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USING THE TWITTER PLATFORM AS A RESEARCH METHOD IN THE INFORMATION AND SOCIAL MEDIA AGE

Research full-length paper

Big Data and Business Analytics Ecosystems

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Abstract

Within the context of social media there are rich and massive qualitative sources of data. The intense volume of data produced by social media comprises a promising resource for studying socially constructed language, interactions and behaviours. Research utilising data from social media offers a useful alternative to traditional research methods, which are often restricted and limited by theoretical and methodological boundaries. Social media data are characterised by a qualitative and unstructured nature of using words, either written or spoken, that naturally leads to using a qualitative approach. With social media, researchers immerse themselves with captured social media data as 'text'. Such involvement poses challenges to researchers, and in particular to identify and locate appropriate data to be collected and develop an appropriate research design that analyses data to its full potential with valid findings. This study contributes methodologically to qualitative research and extends traditional qualitative methods to include the social media platform of designated hashtag of Twitter. Two cases of Organic and Semi-organic Twitter Data are discussed along with research implications and limitations.

Key words: e-government, satisfaction, Twitter, ubiquitous.

1 Introduction

This study contributes to the methodology of qualitative research, illuminating the use of social media platform of Twitter as a research method in general, and a research approach towards the study of Information Systems (IS) in particular. There has been a continuous increase in the number of Internet users (Internet World Stats, 2012), and in particular in users focused on the use of social media applications, which have been consistently adopted by various age groups (GlobalWebIndex, 2014). Thus social media is a promising venue for conducting research by utilising and understanding social media data on these social platforms. On the other hand, the nature of social media data, with its massive volume and unstructured format, poses challenges to the analysis process, to how value might be created and to addressing ethical issues associated with its use.

Utilising social media for the purposes of conducting research strongly influences research methodology. The context of social media and the nature of data produced and exchanged by using such media impact the research design, in contrast to traditional approaches and methods in which the research design impacts the nature of produced and collected data. Traditional research methods usually focus on direct interaction between the researcher and the participants in order to collect data. Different forms of traditional research methods including interviews, observations, ethnography and quantitative studies using questionnaires: all of which require the researcher to be personally involved from the early stages of designing and developing the research instrument, to the process of analysing

and validating the data. With social media, researchers have the option to observe and investigate social interaction in a specified context by capturing and analysing social media interactions without being personally involved. Thus, researchers immerse themselves with captured social media data as 'text'. Such involvement poses challenges to researchers, in particular to identify and locate appropriate data to be collected, and to develop an appropriate research design that analyses data to its full potential, in order to best address the research questions under consideration with valid conclusions.

Within the context of social media there are rich and massive qualitative sources of data in the form of social interactions, behaviours and exchanges. The intense volume of data produced by social media use comprises a rich and promising resource for studying socially constructed language, interactions and behaviours. These data are characterised by a qualitative and unstructured nature that manifests in the form of social interactions using words, either written or spoken, that naturally leads to using a qualitative approach in this study. Social media data in the form of textual data has the distinctive features of text described by Krippendorff (2013) as 'text means something to someone, it is produced by someone to have meanings for someone else, and these meanings therefore must not be ignored and must not violate why the text exists in the first place'.

We begin with a short review of user satisfaction in the context of information systems to expand our understanding of this construct. We also review using social media as a tool in conducting research. After discussing data collection and analysis, we present our two studies, with our research findings. We then discuss contributions to methodology and the limitations of this research, followed by conclusions.

2 User Satisfaction

Many previous studies consider the use of user satisfaction as a surrogate measure for IS success, and have devoted effort to develop and validate instruments to measure such a construct (Bailey & Pearson, 1983; Baroudi & Orlikowski, 1988; Ives, Olson, & Baroudi, 1983; Doll & Torkzadeh, 1988). In information systems context (IS), identified satisfaction measures in the literature use scales to measure users' satisfaction. These measures are developed using statistical methods to assess the correlations between variables, and reflect the positivist paradigm. This approach of quantitative research was dominant until the mid-1990s, and was considered the only scientific and rigorous approach to conduct research (Sarker, Xiao, & Beaulieu, 2013; Orlikowski & Baroudi, 1991). Subsequently, IS discipline has moved to adopt various philosophical assumptions to enhance understanding of IS phenomena, and in particular to consider the importance of interpretive research in IS, as this produces insights difficult to obtain by quantitative research (Orlikowski & Baroudi, 1991; Gephart, 2004; Walsham, 2006; Bansal & Corley, 2011). In this study, social media data is utilised, captured and analysed in order to help us to evaluate e-government IS in terms of users' satisfaction and perceptions, which in turn are used as indicators to measure IS effectiveness (success).

End-User Computing Satisfaction (EUCS) is considered a well-established instrument to measure user satisfaction (Doll & Torkzadeh, 1988). EUCS conceptualised that user satisfaction can be explained by five constructs: Content, Accuracy, Format, Ease-of-use and Timeliness. The validity of EUCS has been confirmed by multiple studies and it is used as a standardised measure for user satisfaction (Doll, Xia, & Torkzadeh, 1994; McHaney, Hightower, & White, 1999; McHaney, Hightower, & Pearson, 2002; Somers, Nelson, & Karimi, 2003; Harrison & Rainer, 1996; Seddon & Yip, 1992). Thus, EUCS is used to form an initial understanding in this study to explain satisfaction and to carry out the hermeneutic analysis.

3 Twitter Platform

Twitter is employed to provide empirical materials for this study. The micro blogging feature of Twitter allows users to exchange short messages of up to 140 character 'tweets' that can include photos, videos or conversations, and the hashtag (#) feature that organises information into a particular topic constitutes the core data collection method in this study. Also, exchanges using Twitter fit with the framework of social exchange theory (SET) (Blau, 1986), which is the adopted theoretical framework to understand social media data of Twitter and explain satisfaction formation as investigated in this study. Another important feature that distinguishes Twitter from other social media is connectivity, as it works as a broadcast channel that allows its users to follow other public Twitter accounts without privacy and invitation restrictions. Twitter is simply about 'keeping you updated', a feature that has importance in the context of e-government and public sector organisations in order to communicate with the public regarding provided information and services. Other social networks are more about closed social friendship networks, typically with restrictions to provide privacy. Using Twitter in the context of conducting research has been employed by many researchers as a way to understand the nature and influence of interactions on social media (Jansen et al., 2009; Kassens-Noor, 2012; Rui, Liu, & Whinston, 2013).

Various studies have utilised social media platforms for conducting research, including studying social relationships (Mamic & Almaraz, 2013; Lee, Oh, & Kim, 2013), virtual ethnography (Carter, 2005), and measuring and evaluating the impact of electronic word of mouth in marketing (eWoM) (Jansen et al., 2009; Hu, Liu, & Zhang, 2008). A briefly review of approaches to social media research allows a holistic picture of how social media has been utilised methodologically in previous research. There are various methodological approaches to social media, but mostly are qualitative in nature, such as blogs analysed using a meaning extraction method (Argamon et al., 2007), Twitter adopted as a qualitative research method (Chew & Eysenbach, 2010; Dann, 2010; Marwick & Boyd, 2010), in an experimental setting (Kassens-Noor, 2012), and data analysed using content analysis and grounded theory approach. Also, Twitter is employed for data mining and clustering approach (Lee & Chien, 2013), and online communities studied as netnography, which is an ethnography approach for studying cultures and communities within cyberspace (Kozinets, 2002). Social networks, such as Facebook and LinkedIn, data are employed for qualitative discourse analysis approach (Papacharissi, 2009).

4 Data Collection and Analysis

In this study, we presented and illustrated our two studies of utilising Twitter social media platform as a promising research method for conducting research, these being the Oyster and Ambassador cases, which were identified on the basis of theoretical sampling. Theoretical sampling is defined as 'a means "whereby the analyst decides on analytic grounds what data to collect next and where to find them."' (Strauss, 1987). Thus, the researcher decides what data are needed and how this can be collected based on the theoretical purpose and contribution the researcher aims to achieve. Also, identified e-government systems need to be in a mature stage, as advised by Gupta and Jana (2003), in order to evaluate e-government IS effectiveness adequately. The Oyster system provides fully-automated services to its users, while the electronic services provided by Ambassador system are not fully automated, as placed electronic requests need to be processed later. An important consideration in such systems is the role that human intervention plays in processing requests.

Data for both cases was collected over an eight months period starting in September 2014 and finishing in April 2015. Contextual Twitter data was collected using specific software for the Oyster study, with the motive to use it to support the research methodology and allow manual collection for the Ambassador study. For the Oyster study, data was harvested by using hashtags and keywords as explained in the following section. In the Ambassador Study, a twitter hashtag was launched in the Arabic language as it is the native language for Ambassador users. Therefore, the researcher had to

collect tweets from participants manually, as available software for collecting tweets automatically does not support the Arabic language.

Thus Twitter data were collected using specific hashtags and keywords in order to ensure that collected data was organised around and related to the research issue. Research methods for collecting data usually focus on identifying appropriate research participants, typically in the form of identifying particular groups of participants or a representative sample of the target population. Using social media with the focus on Twitter enables data collection from a wider range of participants in a particular context without any prior identification, and produces a comprehensive picture and understanding of the issue under investigation and how it is perceived by participants. Instead of identifying research participants a priori, users of e-government that use Twitter have the opportunity to contribute their perceptions and experiences of e-government, which allows the researcher to reach more participants and have a wider understanding of the issue under investigation. Textual data generated by using Twitter in the forms of social interaction and communications are used as a primary data source.

Using hashtag sampling as a theoretical sampling technique ensures that collected data are relevant to the research issue. It is also important to note that such an approach to data collection implies that collected data is limited to social media users, in particular to the participants of a particular hashtag on Twitter. Figure 1 below clarifies the age distribution of Twitter users.

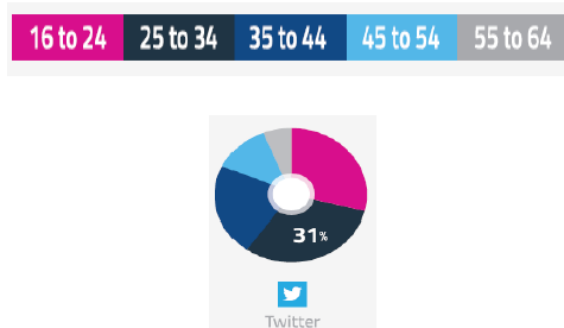


Figure 1. Active Users of Twitter Around World, by Age, Adopted from GlobalWebIndex (2014).

In this study, we adopt a qualitative research approach with 'interpretive' underlying philosophical assumptions that are underpinned by socially constructed knowledge. This is accomplished by various interpretive practices being carried out by the researcher, who aims to understand social reality from individuals' perceptions. Applying an interpretive perspective allows analysis of the meaning of the 'tweet', instead of quantifying 'tweet' type. Thus themes, constructs and variables are uncovered and extracted in an inductive approach in order to understand the dimensions of satisfaction of users of IS. This allows the researcher to measure satisfaction based on variables derived from a bottom-up approach in which variables are identified and extracted from social interactions of participants, in contrast to identified and validated scales in the literature of IS, which are usually developed by using variables derived from a top-down approach. The findings constitute a formulation of constructs and variables that are used as a base for measuring users' satisfaction with e-government IS. The analysis process incorporates the context of identified e-government IS, and in the light of that the meaning of data are justified and validated.

For the analysis process, a hermeneutic circle is applied for each tweet, which is interpreted in light of the entire set of collected tweets, and vice versa, until a final understanding of tweets is achieved. We started with the initial understanding of IS users' satisfaction as conceptualised by the five constructs of content, accuracy, format, ease of use and timeliness (Doll & Torkzadeh, 1988). The use of

hermeneutics enabled understanding to continuously evolve from initial understanding until an understanding of sufficient depth is reached. Each tweet or short message of up to 140 characters constituted a strip, which is a term used to label various phenomena as data against which the researcher tests initial understanding (Agar, 1986). In this study, each 'tweet' is considered as a 'strip' to be coded and examined. Individual 'tweets' are short enough by their nature, with a maximum length of 140 characters, and do not need to be segmented. The researcher needs to examine each 'tweet' individually and carry out the coding process inductively and iteratively in light of identified categories. Any anomalous 'tweets' that neither fit into identified codes nor can be used to produce new code leads the researcher to 'breakdowns' of identified categories into subcategories. Each 'breakdown' needs to be resolved by revising identified code 'categories' and adjusting accordingly in order to accommodate any anomaly strip found. This requires the researcher to revise identified categories with emerging subcategories and going back to revisit coded strips to make further adjustments in the light of modified codes. Thus the researcher is involved in a hermeneutic circle of going back to coded strips and making needed adjustments as understanding evolves with each iteration by relating individual meanings of tweets to the whole. Such an interpretive process requires the researcher to use iterative practices of coding, revising and adjusting accordingly. An iterative approach ensures that data are analysed systematically and rigorously (Saunders, Lewis, & Thornhill, 2002). Examining and evaluating the findings from the initial data set through cross-validation across archives of data corroborated the findings.

5 First Case: Organic Twitter Data

Oyster is the ticketing payment system for public transportation across London's travel network, in Greater London, UK, and is implemented and operated by Transport for London (TFL). The system is a publically accessible system and provides fully-automated services to its users, who use it to pay fares for travel and to maintain their accounts. In the Oyster study, organic data were collected by harvesting data (tweets) that already existed, and without intervention by the researcher. Thus, the researcher observed and captured authentic and real social exchanges between a local government organisation, Transport For London (TFL) and its partners, and users of the Oyster system.

For the Oyster study, social media data was harvested using a Webometric tool that searches and retrieves Tweets by accessing the Twitter Application Programming Interface. We harvested Twitter data by using hashtags of `evaluate_oyster`, `TFL`, and `underground`. Also, we harvested data by using keywords including `oyster`, `oyster card`, `TFL`, and `underground`. Harvesting tweets using various keywords and hashtags resulted in a volume of data of 1,577,232 tweets. Using auto-coding to analyse this data and extract constructs did not return useful results. Thus the data was resampled in order to obtain a representative sample of tweets to be analysed manually, with the aim of extracting value and meaning. Analysing the sample of tweets led us to identify the tweets harvested by using the keyword 'Oyster card' as being relevant to our study of capturing users perceptions regarding their Oyster system, and data related to this keyword was then chosen as the main source of data to be analysed. The total number of tweets harvested using the keyword of 'Oyster Card' was 37,814 tweets which were identified earlier to be the main source for data analysis. Because of the large volume of data, we start by analysing just two archives, comprised of 6840 tweets by using hermeneutic circle (Agar, 1986). The extracted constructs thus found will then be used to help filter the other archives, comprised of 30974 tweets, by searching through them using key-word searches. This approach allows us to validate identified constructs across the larger data set of all the archives. We then carry out a constructive interpretive practice on the harvested tweets, in order to learn how IS users perceive and conceptualise their system in relation to identified constructs as discussed follows.

6 Second Case: Semi-Organic Twitter Data

The Ambassador system, developed and operated by the Ministry of Higher Education in Saudi Arabia, allows Saudi students to communicate with the Ministry and Saudi Bureaux in the country

they are studying in. Ambassador provides Saudi students with electronic online services allowing them to place various types of requests electronically, such as financial and educational requests, which are later processed by the Ministry and related bureaux where students are based. The Ambassador study involved the collection of semi-organic data obtained by launching a designated hashtag and asking users to participate without exerting any influence on their responses. We conceptualise this data as semi-organic data, as the researcher was involved in the process, but only in a limited way - asking users to participate.. This type of data is user-generated, as the researcher requested the data, as contrasted to the organic data utilised in the Oyster study, which was organically user-generated with no requests by the researcher.

The designated hashtag allowed the researcher to collect and organise relevant data, so there was a role in establishing the exchanges between the researcher, Ambassador users, and between users themselves. The established and captured social exchanges were analysed, but the researcher could not respond and incorporate identified system concerns for system improvements, but could only observe and analyse these exchanges Social media data was collected using designated Arabic language hashtag (#تقييم_سفير): '#Evaluate_Ambassador' is the English translation. Thus, all collected tweets are relevant and usable and resulted in collecting 297 usable tweets. All collected tweets were in Arabic, the native language of the users, but were analysed and interpreted in English. All included quotations are direct translation to convey user perception of the system and strengthen our argument.

7 Findings

As we utilised the social media platform of Twitter as a research method for data collection, we conceptualised the interaction on this social platform as a case of social exchange (Blau, 1986) for data interpretation, to help us explain and make sense of the collected Twitter data. In this inductive approach, we carry out a constructive interpretive practice on collected tweets using the concept of breakdown resolution, in which each tweet is interpreted in the light of the entire set of collected tweets, and vice versa, until a final understanding of tweets is achieved. The emergent categories and their subcategories from the hermeneutics is presented in Table 1 and Table 2 for both studies of Ambassador and Oyster.

We started with the initial understanding of IS users' satisfaction as conceptualised by the five constructs of End-User Computing Satisfaction (EUCS) of content, accuracy, format, ease of use and timeliness that explain satisfaction formation (Doll & Torkzadeh, 1988). We found that all five constructs of EUCS (Doll & Torkzadeh, 1988) emerged in the Ambassador Study, while only three constructs emerged in the Oyster study: accuracy, ease of use, and timeliness. The three common emerged constructs of accuracy, ease of use, and timeliness were found to be consistent with previous research, as these constructs are considered to be core constructs for system success, regardless of the nature and complexity of the system (Petter, DeLone, & McLean, 2012).

By investigating the construct of content in the two different studies of the Oyster and Ambassador systems, we found that a new meaning emerged. From this we formulated a new interpretation of this construct. In the Ambassador study, where the system involved human intervention in receiving and processing digital requests, we found that the construct of content diverged from its meaning as used in the work of Doll and Torkzadeh (1988), to be about content of received information by human involvement and the content of information of the system itself, as clarified in this strip:

'The system is good and easy to use, it lacks supervisors understanding how to respond and deal with each case accordingly'

In the Oyster study where the system provided fully-automated services, we found that the construct of content did not emerge at all. We believe this is due to the fact use of the Oyster system is in the context of paying for public transportation, and that users perceived the constructs of effort in using the system, and time, to be relevant and important.

The construct of Accuracy involves the accuracy of information provided by the system (Doll & Torkzadeh, 1988). In the Ambassador Study we found that the construct of accuracy diverged from the meaning used by Doll and Torkzadeh (1988) into the accuracy of received response by human involvement and the accuracy of the system itself, as clarified in this strip:

'Inquiries are sent many times to get clearer answers... many questions are not enlisted by regulation so we get many individual's answers'

In the Oyster study we found that the construct of accuracy diverged into the accuracy of fares automatically deducted by the system (the accuracy of information provided by the system) and the accuracy of the system itself (the accuracy of the functionality of the system), as clarified in these strips:

'@TfLWaystoPay; As per the attached picture the oyster card system erroneously overcharged me £4.80 for an off-peak journey. '

'@TfLWaystoPay tried to renew oyster season ticket on ur website. Kept saying it didn't work. But U charged my credit card 4 times! Pls help'

The construct of format is about the output of information presented by the system (Doll & Torkzadeh, 1988). The construct of format emerges in the Ambassador study, while it does not emerge in the Oyster study. We attribute this to the nature of use of each system. In Oyster, users use the system for payment for public transportation. In Ambassador, users communicate through the system by receiving information and uploading documents, in which the construct of format becomes relevant. In such a system users consume the information provided and presented by the system, thus the format of information becomes an important and relevant construct for the Ambassador system.

The construct of ease of use manifested in both the Ambassador and Oyster systems. The construct of Timeliness is about 'in time' and 'up-to-date' information provided by the system (Doll & Torkzadeh, 1988). In Ambassador we found that the construct of timeliness diverged into the timeliness of received response by human involvement and the timeliness of the system itself (technological response-speed of the system), as clarified in these strips:

'Ambassador system is amazing with many features. but the speed of processing request depends on the receiver (employee) processing that request'

'Ambassador (the system) is such an amazing system... I don't see any flaws about it except for the delayed response of the supervisions to the placed requests through the system. It is not a problem with the system but it is with those who use it'

'The system is sort of good but we wish the smartphone platform application will be developed, because it is so, so, so slow'.

In the Oyster study, we found that the construct of timeliness to be mainly about the timeliness of technological elements responses to the user (system speed), as clarified in this strip:

'Contactless card still slower than Oyster at opening the ticket gates.'

By analysing the social media data of Twitter, we learned that the Oyster system involved various technological elements including the Oyster website, the Oyster reader, the Oyster card, the contactless bank card, and more. During the analysis process, we learned that each of these technological elements has its own degree of timeliness regarding its technological response. Thus, evaluating the timeliness of such systems become a challenging task, as omitting timeliness of some technological elements may result in not having an accurate meaningful holistic evaluation of the system. Further, the task of considering all technological elements using the conventional instrument of a designated survey may be too lengthy and daunting to ask a user to complete. In addition, some parts of such a survey may likely prove irrelevant to and individual user using only some parts of the system.

In addition to the aforementioned constructs taken from the EUCS model, there are a number of other common constructs that emerged in both the Oyster and Ambassador studies. These constructs are user effort in using the system, responsiveness to IS users, level of advancement of utilised technology, IS support, human competence, organisational influence, and level of ubiquitous of IS. There are four additional constructs emerged in our study of Oyster: technological faults, technological competition, technological compatibility, and social exchange (sharing, disseminating, and contacting). There are seven additional constructs that emerged in our study of Ambassador: ease of communication, automated services, IS updates, organisational productivity, employee's surveillance, awareness of system features, and reducing fraud. Users expressed their satisfaction with Ambassador as they perceived ease of communication facilitated by the system, in which users were able to submit digitalised requests thought the system with less time and effort.

Results of the Open Coding: The Information Exchanges on Social Media using Twitter Designated Hashtag (#Evaluate_Ambassador*)		
System	Content Content of IS Sufficient Content More Content Content received by human involvement	
	Accuracy Accuracy of IS Accuracy of Human Involvement	
	Format (system output presented in useful format)	
	Ease of Use (ease of use of the system)	
	Timeliness Timeliness of IS Timeliness of received response/human involvement	
	Ease of Communication	
	Automated Services	
	End-User Effort Using the System	
	IS updates	
	Technological advance	
	Human & Organisational	Responsiveness (perceive responsiveness of human involvement)
		IS Support End-user Tainting Technical Support End-user Guidance
Employees/ human involvement competence		
Organisational influence		
Organisational productivity		
Employees surveillance		
Awareness of system features		

	Reduce fraud & manipulation
Ubiquitous IS	Accessing and using the System

*'#Evaluate_Ambassador' is the English translation for the Arabic hashtag

Table 1. Results of the Open Coding of Social Media Data of Twitter of Ambassador System.

Results of the Open Coding: The Information Exchanged on Social Media using Twitter	
System	Technological faults Faulty Card Reader Faulty Oyster Card Faulty Oyster Machine Faulty Oyster Website Faulty connection to other contactless technology elements.
	Accuracy Accuracy of the system itself Accuracy of charged travel prices by the system
	Technological Advances
	End-User Effort Using the System
	Timeliness of the technological response to end-users
	Ease of Use
	IS Support End-user training Technical Support
Social Exchange on Twitter	Sharing experience of using Oyster system in daily life Disseminate Public Transport Updates
	Contacting customer support To receive advice and help To report issue and improvement suggestion
	Responsiveness (perceived responsiveness of IS support)
Human & Organisational	IS Support End-user Training Technical Support
	Human Competence of Employees of TFL & Quality of Received Support Positive Perception of Staff Negative Perception of Staff
	Organisational influence
	Technological Competition (in which a newer technology introduced, its use overweight, replaced, or compete with the existing one)
Ubiquitous IS	Accessing the System (lack of ubiquity in term of smart-phone platform)
	Making Use of the System (sufficient ubiquity fulfil various end-users needs)
	Technological Compatibility

Table 2. Results of the Open Coding of Social Media Data of Twitter of Oyster System (Data harvested using the keyword of 'Oyster Card')

8 Methodological Contributions

The issue of IS users satisfaction has been investigated in previous studies mainly by utilising conventional qualitative and quantitative research methods (Bailey & Pearson, 1983; Ives, Olson, & Baroudi, 1983; Doll & Torkzadeh, 1988; Leclercq, 2007; Irani et al., 2012). This current study contributes a methodology of conducting research using social media platform of Twitter as a research method in general, and a research approach towards the study of IS in particular. Previous studies in various disciplines utilise social media in research by ‘crawling’ or harvesting data automatically (Jansen et al., 2009; Rui, Liu, & Whinston, 2013), or by interacting with participants directly (Kassens-Noor, 2012).

This study utilises crawling data automatically obtained using specific software; for example, in the Oyster study the researcher harvested Twitter data. This approach is used in previous studies, but not in the context of IS and e-government. In addition, the methodology in this study utilises a designated Twitter hashtag, in contrast to gathering data by the crawling approach. This approach was used in the Ambassador study, when users of the system were asked to participate in a designated hashtag with their perceptions of their systems, and how they evaluated these. To the knowledge of this researcher, this study is the first in which the approach of using a designated Twitter hashtag as a research method is taken. The researcher conceptualises this data to be semi-organic data, as the researcher asked users for participation, without exerting influence on their responses. The designated hashtag allowed the researcher to establish an exchange thus collecting relevant data to the issue under investigation.

In the Oyster study, organic data were collected by harvesting data (tweets) that already existed, and without researcher intervention. Thus, the researcher observed and captured authentic and real social exchanges. The findings derived from the Oyster study are based on a limited timeframe, defined as the time interval over which tweets were harvested. It is possible that other findings might emerge based on a different set of harvested data; for example, if something dramatic or unusual occurred with the Oyster system during the timeframe of data collection, this could very possibly result in data that would modify and influence these findings. The Ambassador study involved the collection of data by asking users to tweet their ideas and experiences by participating in an Ambassador designated hashtag on Twitter.

In both studies, users reflected on the system being used, regardless of the way the researcher collected the data, or whether the data was generated with or without the researcher’s intervention. These findings are consistent across both studies, as emerged factors are related to the system itself, to human and organisational factors, and to factors related to the ubiquity of IS. The additional emerged factor in the Oyster study of social exchanges on Twitter is a result of true social exchanges being observed.

Utilising social media data from Twitter helps to create findings that would not have been produced by using conventional research methods, either qualitative or quantitative, which are restricted by theoretical and methodological boundaries. New understanding emerges about the construct of IS users’ satisfaction based on using social media data from Twitter, and demonstrates this to be a promising tool for evaluating the satisfaction of the ubiquitousness of IS for e-government. This approach of establishing, capturing, and utilising social exchange is presented and its feasibility is demonstrated in the Ambassador study. The approach of using social media is used not only for data collection, but also extended as an e-government evaluation tool that facilitates a continuous evaluation process for the effectiveness of e-government systems, which contrasts to conventional approaches of using surveys for system evaluation. As postulated by SET (Blau, 1986), we derived

that the approach of digitalised exchanges of social media from Twitter can result in satisfaction formation, as long as constructive exchanges are established. This study uses designated Twitter hashtags to collect data relevant to the research question, which contrasts to harvesting tweets as identified and used in the literature. Also, data derived from designated hashtags can be used by e-government organisations for system evaluation and improvement, which contrasts to the approach of harvested tweets that results in collecting large amounts of data, but not necessarily related to the issue under investigation. Harvested data also need to be cleaned or analysed automatically by using various software applications.

9 Research Limitations

Due to the nature of this study that uses social media data from Twitter, limitations emerged that are pertinent to the nature of the data. As each tweet is comprised of short text entries up to 140 characters long, the researcher was forced to deal with limitations due to this length restriction. Using designated hashtags, as in the case of the Ambassador Study, helped to eliminate the problem of short and unclear Tweets, because they allow the researcher to interact with participants and ask probing questions as in these examples of Tweets:

'Ambassador (the system) still needs to be improved, slowness is one of its flaw # سفير_قيم '

'@researcher-to-participant¹: Can you please advise us what's needs to be improved?'

'@ participant-to-researcher²: 1. providing the supervisor details (employee who processing requests placed through the system), contact numbers and email 2.enabling uploading requests 3-improve the interface of the system'

Furthermore, interaction and clarification takes place between users themselves without the intervention of the researcher, as demonstrated in these examples of Tweets:

'When the supervisor (the employee) rejects a student request, the student will need to place a new one because of the missing requirements. If there was a way to modify existing requests and add missing requirements without the need to place a new request # سفير_قيم '

'@participant-to-participant³: such feature is existing in Ambassador, but unfortunately is not used by employees maybe they were not trained to use it. Few supervisors (employee) use it and return requests to students to modify it instead of rejecting the request and ask student to place a new one'

Here is another example of tweets that clarify the interaction among users regarding the system:

'Ambassador as a system is excellent but rejecting requests for the first time seems odd and tiring for students in terms of time# سفير_قيم '

'@participant-to-participant: enforcing the employee to reply in two days as a maximum is the reason for such hasty responses sometimes'

1 Using the language of social media of Twitter, the researcher is asking the hashtag participant by using the symbol of '@' followed by participant username which is anonymous in this example of tweet.

2 Using the language of social media of Twitter, the participant is replying to the researcher by using the symbol of '@' followed by researcher username which is anonymous in this example of tweet.

3 In this example of tweet, end-users of Ambassador interacting with each other, as one end-user replied to another end-user who participated in the hashtag.

While harvesting Tweets was adopted in the Oyster study, the researcher found during the analysis process that collected data needs to be analysed without being able to penetrate deeper on unclear or ambiguous statements, as there is no way to ask for clarification. Thus, the researcher could only work with the data gathered; for example, one tweet could contain an interesting point to be investigated further, but unfortunately no more data could be found to explain this in more detail. Consider these two examples of organic (self-generated) tweets obtained without any intervention in the Oyster study:

'Yeah but the oyster card website won't accept that format'

'@ScotRail yes, which only confused me further because I was expecting an oyster-card type format'

Also, as data are harvested, the researcher needs to ensure the information and knowledge from Tweets is correct, as not all tweets contain correct information: some tweets contain misconceptions, opinions based on the experience of the person who wrote it, or obsolete information. In addition, tweets are not necessarily true, and all collected data cannot be assumed to be true, or up-to-date. Therefore, 'garbage' tweets are not just confined to irrelevant tweets, but also may be garbage due to lack of truthfulness or accuracy. Consider these examples of tweets, in which the Oyster website allows for enquiries without providing an Oyster card number, and where providing such number is optional:

'@TfLTravelAlerts site doesn't work unless you have oyster card number. Help, contact is useless if you don't know your card number.'

'@TfLOfficial why can I only make an online enquiry by supplying Oyster Card NUMBER details? I have a freedom Pass!'

Users of public transportation do not necessarily have an Oyster card number, because there are alternatives to use the Oyster system, such as the 'Freedom Pass'. The Freedom Pass grants free public transportation for eligible elderly and disabled persons (London Councils, 2015). The researcher checked the Oyster website to examine the issue of the enquiry process by filling out an online form, and found that users have the option to complete the online form without the restriction of providing Oyster number details that were reported by the user. The researcher believes that the system operators of TFL have incorporated users' needs as part of their use of social media from Twitter, so that successful responsiveness and continuous evaluation approaches of the system by using social media from Twitter can influence users' perceptions of satisfaction with the system.

This study recognises that findings are subject to limitations due to the nature of Tweets, but there are other challenges that emerged specifically to each study. In the Ambassador Study, a twitter hashtag was launched in the Arabic language. Therefore, the researcher had to collect tweets from participants manually, as available software for collecting tweets automatically does not support the Arabic language. In this case, the number of resulting Tweets by participants was manageable, and the number of received tweets was small enough to make manual processing feasible. Also, collected data from Tweets was often in the Arabic language, as participants tend to use their native language, Arabic, to talk about their system on Twitter. Thus, we had to use direct translations of Tweets for the quotations in our analysis in order to depict users' perceptions, as close as possible to the opinions expressed by the users, in order to allow transparency for readers so they can read the tweets. However, language is nuanced, and it is certain that some information will be lost in translation.

The challenges that emerged in the Oyster Study included identifying relevant Tweets and analysing the very large volume of data collected by the software used for automatically harvesting tweets. In order to gain meaning from this massive number of Tweets and extract values to enhance understanding, the researcher had to focus on analysing particular Tweets harvested using the keyword 'Oyster Card' that were identified to be relevant after the process of Tweet sampling and manual examination. The very large volume of data harvested automatically imposed a challenge on the analysis process to extract value and meaning, because of the massive amount of data and the noise contained in it making some data not relevant. This study utilised the feature of auto-coding of ATLAS.ti to help in analysing Tweets that were identified to be relevant to the study and were collected by using the key word 'Oyster study', which were examined manually by the researcher with the support of the auto-coding feature.

10 Conclusion

The issue of user satisfaction in information systems context has been investigated in previous studies, mainly by using conventional approaches of qualitative and quantitative research methods (Bailey & Pearson, 1983; Ives, Olson, & Baroudi, 1983; Doll & Torkzadeh, 1988; Leclercq, 2007; Irani et al., 2012). This study contributes methodologically to the construct of user satisfaction by using the Twitter social media platform as a research method, and presents analysis of two empirical studies of the Ambassador and Oyster systems.

We started with the initial understanding of IS user satisfaction as conceptualised and explained by the five constructs of content, accuracy, format, ease of use and timeliness (Doll & Torkzadeh, 1988) until we reached the new emerged meaning of satisfaction by analysing Twitter data. we found that four types of information exchanged on Twitter emerged that impact user satisfaction with IS. These emerged constructs are information about the system itself, information about human and organisational aspects, information about the IS ubiquitousness, and information about types of social exchanges on Twitter in relation to the Oyster study. Social media data of Twitter help us to expand the existing conceptualisation of satisfaction in the literature and enlighten our understanding about satisfaction formation as conceptualised by users using the data exchange on the Twitter platform, and our understanding of satisfaction is evolved in order to properly evaluate processes of the system. Utilising social media data from Twitter helps to create findings that would not have been produced by using conventional methods of undertaking research, either qualitative or quantitative, which are restricted by theoretical and methodological boundaries. These findings could be of interest to researchers and practitioners involved in IS evaluation, as these shed light on using social media of Twitter for information system evaluation, and in particular in the context of e-government.

References

- Agar, M.H. (1986). *Speaking of Ethnography*. SAGE Publications.
- Argamon, S., Koppel, M., Pennebaker, J.W. and Schler, J. (2007). "Mining the Blogosphere: Age, Gender, and the Varieties of Self-Expression" *First Monday* 12 (9).
- Bailey, J.E. and Pearson, S.W. (1983). "Development of a Tool for Measuring and Analyzing Computer User Satisfaction" *Management Science* 29 (5), 530-545.
- Bansal, T. and Corley, K. (2011). "From the Editors: The Coming of Age for Qualitative Research: Embracing the Diversity of Qualitative Methods" *Academy of Management Journal* 54 (2), 233-237.
- Baroudi, J.J. and Orlikowski, W.J. (1988). "A Short-Form Measure of User Information Satisfaction: A Psychometric Evaluation and Notes on Use" *Journal of Management Information Systems* 4 (4), 44-59.

- Blau, P.M. (1986). *Exchange & Power in Social Life*. Transaction Publishers.
- Carter, D. (2005). "Living in Virtual Communities: An Ethnography of Human Relationships in Cyberspace" *Communication & Society* 8 (2), 148-167.
- Chew, C. and Eysenbach, G. (2010). "Pandemics in the Age of Twitter: Content Analysis of Tweets during the 2009 H1N1 Outbreak" *Plos one* 5 (11), e14118.
- Dann, S. (2010). "Twitter Content Classification" *First Monday* 15 (12).
- Doll, W.J. and Torkzadeh, G. (1988). "The Measurement of End-User Computing Satisfaction" *MIS Quarterly* 12 (2), 259-274.
- Doll, W.J., Xia, W. and Torkzadeh, G. (1994). "A Confirmatory Factor Analysis of the End-User Computing Satisfaction Instrument" *MIS Quarterly* 18 (4), 453-461.
- Gephart, R.P. (2004). "Qualitative Research and the Academy of Management Journal" *Academy of Management Journal* 47 (4), 454-462.
- GlobalWebIndex, (2014). GWI Social (GlobalWebIndex's quarterly report on the latest global trends in social platform usage). URL: <http://insight.globalwebindex.net/gwi-social-january-2014> (visited on 24/03/2014).
- Gupta, M.P. and Jana, D. (2003). "E-government Evaluation: A Framework and Case Study" *Government Information Quarterly* 20 (4), 365-387.
- Harrison, A.W. and Rainer, R.K. Jr. (1996). "A General Measure of User Computing Satisfaction" *Computer in Human Behavior* 12 (1), 79-92.
- Hu, N., Liu, L. and Zhang, J.J. (2008). "Do Online Reviews Affect Product Sales? The Role of Reviewer Characteristics and Temporal Effects" *Information Technology and Management* 9 (3), 201-214.
- Internet World Stats, (2012). Internet Usage Statistics: The Internet Big Picture. URL: <http://www.internetworldstats.com/stats.htm> (visited on 24/03/2014).
- Irani, Z. et al. (2012). "An Analysis of Methodologies Utilised in e-Government Research: A User Satisfaction Perspective" *Journal of Enterprise Information Management* 25 (3), 298-313.
- Ives, B., Olson, M.H. and Baroudi, J.J. (1983). "The Measurement of User Information Satisfaction" *Communications of the ACM* 26 (10), 785-793.
- Jansen, B.J., Zhang, M., Sobel, K. and Chowdury, A. (2009). "Twitter Power: Tweets as Electronic Word of Mouth" *Journal of the American Society for Information Science and Technology* 60 (11), 2169-2188.
- Kassens-Noor, E. (2012). "Twitter as a Teaching Practice to Enhance Active and Informal Learning in Higher Education: The Case of Sustainable Tweets" *Active Learning in Higher Education* 13 (1), 9-21.
- Kozinets, R.V. (2002). "The Field Behind the Screen: Using Netnography for Marketing Research in Online Communities" *Journal of Marketing Research* 39 (1), 61-72.
- Krippendorff, K.H. (2013). *Content Analysis: An Introduction to its Methodology*. Third Edition, SAGE Publications.
- Leclercq, A. (2007). "The Perceptual Evaluation of Information Systems Using the Construct of User Satisfaction: Case Study of a Large French Group" *The Data Base for Advances in Information Systems* 38 (2), 27-60.
- Lee, C.H. and Chien, T.F. (2013). "Leveraging Microblogging Big Data With A Modified Density-Based Clustering Approach for Event Awareness and Topic Ranking" *Journal of Information Science*, 1-21.
- Lee, K., Oh, W.Y. and Kim, N. (2013). "Social Media for Socially Responsible Firms: Analysis of Fortune 500's Twitter Profiles and their CSR/CSIR Ratings" *Journal of Business Ethics* 118 (4), 791-806.
- London Councils, (2015). Freedom Pass. URL: <http://www.londoncouncils.gov.uk/services/freedom-pass> (visited on 10/12/2015).
- Mamic, L.I. and Almaraz, I.A. (2013). "How the Larger Corporations Engage with Stakeholders through Twitter" *International Journal of Market Research* 55 (6), 851-872.
- Marwick, A.E. and Boyd, D. (2010). "I Tweet Honestly, I Tweet Passionately: Twitter Users, Context Collapse, and the Imagined Audience" *New Media & Society* 13 (1), 114-133.

- McHaney, R., Hightower, R. and Pearson, J. (2002). "A Validation of the End-User Computing Satisfaction Instrument in Taiwan" *Information & Management* 39 (6), 503-511.
- McHaney, R., Hightower, R. and White, D. (1999). "EUCS Test-Retest Reliability in Representational Model Decision Support Systems" *Information & Management* 36 (2), 109-119.
- Orlikowski, W.J. and Baroudi, J.J. (1991). "Studying Information Technology in Organizations: Research Approaches and Assumptions" *Information Systems Research* 2 (1), 1-28.
- Papacharissi, Z. (2009). "The Virtual Geographies of Social Networks: A Comparative Analysis of Facebook, LinkedIn and ASmallWorld" *New Media & Society* 11 (1-2), 199-220.
- Petter, S., DeLone, W. and McLean, E.R. (2012). "The Past, Present, and Future of 'IS Success'" *Journal of the Association for Information Systems* 13 (5), 342-362.
- Rui, H., Liu, Y. and Whinston, A. (2013). "Whose and What Chatter Matters? The Effect of Tweets on Movie Sales" *Decision Support Systems* 55 (4), 863-870.
- Sarker, S., Xiao, X., and Beaulieu, T. (2013). "Qualitative Studies in Information Systems: A Critical Review and Some Guiding Principles" *MIS Quarterly* 37 (4), iii-xviii.
- Saunders, M., Lewis, P. and Thornhill, A. (2002). *Research Methods for Business Students*. Third Edition, Pearson Education.
- Seddon, P. and Yip, S. (1992). "An Empirical Evaluation of User Information Satisfaction (UIS) Measures for Use with General Ledger Accounting Software" *Journal of Information Systems* 6 (1), 75-92.
- Somers, T.M., Nelson, K. and Karimi, J. (2003). "Confirmatory Factor Analysis of the End-User Computing Satisfaction Instrument: Replication within an ERP Domain" *Decision Sciences* 34 (3), 595-621.
- Strauss, A. (1987). *Qualitative analysis for social scientists*. Cambridge University Press.
- Walsham, G. (2006). "Doing Interpretive Research" *European Journal of Information Systems* 15 (3), 320-330.