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Banerjee, Snehasish orcid.org/0000-0001-6355-0470, Singh, Jyoti Prakash, Dwivedi, Yogesh et al. (1 more author) (2021) Social media analytics for end-users' expectation management in information systems development projects. Information Technology and People. pp. 1600-1614. ISSN 0959-3845

https://doi.org/10.1108/ITP-10-2020-0706

Social media analytics for end-users' expectation management in information systems development projects

Journal:	*Information Technology & People*
Manuscript ID	ITP-10-2020-0706.R2
Manuscript Type:	Article
Keywords:	Social media < Technology, Global information system < Technology, IT project management < Information system development < Practice, End users < People, Virtual world < Technology, E-service < Study setting, Virtual community < Study setting

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Abstract

Purpose: This exploratory research aims to investigate social media users' expectations of information systems (IS) products that are conceived but not yet launched. It specifically analyses social media data from Twitter about forthcoming smartphones and smartwatches from Apple and Samsung, two firms known for their innovative gadgets.

Design/methodology/approach: Tweets related to the following four forthcoming IS products were retrieved from 1st January 2020 to 30th September 2020: (1) Apple iPhone 12 (6,125 tweets), (2) Apple Watch 6 (553 tweets), (3) Samsung Galaxy Z Flip 2 (923 tweets), and (4) Samsung Galaxy Watch Active 3 (207 tweets). These 7,808 tweets were analysed using a combination of the Natural Language Processing Toolkit (NLTK) and sentiment analysis (SentiWordNet).

Findings: The online community was quite vocal about topics such as design, camera and hardware specifications. For all the forthcoming gadgets, the proportion of positive tweets exceeded that of negative tweets. The most prevalent sentiment expressed in Apple-related tweets was neutral but in Samsung-related tweets was positive. Additionally, it was found that the proportion of tweets echoing negative sentiment was lower for Apple compared with Samsung.

Originality: This paper is the earliest empirical work to examine the degree to which social media chatter can be used by project managers for IS development projects, specifically for the purpose of end-users' expectation management.

Keywords: Social media analytics, Information systems development, Twitter, Sentiment analysis, Apple, Samsung

Article type: Research paper

1. Introduction

Although businesses are increasingly becoming reliant on information systems (IS), information systems development (ISD) projects continue to battle a chequered history of successes and failures (Baghizadeh et al., 2020; Dwivedi et al., 2015; Pan et al., 2008). One of the many reasons why ISD projects fail is the inability of project management teams to manage the expectations of end-users, who constitute the key stakeholders (Chua, 2009; Hughes et al., 2020; Schwalbe, 2015).

ISD projects are likely to succeed if end-users are involved early in the projects' lifecycle, and have realistic expectations about the IS products that are likely to emerge from the projects (Baghizadeh et al., 2020; Hughes et al., 2020; Kræmmergaard and Rose, 2002). As a key

component of stakeholder management, engaging in a dialogue with end-users from an early stage is regarded as the most critical aspect in order for project management teams to deliver the right IS products (Chua and Banerjee, 2018; Maruping and Matook, 2020; Prasad et al., 2018; Schwalbe, 2015).

In particular, for projects meant to develop IS products for the mass market, social media has the potential to serve as end-users' expectation management tool in the hands of ISD project managers. This is due to two reasons. First, social media is known for its popularity and ubiquity. Platforms such as Twitter now boast of an enormous user base of over 370 million[1], many of whom could be prospective end-users who are free to voice their expectations about forthcoming IS products (Dolan et al., 2016; Kaplan and Haenlein, 2010; Roberts et al., 2016; Tsohou and Holtkamp, 2018). When social media content about forthcoming IS products from prospective end-users is mined systematically, it can offer useful insights about their expectations (Jia et al., 2020; Kanagarajoo et al., 2020; Waters et al., 2009). However, there is still a lack of research about social media content related to IS products that are conceived but not yet launched. Hence, the question of how ISD projects could leverage social media for the purpose of managing the expectations of end-users regarding forthcoming IS products still remains open.

Second, social media platforms have been shown to facilitate information exchange between businesses and end-users in a variety of contexts ranging from knowledge management and marketing to consumer co-creation or new product development (Berger et al., 2020; Chua and Banerjee, 2013; Dotsika and Patrick, 2013; Roberts et al., 2016). This suggests that they have the capacity to foster dialogue between ISD project management teams and prospective end-users about an IS product prior to its launch. Hence, it is not a surprise that incorporating social media and analytics has been highlighted as imperative for project managers (Kanagarajoo et al., 2020; Niederman, 2021; Remidez and Jones, 2012).

Meanwhile, the value of social media data analytics in the IS landscape is well established (Chen et al., 2012). Research using social media data analytics has so far looked into users' opinions about already-launched IS products. For example, Lipizzi et al. (2015) analysed social media content after the launch of Apple's iPad and Samsung's Galaxy gear smartwatch. However, to the best of the authors' knowledge, research has yet to employ social media data analytics to study the communication between businesses and prospective end-users about an IS product before it is launched in the market.

Therefore, employing social media data analytics, the objective of this exploratory research is to investigate end-users' expectations of IS products that are conceived but not yet launched. The scope of the paper is delimited to a subset of ISD projects—particularly those that deliver IS products for the mass market. As the test cases for investigation, the paper specifically studies the cases of Apple and Samsung, two firms known for their innovative gadgets.

At the point of inception of this paper, Apple had smartphones up to iPhone 11 and smartwatches up to Apple Watch 5. Samsung's latest smartphone was in Galaxy series with Z Flip and its latest smartwatch was Galaxy Watch Active 2. Therefore, the paper employs social media data analytics on tweets related to (1) Apple iPhone 12, (2) Apple Watch 6, (3) Samsung Galaxy Z Flip 2, and (4) Samsung Galaxy Watch Active 3. Of these four IS products, iPhone 12 and Apple Watch 6 are now available in the market and hence allow examining whether the expectations voiced on social media were actually incorporated in the products. The following research questions are formulated to guide the exploratory investigation:

RQ1: What are the commonly mentioned themes (i.e., end-users' expectations) for each of the four IS products, as evident from social media data?

RQ2: What is the sentiment echoed in end-users' expectations?

RQ3: In what ways do end-users' expectations about the four IS products vary?

RQ4: For the two IS products that are now available in the market (Apple iPhone 12 and Apple Watch 6), to what extent do the actual product specifications cater to end-users' expectations?

The contributions of this paper are three-fold. First, it deepens the understanding of the extent to which social media content about not-yet-launched IS products offers insights to project management teams about managing end-users' expectations. This paper has the potential to shed light on laypersons' expectations about forthcoming IS products, and provide real-time insights into the evolving discussions. Second, implicit evidence notwithstanding, this paper is the earliest empirical work to examine if the social media chatter can be used for ISD project management. Marketing teams are expected to be already monitoring such online content. But marketing teams may not always communicate with project managers. Software engineers may not look through such content either (Heller and Robinson, 2017; Ryan 2020). Hence, this paper is a step forward in bridging the chasm between marketing teams and ISD teams. Third, through this exploratory social media data analytics study, the paper sheds light on how consumers of the two premium brands, Apple and Samsung, differ in voicing their opinions on social media.

The rest of the paper proceeds as follows: The following section (i.e. Section 2) reviews the related literature. Next, the methodology is presented in Section 3 followed by the results in Section 4. Thereafter, the results are discussed to highlight the theoretical contributions, the practical implications as well as the limitations and future research directions in Section 5. Finally, Section 6 concludes this research.

2. Literature Review

2.1. ISD Project Stakeholder Management: The Role of Social Media

The IS literature has long advocated the importance of studying how ISD projects are managed coupled with ways in which individuals, groups, organisations, and markets interact with new technology (Sidorova et al., 2008). Over the years however, these activities have changed

drastically due to technological advancements, and the trend is not expected to plateau any time soon. Compared with the pace of change in ISD project management practices, the academic discourse is much slower to evolve (Burton-Jones et al., 2021; Kuhn, 1996; Niederman, 2021). As a modest attempt to address this practice-theory evolution mismatch, the current paper explores ISD project management from the perspective of social media, which has now become one of the biggest driving forces in today's world but has rarely been studied in the ISD literature.

Social media data is being increasingly utilised by businesses for a variety of purposes such as customer acquisition, marketing, new product development, and public relations (Berger et al., 2020; Dotsika and Patrick, 2013; Grover and Kar, 2020; Roberts et al., 2016; Waters et al., 2009). In the realm of project management too, social media-based intelligence can serve as a valuable resource for project managers (Harrin, 2016; Kanagarajoo et al., 2020; Schwalbe, 2015). Project management systems often incorporate social media capabilities and monitoring as part of the overarching software (Remidez and Jones, 2012). Thus far, the proposition that social media can be helpful for project management is supported by much anecdotal evidence but a little empirical investigation (Kanagarajoo, 2018; Roberts et al., 2016).

This paper argues that social media can help, at least in part, in project stakeholder management, particularly for projects that are meant to deliver IS products for the mass market. Project stakeholder management refers to the activities involved in dealing with individuals or groups who may affect or be affected by the project processes, contents or outcomes (Eskerod et al., 2015). A significant part of a project manager's role lies in communicating with stakeholders and acquiring knowledge about them to get the project done (Harrin, 2016; Jia et al., 2020; Maruping and Matook, 2020). For ISD projects delivering IS products for the mass market, end-users clearly constitute a crucial stakeholder group who could be reached easily via social media (Kanagarajoo et al., 2020).

Social media has now cemented itself as an effective tool for quick and easy communication (Kaplan and Haenlein, 2010), pertinently between businesses and netizens (Chua and Banerjee, 2013; Osei-Frimpong et al., 2019). The adoption of social media, for purposes such as collaboration and stakeholder engagement, has been particularly high in ISD projects (Kanagarajoo, 2018). Recent works suggest that social media and data analytics can play a crucial role is assisting project managers inherit knowledge about external stakeholders (Jia et al., 2020; Kanagarajoo et al., 2020; Niederman, 2021). Therefore, one would expect social media to facilitate useful information exchange between ISD teams and netizens, who are potential end-users of IS products to be launched in the market. In consequence, analytics of such social media data may help ISD project managers. This is the hitherto-unexplored possibility which the current paper seeks to empirically explore.

From a theoretical standpoint, this possibility is rooted in the social exchange theory. The theory posits that stakeholders engage with a given initiative depending on their perceptions of expected outcome, and this engagement facilitates transfer of values (Bagozzi, 1975). When applied in the context of anticipated IS products that are not yet available in the market, the theory would suggest that potential end-users—the online community—will engage with the topic on social media. The nature of the online engagement will depend on their perceptions of the forthcoming IS products. Netizens could voice their opinions about the features they are looking forward to, and those that they would rather not have. In turn, this social media chatter has the potential to facilitate transfer of values—specifically, informational values in this case—for the ISD teams, enabling them to link customer wishes with product design.

2.2. Social Media Chatter: Unconceived, Existing and Conceived Products

Social media empowers the online community to voice their opinions about products—some of which can be unconceived, some already existing in the market, and others conceived but not yet launched. With respect to unconceived products, the literature on consumer co-creation

can be brought to bear. Co-creation refers to the process through which businesses seek to develop completely new offerings by soliciting inputs from customers (Piller et al., 2005; Wikström, 1996). Co-creation is predominantly facilitated by social media as users create user-generated content highlighting ideas of unconceived products in return for financial or societal rewards (Roberts and Darler, 2017). Businesses make use of this wisdom of the crowd to innovate (Chua and Banerjee, 2013). In the IS domain, for example, Dell launched its crowdsourcing platform IdeaStorm in 2007 to enable social media users to send in their ideas about unconceived products that Dell should introduce (Bayus, 2013).

When it comes to existing products in the market, the online community also tends to be quite vocal. For example, Stone and Choi (2013) studied the social media chatter on Twitter about a smartphone model. Using sentiment analysis and classification algorithms, it confirmed the viability of social media data for consumer preference modeling. More recently, Lipizzi et al. (2015) inspected user-generated content related to two IS products launched by Apple and Samsung. Using conversational analysis, it identified nuances in the social media discourse related to the two competing products. Compared with Apple, Samsung-related content attracted more ambivalent and changing opinions.

If the social media chatter related to unconceived and existing products has been shown to be valuable for research and practice (Bayus, 2013; Lipizzi et al., 2015; Roberts and Darler, 2017; Stone and Choi, 2013), one can assume that the online buzz related to products conceived but not yet available in the market will be important too. With respect to such products however, the literature is extremely scanty. In this vein, Castillo et al. (2021) recently pointed out that research predominantly examines electronic word-of-mouth on products or services available in the market but overlooks the nature of user-generated content on offerings that users are aware of but have yet to be launched. Therefore, they have called for more research to better

understand "the phenomenon of pre-consumption online engagement" as such social media content can help forecast future sales and develop effective targeting strategies.

Inspired by Castillo et al. (2021), this paper argues that the social media chatter related to upcoming IS products will offer useful insights to ISD project managers, particularly with respect to end-users' expectation management. The most relevant work in this regard is Williams et al. (2015), albeit not in an ISD context. It investigated social media interactions in the planning stage of a high-speed railway project in the UK. While the project was officially approved in 2012 to start in 2017, the paper—informed by Bagozzi's (1975) social exchange theory—examined the online chatter during 2013-2014. Most stakeholders were found to oppose the proposed rail network on Twitter. Reasons included environmental concerns, political apprehensions, and how the funding could be used for better purposes. These were useful insights for the project managers.

Building on these works, this paper investigates how the online community discusses IS products that are conceived but yet to be launched. This is important because prior works highlight the possibility for ISD teams to leverage social media data for product design-related decision-making (Stone and Choi, 2013). Pre-launch online chatter about IS products can be insightful for not only the ISD project managers but also the concerned businesses in general (Castillo et al., 2021). Nonetheless, given the widespread literature on the dark side of social media, it may also be fraught with misinformation about the IS products (Aswani et al., 2019; Baccarella et al., 2018; Fox and Moreland, 2015). This in turn may confuse prospective buyers in the online community, thereby unfairly disadvantaging the businesses.

Marketing teams are expected to monitor the social media content about IS products that have been conceived but not yet available in the market. However, there is evidence that marketing and ISD teams seldom work together (Heller and Robinson, 2017; Ryan 2020). Purcarea (2020) pointed out that marketing teams and ISD teams often do not communicate with each other

adequately. Marketing teams clearly have access to customer-centric data from social media that is poised to help manage end-users' expectations. Nonetheless, the extent to which they communicate with the ISD engineers and project managers is not known.

3. Research Methods

Research on social media data analytics commonly follow the Capture-Understand-Present (CUP) approach as its guiding framework (Fan and Gordon, 2014; Grover et al., 2018; Rao et al., 2020). The Capture stage helps identify relevant social media content followed by its pre-processing. The Understand stage helps make sense of the pre-processed social media data using techniques such as natural language processing and sentiment analysis. Finally, the Present stage is meant to highlight the results in an easy-to-understand format. The methodology of this paper is guided by the CUP approach (Fan and Gordon, 2014; Grover et al., 2018).

In terms of the Capture stage, the dataset was collected from Twitter, a widely cited and popular resource for social media data analytics (Aswani et al., 2019; Grover et al., 2018; Pal et al., 2017). Pertinently, Twitter has been used to study how netizens talk about innovative gadgets (Lipizzi et al., 2015). As an additional data source, YouTube was also considered. However, most of the YouTube videos about innovative gadgets were related to unboxing and ways to use a specific feature about existing IS products. There were hardly any content reflecting end-users' expectations of forthcoming IS products. Hence, drawing data from YouTube was not a viable option.

The dataset collection started from 1st March 2020 and continued till 30th September 2020. During this period, tweets were retrieved using Twitter's Streaming Application Programming Interface (API). Historical tweets from 1st January 2020 to 29th February 2020 were also obtained using Twitter's Rest API. As the Rest API could not capture all the related tweets, a Python crawler was developed using the package Beautiful Soup to get more historical data.

To collect data related to the four chosen IS products, a Python script with the Streaming API of Twitter was used. It retrieved tweets based on the following keywords: “iPhone 12”, “Apple Watch 6”, “Samsung Galaxy Z Flip 2”, and “Samsung Galaxy Watch Active 3”. To ensure comprehensiveness of the data collection process, we ran the program in four different workstations with four login IDs to capture tweets related to each product. The retrieved tweets were then manually checked to remove irrelevant and non-English content.

The final dataset included (1) 6,125 tweets related to iPhone 12, (2) 553 tweets related to Apple Watch 6, (3) 923 tweets related to Samsung Galaxy Z Flip 2, and (4) 207 tweets related to Samsung Galaxy Watch Active 3. These 7,808 tweets were then pre-processed to remove Internet references and URLs. The stop words of English language were also eliminated. Thereafter, smileys and emoticons were converted into appropriate words such as happy, sad and neutral.

In terms of the Understand stage of the CUP approach, the exploratory research questions were addressed using a combination of the Natural Language Processing Toolkit (NLTK) and sentiment analysis. Using NLTK, the goal was to identify the top *k* words in the collection of tweets for each of the four IS products. The sentiment of aspects such as *design*, *camera*, *hardware specifications* and *5G* was ascertained using the SentiWordNet library to map end-users’ expectations. The tweets were manually labelled into complaints or praises related to the products. Thereafter, a Naïve Bayes classifier was used to classify new tweets into complaints or praises. The results of these analyses are presented in the next section in accordance with the research questions. This constitutes the Present stage of the CUP approach. A block diagram of the methodology is shown in Figure 1.

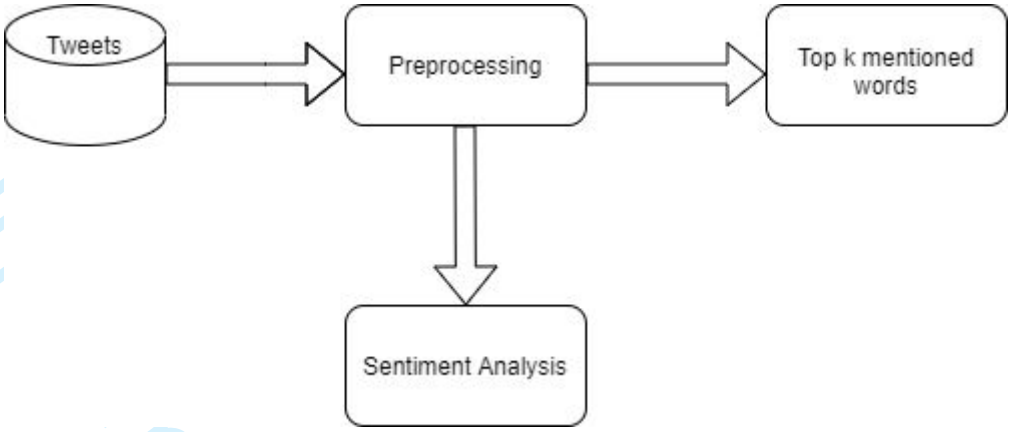

Figure 1: Block Diagram showing the data collection and analysis methodology.

4. Results

This exploratory research aims to investigate social media users' expectations of IS products that have been conceived but not launched yet. Four research questions are formulated. The results presented in this section address them as follows:

RQ1: What are the commonly mentioned themes (i.e., end-users' expectations) for each of the four IS products, as evident from social media data? Table I presents the 20 most frequently occurring words in tweets regarding the four IS products. With respect to iPhone 12, end-users' expectations were often focused on flip, wifi, 802.11ay, glasses and face. Here, flip refers to a type of smartphone design whereas 802.11ay refers to a new wireless communication standard. End-users were expecting the iPhone 12 to have a flip design, implementing the newer standard of wireless communications 802.11ay. An example tweet is as follows: "Do you know if they're going to take advantage of the new short-range wifi architecture (802.11ay) rumored to be coming to the iPhone 12?" End-users were quite vocal about network settings and wifi as well as facial recognition features. Many were also relating this forthcoming IS product with Apple Glasses. Interestingly, coronavirus was also a commonly-mentioned theme. People were sceptical about the release date of iPhone 12 due to the pandemic.

Regarding Apple Watch 6, several end-users were found to tweet about its price. In the wake of the Covid-19 outbreak, many of them were expecting it to contain a blood oxygen level

sensing functionality. This is reflected in tweets such as "Will Apple Watch 6 have blood pressure or oxygen saturation sensor? What do you think?" Many were also relating this forthcoming IS product with iPad. Regarding Samsung Galaxy Z Flip 2, end-users' expectations widely revolved around 5G. They were also talking about its design as reflected in tweets such as "Samsung Galaxy Z Flip 2 and Samsung Galaxy Z Fold 3 are rumoured to launch as the next foldable handsets from the company…".

Regarding Samsung Galaxy Watch Active 3, end-users' expectations often focused on its battery and colours. This is evident from tweets such as "Battery may improve" and "Latest Samsung Galaxy Watch Active 3 leak hints at three colo[u]rs". They were expecting the IS product to come with a stainless-steel case.

Table I. Top 20 words in tweets for each IS product.

Apple iPhone 12	Apple Watch 6	Samsung Galaxy Z Flip 2	Samsung Galaxy Watch Active 3
12	40,900	5g	active
5g	air	brand	battery
802.11ay	apple	changing	better
apple	appleevent	cutting	case
appleevent	applewatch6	device	change
brand	applewatchseries6	discover	colours
concept	blood	edge	design
coronavirus	event	experience	galaxy
could	features	fold	hints
face	hands	fold2	inch
flip	ipad	future	latest
glasses	new	galaxy	leak
iphone	oxygen	hinge	likely
may	price	meet	may
new	se	new	samsung
phone	series	samsung	specs
standard	starts	shape	stainless
support	via	smartphone	steel
upgrade	watch	technology	three
wifi	youtube	unlocks	watch

RQ2: What is the sentiment echoed in end-users' expectations? Table II presents the sentiment distribution in tweets regarding the four IS products. For all the forthcoming gadgets, the proportion of positive tweets exceeded that of negative tweets.

Table II. Sentiment distribution in tweets for each IS product.

Sentiment	Apple iPhone 12	Apple Watch 6	Samsung Galaxy Z Flip 2	Samsung Galaxy Watch Active 3	Total
Positive	2,450 (40.00%)	252 (45.57%)	480 (52.00%)	127 (61.35%)	3,309 (42.38%)
Neutral	3,185 (52.00%)	268 (48.46%)	314 (34.02%)	16 (7.73%)	3,783 (48.45%)
Negative	490 (8.00%)	33 (5.97%)	129 (13.98%)	64 (30.92%)	716 (9.17%)
Total	6,125	553	923	207	7,808

Aspect-based sentiment analysis. To delve deeper, sentiment scores were granularly calculated for specific aspects such as design, camera, hardware specifications and 5G. With respect to iPhone 12, these sentiment scores were 0.089, 0.212, 0.0219 and 0.132 respectively. The overall sentiment score of all tweets related to iPhone 12 was 0.0948. In the case of Apple Watch 6, the sentiment score for design and looks was 0.175, and for hardware specification was 0.236. The overall sentiment of all tweets about the IS product was 0.201.

With respect to Samsung Galaxy Z Flip 2, design and looks had a sentiment score of 0.005. The camera of the phone received a negative sentiment score of -0.0142. Nonetheless, end-users voiced positive sentiments over 5G with a sentiment score of 0.1404. The overall product sentiment was 0.1074. Finally, Samsung Galaxy Watch Active 3 had a positive sentiment of 0.122 for design. Due to the unavailability of sufficient data points, the sentiment scores corresponding to other features such as hardware specifications could not be obtained for this IS product. Furthermore, to understand the extent to which end-users talk about potential problems in forthcoming IS products, the dataset was filtered to identify tweets containing words such as "too slow", "slow", "poor selfie", "poor camera", "poor quality", "poor", "bad" and "not good". However, there were few such tweets.

RQ3: In what ways do end-users' expectations about the four IS products vary? As shown in Table II, the most prevalent sentiment expressed in Apple-related tweets was neutral (52.00% for iPhone 12 and 48.46% for Apple Watch 6). In contrast, the most prevalent sentiment expressed in Samsung-related tweets was positive (52.00% for Samsung Galaxy Z Flip 2 and 61.35% for Samsung Galaxy Watch Active 3). Additionally, it was found that the proportion

of tweets echoing negative sentiment was lower for Apple (8.00% for iPhone 12 and 5.97% for Apple Watch 6) compared with Samsung (13.98% for Samsung Galaxy Z Flip 2 and 30.92% for Samsung Galaxy Watch Active 3). Compared with the forthcoming IS products from Apple, those from Samsung seemed to polarise netizens' opinions to a greater extent. End-users voiced their concerns related to the camera quality of Samsung Galaxy Z Flip 2.

In the case of forthcoming smartphones, end-users were mostly excited about design and network features (e.g., Flip design and 802.11ay for iPhone, fold design and 5G for Samsung Galaxy Z Flip 2). In the case of forthcoming smartwatches, end-users' tweets reflected an interest in facilities to calculate blood oxygen level. Clearly, the pandemic has had an effect on how the online community discusses forthcoming IS products. Health- and Covid-related issues were found in tweets related to the smartwatches, but not in tweets related to the smartphones.

RQ4: For the two IS products that are now available in the market (Apple iPhone 12 and Apple Watch 6), to what extent do the actual product specifications cater to end-users' expectations?

Among the four IS products studied in this paper, iPhone 12[2] and Apple Watch 6[3] are now already available in the market. The authors manually inspected the product specifications to ascertain the extent to which they catered to the views expressed on social media prior to the launch of these two IS products.

With respect to iPhone 12, the social media chatter related to its flip design and 802.11ay wireless standard turned out to be rumours. End-users' expectations around these aspects seem to have gone unnoticed. With respect to Apple Watch 6, several end-users expected it to contain a blood oxygen level sensing functionality. Indeed, Apple Watch 6 allows measuring individuals' blood oxygen level. This suggests that end-users' expectations voiced through social media might have informed, at least partially, the development of this IS product. Nonetheless, more research is needed to empirically corroborate this possibility.

5. Discussion

Four key findings have emerged from this exploratory research. First, users do make use of social media to voice their opinions and expectations about forthcoming IS products. This lends support to the premise of this paper that if netizens chat about already launched products and not-yet-conceived products (Lipizzi et al., 2015; Roberts et al., 2017), they should chat about products that are conceived but yet to be launched. In turn, social media data analytics can help in terms of project stakeholder management, supporting previous anecdotal evidence (Berger et al., 2020; Jia et al., 2020; Kanagarajoo et al., 2020).

Second, sentiment analysis of tweets across all the four IS products shows that around 48.45% of the content express neutral views while 42.38% express positive sentiment. In a study of tweets on existing products, Lipizzi et al. (2015) showed that Apple and Samsung gadgets attract numerous positive comments. This paper found a similar trend even when considering products that are not yet available in the market. The fact that positive tweets outnumbered negative tweets is a promising sign insofar as Apple and Samsung are concerned. Nonetheless, the firms could explore different options to give a positive slant to the majority of the neutral tweets prior to product launches.

Third, the online chatter about forthcoming IS products identified several features that receive positive sentiment as well as those that receive negative sentiment. This can be useful for IS project management teams, who should strive to maximise end-users' satisfaction regarding the positively-viewed features and minimise reputational risk regarding the negatively-viewed aspects. For example, regarding Samsung Galaxy Z Flip 2, the sentiment score of tweets related to its camera was negative (-0.0142). Such social media content can offer useful insights to IS developers.

That said, IS developers and project management teams are not anticipated to monitor the online chatter about forthcoming products. This is expected to be done by the social media

marketing team. Meanwhile, there exists much evidence that ISD and marketing teams work in silos (Heller and Robinson, 2017; Purcarea, 2020; Ryan 2020). If the marketing team has access to end-users' expectation-related data that the development and project management teams cannot utilise, it will leave potential customer insights untouched.

Finally, the Covid-19 pandemic has implications for IS products intended for the mass market. Specifically, health benefits seem to constitute a key value proposition for such IS products as the world continues to fight the pandemic. For example, end-users expected Apple Watch 6 to help measure blood oxygen level. Firms manufacturing IS products for the mass market should consider developing gadgets that can help identify coronavirus exposure risk, detect symptoms and even identify treatment options.

A number of tweets also echoed apprehensions regarding ways in which the pandemic would affect product release dates. However, there was hardly any tweet from either Apple or Samsung to update end-users about how the pandemic might affect their supply chains and release dates. Even though the literature highlights that social media can help foster a dialogue between firms and end-users (Chua and Banerjee, 2013; Dotsika and Patrick, 2013; Roberts et al., 2016), the level of such dialogue has scope for improvement when it comes to forthcoming IS products. Through these findings, the paper makes several important theoretical and practical contributions, which are highlighted below.

5.1. Theoretical Contributions

On the theoretical front, the paper makes the following three key contributions. First, it offers a fresh perspective to the literature on social media data analytics for business purposes. Existing studies on business analytics have often studied social media in relation to products and services that have already been launched (e.g., Lipizzi et al., 2015). The consumer co-creation literature has also studied social media in relation to products that are not even conceived but possible to be developed through crowdsourcing (e.g., Roberts et al., 2017).

Deviating from such works, this paper studies social media in relation to IS products that are conceived, possibly undergoing development, but yet to be launched.

Second, this paper initiates a new strand of empirical research focusing on the intersection between social media data analytics and ISD project management. The importance of social media in business is well documented in the literature. Social media is known to help businesses in engaging stakeholders (Waters et al., 2009). Particularly in the context of ISD, research has highlighted the potential of social media to inform project management—albeit implicitly (Remidez and Jones, 2012; Roberts et al., 2016). Extending the implicit references in the literature, this paper represents one of the earliest attempts to empirically demonstrate the degree to which ISD project management teams could make use of social media to manage end-users' expectations.

Third, in studying a relatively new and under-explored phenomenon (i.e., how end-users talk about forthcoming IS products on social media), the paper reinforces the existing theoretical framework of social exchange (Bagozzi, 1975) for understanding online user-generated content. With this theoretical lens, Williams et al. (2015) showed that social media interactions in the early stage of a non-ISD project can be helpful for project managers in terms of value transfer. Extending the literature, this paper shows that the online chatter about forthcoming IS products can also offer useful insights to project management teams. In this way, it also contributes to the emerging literature on pre-consumption online chatter (Castillo et al., 2021). However, the extent to which businesses actually monitor the content still remains an open question that future works need to address.

5.2. Implications for Practice

On the practical front, the paper offers insights into how prospective end-users communicate on social media about much-awaited IS products before they are launched, and how such communication could be processed by ISD project management teams to manage expectation.

These insights in turn can inform efforts of fostering a positive opinion climate online, as well as developing meaningful relations between ISD project management teams and prospective end-users of IS products—both of which are key prerequisites for ISD projects to succeed.

In particular, this paper recommends adding capabilities of social media data analytics to ISD project management approaches, especially when the IS products are meant for the mass market. This can help in managing stakeholders' expectations before product launch. Such a recommendation is consistent with recent studies but in a non-ISD context (e.g., Jia et al., 2020).

Additionally, the paper recognises the need for marketing and ISD teams to collaborate closely. It is important to break down silos and foster greater knowledge exchange across different teams within an organisation. Given the popularity of social media as a platform for end-users to talk about forthcoming gadgets, social media marketers need to work closely with ISD teams to help with project stakeholder management. This will allow ISD developers and project managers to be agile in effectively responding to the constantly evolving end-user expectations, which in turn may reduce the likelihood of ISD project failures (Baghizadeh et al., 2020).

Overall, the ways in which firms use social media to create a hype about forthcoming IS products for the mass market has much scope for improvement. For one, while a number of tweets echoed apprehensions regarding ways in which the pandemic would affect product release dates, there was hardly any tweet from either Apple or Samsung to update end-users about the impact of Covid-19. Consistent with the literature on the dark side of social media (Aswani et al., 2019; Baccarella et al., 2018; Fox and Moreland, 2015), rumours about forthcoming IS products made their presence felt. For example, iPhone 12 was expected to come with a flip design and 802.11ay wireless standard. However, there was hardly any tweet to debunk such myths. Social media marketing teams are recommended to play a more proactive role in managing the online chatter about forthcoming IS products.

Finally, as the world continues to grapple with Covid-19, the social media data analytics for this paper found evidence that end-users expect upcoming gadgets to address problems caused by the pandemic. Therefore, developers of subsequent IS products for the mass market need to invest in innovations related to video calling, grocery and takeout apps, contactless payment as well as contact tracing functionalities. The tagline for Apple Watch 6[3] "The future of health is on your wrist" shows how Covid-19 is shaping the marketing of gadgets. Nonetheless, it is also important for marketing teams to create a buzz about such functionalities on social media before the products are launched. End-users' expectations can be better managed if firms are more transparent on their social media channels about how the pandemic might affect supply chains and product release dates.

5.3. Limitations and Directions for Future Research

The findings of this paper need to be viewed in light of the following limitations that future research can address. First, data were collected only from Twitter. For this reason, the volume of tweets was not always substantial to draw meaningful inferences. Future research could replicate the current exploratory work by concurrently drawing data from multiple social media platforms. Second, the paper used Apple and Samsung as the test cases for investigation. Caution is warranted in generalizing the findings. Similar research efforts are needed with IS products from other tech giants. Third, since this paper only looked into social media data, there was no scope for triangulation. Future research in this arena could corroborate the insights gleaned from social media data with primary data obtained from ISD project management teams, marketing teams as well as end-users on social media. Surveys or interviews could be conducted with industry stakeholders to better understand who monitors social media content about forthcoming products, for what purposes, how is the monitoring done, and how is the knowledge embedded across different teams within a given organisation.

6. Conclusion

This paper has explored how netizens talk about forthcoming IS products that are intended for the mass market but still not available in the market. Tweets related to the following four forthcoming IS products were retrieved: (1) Apple iPhone 12 (6,125 tweets), (2) Apple Watch 6 (553 tweets), (3) Samsung Galaxy Z Flip 2 (923 tweets), and (4) Samsung Galaxy Watch Active 3 (207 tweets). These were then analysed using a combination of the Natural Language Processing Toolkit (NLTK) and sentiment analysis (SentiWordNet). The online community was found to be quite vocal about topics such as design, camera, and hardware specifications. For all the forthcoming gadgets, the proportion of positive tweets exceeded that of negative tweets. The most prevalent sentiment expressed in Apple-related tweets was neutral. In contrast, the most prevalent sentiment expressed in Samsung-related tweets was positive. Additionally, it was found that the proportion of tweets echoing negative sentiment was lower for Apple compared with Samsung. In sum, compared with the forthcoming IS products from Apple, those from Samsung seemed to polarise netizens' opinions to a greater extent. In the case of forthcoming smartphones, end-users were mostly excited about design and network features. In the case of forthcoming smartwatches, end-users' tweets reflected an interest in facilities to calculate blood oxygen level. Apple Watch 6, which is now already available in the market, indeed allows measuring blood oxygen level. This suggests that end-users' expectations voiced through social media might have informed, at least partially, the development of this IS product.

Notes

[1] https://www.internetlivestats.com/
[2] https://www.apple.com/uk/iphone-12/
[3] https://www.apple.com/uk/apple-watch-series-6/

References

Aswani, R., Kar, A. K., and Ilavarasan, P. V. (2019), "Experience: Managing misinformation in social media—Insights for policymakers from Twitter analytics. *Journal of Data and Information Quality*, Vol. 12 No. 1, pp. 1-18.

Baccarella, C. V., Wagner, T. F., Kietzmann, J. H., and McCarthy, I. P. (2018), "Social media? It's serious! Understanding the dark side of social media", *European Management Journal*, Vol. 36 No. 4, pp. 431-438.

Baghizadeh, Z., Cecez-Kecmanovic, D., and Schlagwein, D. (2020), "Review and critique of the information systems development project failure literature: An argument for exploring information systems development project distress", *Journal of Information Technology*, Vol. 35 No. 2, pp. 123-142.

Bagozzi, R. P. (1975), "Marketing as exchange", *Journal of Marketing*, Vol. 39 No. 4, pp. 32-39.

Bayus, B. L. (2013), "Crowdsourcing new product ideas over time: An analysis of the Dell IdeaStorm community", *Management Science*, Vol. 59 No. 1, pp. 226-244.

Berger, J., Humphreys, A., Ludwig, S., Moe, W. W., Netzer, O., and Schweidel, D. A. (2020), "Uniting the tribes: Using text for marketing insight", *Journal of Marketing*, Vol. 84 No. 1, pp. 1-25.

Burton-Jones, A., Butler, B. S., Scott, S., and Xu, S. X. (2021), "Next-generation information systems theorizing: A call to action", *MIS Quarterly*, Vol. 45 No. 1, pp. 301-314.

Castillo, A., Benitez, J., Llorens, J., and Luo, X. R. (2021), "Social media-driven customer engagement and movie performance: Theory and empirical evidence", *Decision Support Systems*, Vol. 45, Article 113516.

Chen, H., Chiang, R. H., and Storey, V. C. (2012), "Business intelligence and analytics: From big data to big impact", *MIS Quarterly*, Vol. 36 No. 4, pp. 1165-1188.

Chua, A. (2009), "Exhuming IT projects from their graves: An analysis of eight failure cases and their risk factors", *Journal of Computer Information Systems*, Vol. 49 No. 3, pp. 31-39.

Chua, A., and Banerjee, S. (2013), "Customer knowledge management via social media: The case of Starbucks", *Journal of Knowledge Management*, Vol. 17 No. 2, pp. 237-249.

Chua, A., and Banerjee, S. (2018), *IT project failures: Lessons from the ashes*. Pearson Education South Asia, Singapore.

Dolan, R., Conduit, J., Fahy, J., and Goodman, S. (2016), "Social media engagement behaviour: A uses and gratifications perspective", *Journal of Strategic Marketing*, Vol. 24 No. 3-4, pp. 261-277.

Dotsika, F., and Patrick, K. (2013), "Collaborative KM for SMEs: A framework evaluation study", *Information Technology & People*, Vol. 26 No. 4, pp. 368-382.

Dwivedi, Y. K., Wastell, D., Laumer, S., Henriksen, H. Z., Myers, M. D., Bunker, D., ... and Srivastava, S. C. (2015), "Research on information systems failures and successes: Status update and future directions", *Information Systems Frontiers*, Vol. 17 No. 1, pp. 143-157.

Eskerod, P., Huemann, M., and Savage, G. (2015), "Project stakeholder management—Past and present", *Project Management Journal*, Vol. 46 No. 6, pp. 6-14.

Fan, W., and Gordon, M. D. (2014), "The power of social media analytics", *Communications of the ACM*, Vol. 57 No. 6, pp. 74-81.

Fox, J., and Moreland, J. J. (2015), "The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances", *Computers in Human Behavior*, Vol. 45, pp. 168-176.

Grover, P., and Kar, A. (2020), "User engagement for mobile payment service providers–introducing the social media engagement model", *Journal of Retailing and Consumer Services*, Vol. 53, Article 101718.

Grover, P., Kar, A., and Davies, G. (2018), ""Technology enabled Health"–Insights from twitter analytics with a socio-technical perspective", *International Journal of Information Management*, Vol. 43, pp. 85-97.

Harrin, E. (2016), Collaboration tools for project managers: How to choose, get started and collaborate with technology. Project Management Institute.

Heller, J., and Robinson, K. (2017, March 13). Meet your new MOM (Marketing Operating Model). McKinsey. Accessed on 22 Mar 2021 https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/meet-your-new-mom#

Hughes, D. L., Rana, N. P., and Dwivedi, Y. K. (2020), "Elucidation of IS project success factors: An interpretive structural modelling approach", *Annals of Operations Research*, Vol. 285 No. 1, pp. 35-66.

Jia, J., Ma, G., Jiang, S., Wu, M., and Wu, Z. (2020), "Influence of social media use at work on construction managers' work performance: The knowledge seeker's perspective", *Engineering, Construction and Architectural Management*. DOI 10.1108/ECAM-09-2020-0705

Johnson, S. L., Gray, P., and Sarker, S. (2019), "Revisiting IS research practice in the era of big data", *Information and Organization*, Vol. 29 No. 1, pp. 41-56.

Kanagarajoo, M. V. (2018), "A framework for social media use in project management", unpublished dissertation, Edith Cowan University, available at: https://ro.ecu.edu.au/cgi/viewcontent.cgi?article=3105&context=theses (accessed 18 September 2020).

Kanagarajoo, M. V., Fulford, R., and Standing, C. (2020), "The contribution of social media to project management", *International Journal of Productivity and Performance Management*, Vol. 69 No. 4, pp. 834-872.

Kaplan, A. M., and Haenlein, M. (2010), "Users of the world, unite! The challenges and opportunities of Social Media", *Business Horizons*, Vol. 53 No. 1, pp. 59-68.

Kræmmergaard, P., and Rose, J. (2002), "Managerial competences for ERP journeys", *Information Systems Frontiers*, Vol. 4 No. 2, pp. 199-211.

Kuhn, T. S. (1996), *The structure of scientific revolutions* (3rd ed.). University of Chicago Press.

Lipizzi, C., Iandoli, L., and Marquez, J. E. R. (2015), "Extracting and evaluating conversational patterns in social media: A socio-semantic analysis of customers' reactions to the launch of new products using Twitter streams", *International Journal of Information Management*, Vol. 35 No. 4, pp. 490-503.

Maruping, L. M., and Matook, S. (2020), "The multiplex nature of the customer representative role in agile information systems development", *MIS Quarterly*, Vol. 44 No. 3, pp. 1411-1437.

Niederman, F. (2021), "Project management: Openings for disruption from AI and advanced analytics", *Information Technology & People*. DOI 10.1108/ITP-09-2020-0639

Osei-Frimpong, K., McLean, G., and Famiyeh, S. (2019), "Social media brand engagement practices", *Information Technology & People*, Vol. 33 No. 4, pp. 1235-1254.

Pal, A., Chua, A., and Goh, D. H. L. (2017), "Does KFC sell rat? Analysis of tweets in the wake of a rumor outbreak", *Aslib Journal of Information Management*, Vol. 69 No. 6, pp. 660-673.

Pan, G., Hackney, R., and Pan, S. L. (2008), "Information systems implementation failure: Insights from prism", *International Journal of Information Management*, Vol. 28 No. 4, pp. 259–269.

Piller, F., Schubert, P., Koch, M., and Möslein, K. (2005), "Overcoming mass confusion: Collaborative customer co-design in online communities", *Journal of Computer-Mediated Communication*, Vol. 10 No. 4, JCMC1042.

Prasad, W., Perera, G., Padmini, K., and Bandara, H. (2018), "Adopting design thinking practices to satisfy customer expectations in agile practices: A case from Sri Lankan software development industry", Proceedings of the Moratuwa Engineering Research Conference, pp. 471-476.

Purcarea, I. M. (2020), "Marketing transformation under the pressure of the new technologies and emotions impact on decision making", *Holistic Marketing Management Journal*, Vol. 10 No. 4, pp. 13-22.

Rao, H., Vemprala, N., Akello, P., and Valecha, R. (2020), "Retweets of officials' alarming vs reassuring messages during the COVID-19 pandemic: Implications for crisis management", *International Journal of Information Management*, Vol. 55, Article 102187.

Remidez, H., and Jones, N. B. (2012), "Developing a model for social media in project management communications", *International Journal of Business and Social Science*, Vol. 3 No. 3, pp. 33-36.

Roberts, D. L., Piller, F. T., and Lüttgens, D. (2016), "Mapping the impact of social media for innovation: The role of social media in explaining innovation performance in the PDMA comparative performance assessment study", *Journal of Product Innovation Management*, Vol. 33, pp. 117-135.

Roberts, D. L., and Darler, W. (2017), "Consumer co-creation: An opportunity to humanise the new product development process", *International Journal of Market Research*, Vol. 59 No. 1, pp. 13-33.

Ryan, T. (2020). Will the pandemic finally bring marketing and IT teams together? RetailWire. Accessed on 22 Mar 2021 https://www.retailwire.com/discussion/will-the-pandemic-finally-bring-marketing-and-it-teams-together/

Schwalbe, K. (2015), *Information technology project management*, Cengage Learning, Boston, MA.

Sidorova, A., Evangelopoulos, N., Valacich, J. S., and Ramakrishnan, T. (2008), "Uncovering the intellectual core of the information systems discipline", *MIS Quarterly*, Vol. 32 No. 3, pp. 467-482.

Stone, T., and Choi, S. K. (2013), "Extracting consumer preference from user-generated content sources using classification", Proceedings of the International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers, V03AT03A031.

Tsohou, A., and Holtkamp, P. (2018), "Are users competent to comply with information security policies? An analysis of professional competence models", *Information Technology & People*, Vol. 31 No. 5, pp. 1047-1068.

Waters, R. D., Burnett, E., Lamm, A., and Lucas, J. (2009), "Engaging stakeholders through social networking: How nonprofit organizations are using Facebook", *Public Relations Review*, Vol. 35 No. 2, pp. 102-106.

Wikström, S. (1996), "Value creation by company-consumer interaction", *Journal of Marketing Management*, Vol. 12 No. 5, pp. 359-374.

Williams, N. L., Ferdinand, N., and Pasian, B. (2015), "Online stakeholder interactions in the early stage of a megaproject", *Project Management Journal*, Vol. 46 No. 6, pp. 92-110.