to research question
6.	Accumulate data with descriptive summarization
7.	Writing results

Appendix B

Table 14.

Article selection criteria	
1. Article relates to Social media security risks/threats and rewards.	True/False
2. Article answers to question in some means	True/False
3. Article presents enough evidence to answer question	True/False
4. Article concludes with information related to topic of thesis.	True/False