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A nine dimensional framework for digital cultural heritage organizational sustainability

A content analysis of the LIS literature (2000–2015)

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Abstract

Purpose – The purpose of this paper is to report on how library and information science (LIS) as a field operationalizes the concept of organizational sustainability for managing digital resources, projects and infrastructures such as digital libraries and repositories over time. It introduces a nine dimensional framework for organizational sustainability in the digital cultural heritage community.


Findings – Comparing the articles to the nine dimension framework shows that most LIS articles discuss technology, financial or management dimensions. Fewer articles describe disaster planning, assessment or policy dimensions.

Research limitations/implications – Three LIS databases might not include all relevant journals, conferences, white papers and other materials. The data set also did not include books; library management textbooks might include useful material on organizational sustainability. Claims about the prevalence of themes are subject to methodological limits of content analysis.

Practical implications – Organizations that steward digital collections need to be clear about what they mean when they are referring to organizational sustainability so that they can make appropriate decisions for future-proofing their collections. The analysis would also suggest for a greater need to consider the full range of dimensions of organizational sustainability.

Originality/value – By introducing a new nine dimensional framework of organizational sustainability the authors hope to promote more and better conversations within the LIS community about organizational sustainability. The authors hope these conversations will lead to productive action and improvements in the arrangements of people and work necessary to keep digital projects and services going over time, given ongoing challenges.

Keywords Sustainability, Content analysis, Data and digital repositories, Digital longevity

Paper type Research paper

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1. Introduction
The creation of information infrastructures such as data archives, repositories and digital libraries require significant outlays of public or philanthropic funding, and they serve as rich sources of content that support research across the disciplines. Recently, the larger digital resource community has called for concerted attention to the long-term sustainability of these digital cultural heritage organizations (DCHO) (Ember and Hanisch, 2013; Kitchin et al., 2015), raising concerns about both the sustainability of digital materials, but also the sustainability of the DCHO that manages the materials (i.e. the organization’s sustainability). This paper focuses primarily on the latter – the sustainability of the DCHO that develop, manage and support digital cultural heritage. To further the goal of increasing DCHO sustainability, this paper introduces nine dimensions of DCHO organizational sustainability. By generating a broader understanding of the different elements of organizational sustainability, we can improve communications about sustainability efforts and better spread new ideas and best practices.

What does organizational sustainability mean in the library and information science (LIS) community? The slipperiness of the term poses challenges for DCHO that concern themselves with curating and managing content and objects over time, perhaps a very long time (Chowdhury, 2014). We conceptualize organizational sustainability for DCHO as consisting of nine dimensions that we discuss below; but for starting purposes, we define organizational sustainability in the DCHO context as consisting of the arrangements of people and work practices that keep digital projects and services going over time, given ongoing challenges. Other definitions used in the literature allude to breadth and complexity of the concept of organizational sustainability, referring to it as a “broad term which refers to many factors” (Dasgupta, 2005). While this paper focuses on organizational sustainability, it is important to recognize that digital preservation of bits and files represents an important and large outlay for DCHO charged with curating content over time. But, this paper focuses on the DCHO sustainability challenges beyond these technical dimensions of digital preservation.

We analyze a sample of the LIS literature from 2000 to 2015 in light of a nine dimensional view of DCHO sustainability and show what dimensions LIS authors currently emphasize, or what dimensions they tend to ignore, when talking about DCHO sustainability. By introducing a new nine dimensional framework of organizational sustainability for DCHO we hope to promote more and better conversations within the LIS community about organizational sustainability. We hope these conversations will lead to productive action and improvements in the arrangements of people and work necessary to keep digital projects and services going over time, given ongoing challenges.

Our nine dimensional framework stems from a review of LIS literature about organizational sustainability from 2001 to 2003, and a review of major theoretical frameworks of organizational sustainability from across a variety of academic fields (Eschenfelder and Shankar, 2016). We drew on ideas from other frameworks such as the groupings of skill areas for sustainability recommended by the Knowledge Exchange Project (2014) sustainability index which lists target skills needed at different stages of organizational sustainability. From the organizational theory literature, we examined Ostrom and Hess’s (2011) institutional analysis and development framework (IAD) which describes how actors organize themselves to sustainably manage commons resources, and Burnard and Bhamra’s (2011) resiliency framework which depicts organizational “resilience” in terms of feedback loops of environmental scanning and organizational learning. This review resulted in definitions and coding rules for nine dimensions of organizational sustainability: technology, management, relationships, revenue, costs, valued product/service, disaster planning, legal/policy, metrics/assessment. Each of the dimensions had multiple sub-codes representing different aspects of the dimension.
2. Research design

Aims and objectives

This paper introduces nine dimensions of the sustainability of the organizations that support digital collections. It presents quantitative data about the prevalence of each dimension in the LIS literature, and it presents qualitative analysis of what each dimension encompasses. The paper addresses the following research questions:

RQ1. How do discussions of organizational sustainability appear in the literature?

RQ2. What dimensions of organizational sustainability are more prevalent in the literature?

RQ3. Which dimensions of organizational sustainability are less prevalent in the literature?

RQ4. What subthemes emerge within each dimension?

Methodology

In order to answer these questions, the authors conducted a structured content analysis (focusing on the concept of organizational sustainability as defined above) of 15 years of the LIS literature (2000–2015) from three LIS databases using a codebook based on the nine dimension framework.

To develop the corpus of texts for analysis, the authors collected the results of queries of English-language-only articles published from 2000 to 2015 and indexed in the databases Library & Information Science Full Text, Library, Information Science & Technology Abstracts, and Library and Information Science Abstracts in Autumn 2016. The authors used the following query string: “Sustainability in abstract AND digital in abstract AND (library or archive or repository)” to identify relevant abstracts from journal articles (both peer reviewed and not peer reviewed), white papers, conference reports and master’s theses.

Not all returned articles were relevant, so one co-author reviewed all articles in the initial results set for applicability. The authors excluded articles about environmental sustainability, non-digital-program sustainability (e.g. sustainability of information literacy programs), print collection sustainability, sustainability of the entire scholarly communication industry (as opposed to a particular project), or considerations of the environmental impact of information and communication technologies. Importantly, retained articles did not have to use the word “sustainability.” Retained articles also used synonyms such as “longevity,” “future availability,” “future use” or “long-term health” of a collection. Some articles in the initial results set made only passing reference to sustainability and were not suitable for further analysis. In order to qualify for retention, the article’s treatment of sustainability had to consist of more than five lines of text, or the treatment had to be mentioned multiple shorter times within the paper, or the treatment of sustainability had to be visually separated in the text (e.g. in a header), or the treatment had to be included in a table or figure.

After culling articles that did not meet the inclusion criteria, 64 articles were left in the analysis set. The authors obtained the full text of each article in the analysis set.

In order to analyze articles against the nine dimensions, the authors had previously created a codebook and a set of coding rules for each of the nine dimensions based on a pilot study of similar articles from 2001 to 2003. To ensure coding quality, all co-authors participated in four rounds of coder training in which the authors co-coded the same articles, compared the results, discussed discrepancies, and augmented the coding rules for the nine dimensions.

The authors then split into pairs to use the codebook to code the 64 articles in the analysis set. Each pairs of analysts read and coded the complete text of 25–30 articles each.
Each pair compared results for their articles, and resolved discrepancies, before reporting final results. All results reported below are computed from the analysis set of the 64 coded articles from across the fifteen year analysis period of 2000–2015.

3. Results

Overview of literature and prevalence of the dimensions in the literature

At a high level, analysis suggests that authors in the LIS literature talk about sustainability in a passing manner, rather than at length or in great depth. Most articles only briefly discussed sustainability within the context of an article addressing other issues. In general, most articles described only one project, and discussions of any aspect of sustainability were limited to that project. Only four of the analyzed articles presented more abstract, theoretical or comparative views of organizational sustainability (Arnoldus et al., 2011; LeFurgy, 2009; Palaiologk et al., 2012; Zorich, 2003).

Most of the LIS authors used the concept of organizational sustainability as part of an expression of aspiration to continued success based on personal testimony. They explained how “if our project does/has these things, it is/will be sustainable.” Authors also used the concept of organizational sustainability as a tool of compulsion: “If we don’t get x, we won’t be sustainable,” or as a recommendation or warning to peers: “You really ought to do x to be sustainable.”

We analyzed the nationality of each article by identifying the location of the first author’s listed institution. Most of the articles were written by authors at institutions in the northern hemisphere. In all, 45 percent articles were from the USA and 17 percent were from the UK. The majority of the remaining articles were European in origin. About 11 percent of articles stemmed from nations not in the northern hemisphere (e.g. China, Nigeria and Malaysia). Using Ulrich’s database to distinguish publication types, analysis found the vast majority of the articles in the analysis set were published in peer reviewed LIS journals. The second most common type of publication was professional journals. Other publication types included conference papers, newsletters, reports, and a thesis. Quantitatively, Figure 1 shows the number of articles addressing organizational sustainability grew unevenly from 2005-2015. They rose dramatically from 2000 (one article) to 2006 (five articles). After 2006, the number of articles per year has ebbed and flowed, most recently falling to only two articles in 2015.

Table I shows the results of the prevalence of the dimensions in the analyzed literature. The most commonly discussed dimensions in the LIS literature include technology, management, relationships with partners and key stakeholders, and sources of revenue.

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**Figure 1.**
Number of LIS articles addressing organizational sustainability over time

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The authors found that 65 percent of the LIS articles talked about technology in relation to organizational sustainability. The second most common dimension was management; 55 percent of articles discussed management aspects of sustainability. The third most prevalent was relationships, with 47 percent of articles discussing sustainability in terms of relationships between a digital archive, library or repository and other individuals or organizations. The fourth most frequent dimension was revenue; 44 percent of LIS articles discussed sustainability with regard to revenue. Costs and valued produce/service were also common (29 and 24 percent each). The dimensions of disaster planning, legal/policy and metrics/assessment were all described by fewer than 20 percent of coded articles. It is important to point out that if one combines the cost and revenue dimensions, then general financial issues were dominant (73 percent of articles).

The authors had expected that management and financial issues (i.e. revenue and costs) would be prominent dimensions, but the technology dimension dominated. Also, given the prominence of formal evaluation in contemporary institutions, it was surprising that so few articles discussed metrics/assessment in relation to organizational sustainability (11 percent).

The paper continues by describing the qualitative analysis of subthemes within each of the nine dimensions of organizational sustainability. We use direct quotes from articles in our sample to demonstrate subthemes.

**The technology dimension of organizational sustainability.** Technology was the most commonly dimension discussed in the articles (65 percent). Subthemes include standards, data formats, characteristics of software (commercial/open source/proprietary), redundant configuration of servers (clouds, back up arrangements), various types of metadata (identifiers, authenticity) and documentation of technology documentation practices. Inductive analysis of the data focused on illuminating how authors explained the relationship between technology and organizational sustainability (positively or negatively). Not surprisingly, articles discussing the technology dimension had the most overlap with concerns about digital preservation, and this section therefore includes digital preservation concerns in discussion of subthemes.

The two most prominent subthemes included technology in aid of organizational sustainability and technology as a hindrance. Other threads that emerged from analysis included the importance of technology frameworks for sustainability (e.g. Trusted Digital Repositories certification, Open Archival Information System (OAIS) (Lee, 2010; International Organization for Standardization, 2012), and standards compliance and open source technologies as promoting sustainability. Less prominent subthemes included the statement that one must conceptualize technology and sustainability as a process, recycling of technologies and technology as labor- and cost-saving devices.

One set of claims stated that use of technologies with certain characteristics could make DCHO more sustainable than they might otherwise be; or in other words, that a specific

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<tr>
<th>Code/theme</th>
<th>% Articles using this theme</th>
<th>No. of articles using this theme</th>
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<tr>
<td>Technology</td>
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<td>40</td>
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<tr>
<td>Management</td>
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<td>34</td>
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<tr>
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<td>Revenue</td>
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<td>Valued product/service</td>
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<td>Disaster planning</td>
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<tr>
<td>Legal/policy</td>
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<tr>
<td>Metrics/assessment</td>
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Table I. Organizational sustainability theme prevalence in LIS literature.
technology or technologies would aid organizationally sustainability. The examples were short simple statements based on the author’s personal experience, often phrased as a recommendation that might be linked to another dimension of organizational sustainability. For example, Arnoldus et al. (2011) recommended the value of standardized or common technologies for lowering costs, “The use of open standards in the back office and generic technology for the long-term are more sensible decisions […]” (p. 45). Other authors argued that standardized technologies could also decreasing maintenance costs while also increasing ease of use. For example, Dasgupta (2005) recommended “use standards” “monitor” changes, and “migrate” when necessary (p. 7). Many authors referred more to things that would support digital preservation. For example, Fyffe and Warner (2005) recommended metadata and file standards as a means of promoting “technical sustainability”: “Technical sustainability is directly related to the standards and best practices followed when creating the digital files […]” (p. 98). Other authors recommended metadata practices to ensure interoperability and migration of files over the long term, but also for aiding tracking of projects and operations by DCHO. Other sustainability promoting characteristics of technology or technology practices named in articles included: customizability, openness, sharing, seamless interfaces and services, common database systems, central clearinghouses for technical information, and use of sustainable formats.

Some authors warned of how technology issues may inhibit DCHO sustainability. For example, Zorich (2003) described how use of overly local metadata practices may impede sustainability: “one of their greatest sustainability problems is rooted in the heterogeneous recording practices that plague the museum community” (p. 25). Manal et al. (2013) described problems with the adoption of inappropriate standards: “There are significant risks to these investments due to the adoption of inappropriate technologies and standards. This can result in creating resources which are quickly obsolete and unusable or which require the investment to be repeated within a short time frame” (p. 6). Other problems authors addressed included content loss due to technical failures, inability to access storage devices, and loss of software necessary to interpret stored information.

The relationships between standards, sustainability and technology were strong in the LIS literature. This included articles discussing being a trusted repository, articles discussing OAIS (or related models), and articles discussing open source software. As an example of articles that focused on digital preservation aspects of technology, Madalli et al. (2012) explained how open standards promoted the digital preservation: “It is necessary to convert items from proprietary formats into open formats and open standards, so they can then be uploaded into a digital archive for future storage, retrieval, and preservation” (p. 164).

But many authors spoke to how technology promoted organizational sustainability more broadly. For example, Manghi et al. (2010) argued that “customizability, openness, sharing, reuse and orchestration of the given services enable sustainable patterns” in an organization. Renwick (2011) suggested that use of open source technologies was an indicator of an organization’s willingness to “grow, develop, and adapt” to changes, which are qualities of sustainable projects (p. 11). Armstrong (2012) and Arnoldus et al. (2011) wrote about banishing “boutique projects” and using open standards and generic technologies to increase sustainability. Awre (2012) argued that open source could promote sustainability by generating wider interest in projects that “foster […] sustainability of the community around this open source development.” (p. 1).

Fewer papers talked specifically about the importance of storage in terms of sustainability, technology reuse or recycling as a sustainability method or the use of technology to save labor costs.
In summary, the most prominent subthemes within the technology dimension of DCHO sustainability included the arguments that technology can both aid and hinder sustainability, the importance of digital preservation, the importance of technology standards (e.g. OAIS, trusted digital repositories) for guiding sustainability, and the value of open standards and technologies.

**The management dimension of organizational sustainability.** Management was the second most common dimension addressed by articles in the data set. In all, 55 percent of articles included an argument linking management practices and organizational sustainability. Analysis yielded many subthemes including the role of strategic planning and market research, having professionalized processes/procedures/policies and having a business model. Lesser subthemes included the value of scale and changing organizational forms.

One of the most prominent subthemes within management was strategic planning. Authors attested to the importance of systematic planning well beyond the initial phases of a project, and how planning should encompass many aspects of the project. Karim (2004) explained that a project “will need to have a well-planned business strategy in order for it to be sustainable.” (p. 8). For the most part, articles did not give instructions or examples of how to do strategic planning for digital projects and services, but rather simply referred to its importance. (Some exceptions include Arnoldus *et al.*, 2011; Smith, 2001).

Another prevalent subtheme within management was the importance of market research and marketing for sustainability. Authors argued that repositories should identify a target audience for projects and conduct market research in order to develop a highly valued and used service. For example, Armbruster and Romary (2010) critiqued other projects for failing to identify content that is “relevant” and “interesting” to target audiences (p. 6). LIS authors usually did not give instructions or examples of how to do market research, but simply emphasized its importance. Related to market research, authors described the importance of marketing of existing services. Ngulube (2012) notes, “Marketing is therefore critical in ensuring that the archives are well-known by prospective users” (p. 3). Although articles explained that marketing was essential, they did not provide instruction about how to go about marketing.

Stakeholder engagement was a related subtheme; authors argued that engagement increased sustainability. For example, Oldman *et al.* (2014) critique past projects for lack of engagement: “Many cultural data aggregation projects have failed to address these foundational elements contributing instead to a landscape that is still fragmented, technology driven and lacking the necessary engagement from humanities scholars and institutions” (n.p.).

Another subtheme was “business model.” While many articles used the term, fewer attempted to define it beyond a general sense of “how things are done” or “how organizations remain sustainable” (Zorich, 2003). Articles stressed the need to have business models aligned with target audiences, organizational missions, and current or future sources of income. At the same time, as Zorich points out “no one is certain which models work” given their context dependency (p. 26). So the pointers to the importance of business models typically lacked guidance about what business models work when.

A few articles provided more extensive definitions of the term business model, but presented very different views of its components, suggesting a lack of consensus in the field about what a “business model” consists of. For example, Arnoldus *et al.* (2011) described nine elements of value propositions, customer segments, channels, customer relationship, key activities, resources and partnerships. Royan (2003) defined a business model in terms of licenses, subscriptions and rights management systems.

The final major subtheme in the management and sustainability theme was professionalization, or moving from ad hoc decision-making to having formal policies, procedures and processes. LeFurgy (2009) notes the need for “controlled processes” for long-term care of collections (p. 6). Articles argued that policies, procedures, and processes
are important to managing growth, making good decisions, developing and managing relationships and contracts, resource sharing and managing digitization.

Fewer articles discussed management in terms of labor. Those that did tended to emphasize that strong managerial skill sets are important for organizational sustainability. For example, Dasgupta (2005) argues for further development of managerial skills in “public relations, networking and marketing” for project sustainability and that “[...] strong, charismatic, confident project leadership, these techniques have to be acquired.” (p. 10).

Another less often discussed subtheme considered the need for managers to plan for possible changes to their organization in order to increase sustainability in areas such as partnerships, mergers, or succession planning. For example, Cruse and Sandore (2009) summarized projects that reshaped programs and developed “new organizational structures” for long-term sustainability (p. 4). Downs and Chen (2010) described succession planning arrangements made for data in case their repository closes.

In summary, the most prominent subthemes within management were the arguments that strategic planning, market research and business models are important to sustainability. Most articles however, gave little guidance about how to accomplish these tasks.

The relationships dimension of organizational sustainability. The relationships dimension was the third most common theme in the data set. The most common subthemes included pooling resources/reducing costs and flexibility/efficiency. Less common subthemes within relationships included the pros and cons of such: creating strategic partnerships (aka “marry rich”) as a sustainability strategy as well as the downsides of collaborations that impede sustainability.

Many authors described how sharing resources or building other relationships that reduce cost (e.g. by streamlining processes, sharing expertise and training, working on common standards), increases sustainability. A related subtheme was flexibility and efficiency, and authors argued that by collaborating, pooling resources and streamlining processes, projects can more quickly adapt to any expected or unexpected changes, thereby making them more sustainable. Collaborations could also ensure long-term preservation of data resources by ensuring back up homes if repositories close. As noted by Downs and Chen (2010), “Development of collaborations within and between institutions and associated contingency plans provides viable options for the long-term survivability of data” (p. 6).

Several articles discussed the importance of strategically building partnerships with resource-rich partners (primarily funders or other “important” actors) by aligning goals and processes with those partners. We called this the “marry rich” subtheme. Authors argued that by partnering with those that have more money or prestige, digital projects could benefit from a more stable environment, or the social capital from the partner’s reputation. For example, Kretzschmar and Potter (2010) argues that partnership with a university library increases the sustainability of the project, “In order to be the most sustainable, we have to align […] with the mission of the library” (p 444).

However, three articles were more cautious about collaboration. Conner et al. (2009), for example, discussed how multi-institutional partnerships can be problematic for collection sustainability, and emphasized how partnership conversations must include long-term sustainability planning. Oliver et al. (2010) discuss finding a balance between competition and collaboration among partners, and the role of identifying variable information needs to determine whether collaboration or competition is more appropriate. Young (2009) describes the difficulty of communications between partners and how it may negatively impact sustainability.

In summary, the most common subthemes in relationships were arguments that organizational sustainability is aided by resource pooling. This can reduce costs and increase flexibility, allowing digital archives, libraries and repositories to react more quickly to changing opportunities and constraints. While the LIS literature predominantly
presents relationships as positive, a few authors note complications, discussing how partnerships can complicate long-term sustainability planning or actions.

The revenue dimension of organizational sustainability. Revenue was the first of two financial dimensions of sustainability that, when taken together, dominated the corpus of articles. Within revenue, many articles described current or aspirational sources of revenue. A prominent subtheme was the need to have diversified and reliable sources of revenue. Less prominent subthemes included distinctions between startup funding and sustaining funding, challenges of getting grant funding, or the importance of reputation to funding.

The most prominent subtheme related to revenue was the need to have reliable revenue sources. A number of authors described current or aspirational sources of revenue or recommended investigation of a variety of revenue sources. Sources mentioned include, but are not limited to: endowments, donors, sponsorship advertising, and host institution/institution operating budgets, grants, contracts for service, user fees, consortium fees, instructional fees, author fees, user donations/contributions, and lotteries. Many authors expressed opinions about the goodness or badness of these sources of revenue.

Authors argued that lack of reliability of any given source of funding detracted from sustainability. Several authors cast doubt on the reliability of government funding sources or other sources often perceived to be reliable. As Francis (2008) notes, projects historically depending on government funding “are always subjected to the vagaries of budgetary allocation and redistribution. And it is useful to bear in mind that in times of economic crisis, funding for digital libraries could end abruptly” (p. 5).

Another subtheme was the distinction between startup funding and sustaining funding. Authors warned that while sustaining funding is very important to sustainability, it is harder to achieve than startup funding. As Hamilton (2004) advises, “it is best to start from the premise that external funding obtained to establish a project will rarely be an appropriate source to provide ongoing, unlimited funding for its continuation.” (p. 393). Digital projects may not have access to renewable grants available in some areas of the sciences to keep projects going. As Kretzschmar and Potter (2010) explain: “The fact is that most digital humanities projects, even famous ones, are managed by just one developer, or by a small working group, with inconsistent and unreliable funding. We do not have access to grant funding in the same way that our colleagues in the natural and physical sciences have it, with renewable grants that can keep laboratories running for long periods.” (p. 440).

Few LIS authors talked about the importance of reputation or “brand” in getting and maintaining funding but a few alluded to the concept. Zorich (2003) explained how a strong brand can make it easier to win funding, noting that organizations may receive other kinds of support from those that “hold it in high regard” (p. 20). Fewer authors discussed the need to plan and monitor funding both as a managerial activity; however similar themes in costs (see below) were more prominent. Related to brand, a limited number of articles suggested that partnerships might give access to new sources of funding (see relationships above), and one recommended linking digital projects to existing resources in the field so that they come to be seen as permanent fixtures that ought to be funded (see the “marry rich” argument in relationships).

In summary, the most common subthemes included descriptions of current or aspirational sources of revenue, the need to have reliable sources of revenue, and the need to plan well for sustaining sources of revenue.

The costs dimension of organizational sustainability. Costs were the second most-discussed financial dimension. Within costs (i.e. expenditures), the most prominent subthemes include lists of costs, awareness of costs (i.e. cost modeling) and costs associated with ongoing maintenance and access services. Less frequent subthemes included the argument that projects should, at their outset, plan for costs of ongoing operations, and that
boutique projects are less sustainable than scalable projects or projects that share resources or employ standardized solutions.

Many authors listed types of costs they experienced. Numerous authors advised the importance of knowing all of the costs associated with running digital projects and services. A subset of authors recommended that more cost data is important for sustainability. For example, Evens and Hauttekeete (2011) explained that “institutions are unable to report on the expenses” (p. 2). Palaiologk et al. (2012) argued that “[m]ore detailed figures are required to enable better decisions and thus sustain the future of the archiving entity and its data” (p. 196). LeFurgy (2009) contended that good information about costs increased sustainability by increasing transparency and accountability to stakeholders, improving an organization’s ability to “conduct necessary functions within defined cost parameters,” augmenting institutional capacity to pass audits, and facilitating setting of prices and fees (p. 420). But LeFurgy (2009) also presented a counter argument that clear cost information might decrease sustainability by making it easier for funders to make cuts, explaining that “[p]roviding information about the money going into preservation might be an invitation for cuts” (p. 422).

Few articles used the formal term “cost model” or presented recognizable cost models (for one exception see Palaiologk et al. (2012) who presents an activity-based cost model), most referred to tracking or mapping costs. A small subset of articles reported on costs for digitization for their projects. Another subtheme was the argument that digital projects ought not to spend all their money on digitizing or acquiring content but should instead save money to support and improve ongoing use and promotion. For example, Fuller (2006) calls for “more strategically spending must be done to ensure that resources that are purchased get used” (p. 16). Several articles noted how use of custom solutions increased costs over standardized solutions. One author argued that small projects are less sustainable because they cannot reduce costs through economies of scale. In sum, the most prominent subtheme in costs was the argument that having good information on costs made digital projects more sustainable.

The valued product/service dimension of organizational sustainability. Discussion of the value of an archive’s products and services to the user community (or lack thereof) was common in the literature. Articles advised that those beginning a project must identify a market of users for the project, have an understanding of what users need and want, and offer tools and services that meet these needs in order to develop high usage rates needed for sustainability. For example, Hamilton (2004) explained how the founders of an archive should have their market in mind, and not create an archive that only serves their or their colleagues’ needs. Other authors discussed the need for continuous feedback from users, as their needs are not static.

Taking a long-term perspective, a few articles argued that sustainable projects must be able to use data in new ways that may not have been conceptualized when the archive was established. A few authors discussed how having good metadata enables data to be usable in the future. Dasgupta (2005) stressed how sustainability requires collection policies about what not to keep: “The policies have also to lay down criteria for preservation because not all on-line material needs to be preserved on a long-term basis” (p. 7). Timing was identified in several articles as essential when considering the value of a project to potential user communities. As Zorich (2003) explained, the “good ideas bad timing” problem where some projects were unsustainable because they were “ahead of one’s time” (p.32).

The disaster planning dimension of organizational sustainability. Disaster planning, as a dimension of organizational sustainability, was not commonly discussed in the articles (15 percent or nine articles). There was some discussion of threats to the ongoing maintenance of the digital objects including the project, or organization ceasing to exist, mitigating against human error or malfeasance, natural disasters (such as flooding, earthquakes) or technological failures.
As described in the Trustworthy Repositories Checklist (Center for Research Libraries and OCLC, 2007), disaster planning as part of a larger risk management strategy is necessary to creating a trusted digital repository but require “constant monitoring, planning, and maintenance, as well as conscious actions and strategy implementation” (p. 3).

The legal/policy dimension of organizational sustainability. Legal and policy dimensions of sustainability were not often addressed in the articles (13 percent or 8 articles). A few discussed the balance between facilitating maximum access and use of works and encouraging capital investment in digital cultural projects and economic innovation by those projects. For example, Fyffe and Warner (2005) argue, “a balance must be struck between society’s legitimate interest in maximizing access to and use of the work and society’s equally legitimate interest in encouraging capital investment in digitization, dissemination, and long-term curation” (p. 4). In addition, several articles discussed copyright as an obstacle to digital preservation.

The metrics/assessment dimension of organizational sustainability. A few authors described the role of project evaluation and measurement as a dimension of organizational sustainability (11 percent or 7 articles). For example, Zorich (2003) describes the need for formative evaluation to develop a business plan and evaluate the need for and importance of a particular project to foster sustainability. Fuller (2006) explained the importance of demonstrating impact: “funding comes after a demonstrable educational impact” (p. 15). In general, metrics and assessment were discussed in terms of two subthemes: as “inward facing” nativities of organizational planning and risk management and as “outward facing” activities for demonstrating need and impact to stakeholders.

In terms of “inward facing” assessment, many articles mentioned either the Trustworthy Digital Repository Audit and Certification Checklist or the OAIS model, both of which provide assessment frameworks for digital projects that arguably could be used to increase sustainability (Lee, 2010). The Trustworthy Digital Repository Audit and Certification Checklist encourages the use of various evaluation tools by organizations in order to track the need for change and manage risk (2007). Similarly, the OAIS model provides both a framework for development and a set of benchmarks against which a data project can gauge compliance with international best practice and standards.

Assessment and metrics can also assist the data project in its “outward facing” mission of demonstrating success, relevancy, trustworthiness. For example, a few authors argued how tracking citations, or other indicators of use, (and promoting data citation) can prove value and contribute to continued use (and arguably then sustainability). However, in general, there was little discussion of citations/use tracking as a specific component of an institutional sustainability strategy.

4. Discussion
This paper compared LIS authors’ discussion of the organizational sustainability of digital libraries, archives and repositories with a nine dimensional framework of DCHO sustainability. Analysis shows that when LIS authors talk about DCHO sustainability, they mostly discuss the technological dimensions – specifically technological encouragers and inhibitors of organizational sustainability and digital preservation. However, if one combines the costs and revenue dimensions, then financial dimension of organizational sustainability dominates the conversation. LIS authors talked a great deal about having reliable sources of revenue, and understanding all costs inherent in a digital project or service. Management dimensions of organizational sustainability were also prominent.

It is not surprising that the financial, technology and management dimensions were dominant. These are common challenge areas for DCHO. One interesting point related to the revenue dimension: No LIS author argued that their project should not be expected to be sustainable.
While some articles did emphasize the desirability of government funding over fees and other sources of revenue, analysis did not find authors arguing that digital projects ought to be able to subsist solely on public funding due to their nature as public goods. Rather, LIS authors seem resigned to the need to diversify revenue.

We hope that the nine dimensions of organizational sustainability we employed in this paper will promote broader conversations about organizational sustainability. But the nine dimensions are just one example of possible frameworks to use to achieve this goal—other frameworks with more or different dimensions could draw out different aspects of organizational sustainability. The trusted digital repository and OAIS models can also serve that purpose, although they tend to be narrower in scope. As mentioned earlier, an alternative framework we drew on in creating our nine dimensions is the Knowledge Exchange (2014) sustainability index which lists target skills needed at different stages of organizational sustainability. From the organizational theory literature, Ostrom and Hess’s (2011) IAD describes how actors organize themselves to sustainably manage commons resources. We used both of these in creating our nine dimension framework. Both emphasize the importance of policy, assessment and responsiveness to stakeholders through governance processes (we coded for this as part of relationships)—but these dimensions which did not appear prominently in our data.

It is interesting to consider why LIS authors didn’t talk more about the dimensions that appeared less often in our results: disaster planning, legal/policy and metrics/assessment. Our review of the literature suggests that these are important dimensions (Eschenfelder and Shankar, 2016). One reason may be methodological: for example our search approach did not capture articles about disaster planning for DCHO that did not also include the search term of sustainability in the paper abstract. Discussion exists that is not in our analysis set. But, it could also be that our cultural bias toward stories of program success limits broader discussion. All the articles we examined presented sustainability as a positive thing, and no one argued that projects ought to be allowed to run their course and close down. When closures were discussed, they were presented as something to be avoided (if planned for). There is a need to consider the limits of organizational sustainability. In one of five discussions of closures, Zorich (2003) describes some LIS professionals’ belief that projects need support to close “in a dignified manner; otherwise, these projects might linger for years, draining resources to no avail” (p. 25). Greater attention to the closure of projects, the process of gracefully winding things down and the responsible transfer of collections could be very helpful to LIS professionals. Cultural biases that celebrate program creation and successes may unfortunately dampen this conversation.

In another example, the authors had expected more discussion of metrics and assessment in relation to organizational sustainability due to its potential importance in retaining trust of financial supporters and governance bodies. One possible explanation for the modest showing of this dimension is that we did not consider use of technology framework models (e.g. OAIS, trusted digital repository) as assessment. Including references to these frameworks would increase the counts for the metrics/assessment dimension somewhat. Second, in relation to dimensions related to use, fewer tools existed to make systematic assessment of use or impact easy to complete, or the tools were beyond the purview of most institutions. For example, turn-key analytics software to measure digital resource use (web analytics) were more do-it-yourself in early 2000s via log file analysis. Social media platforms only arrived in the mid-2000s and social media impact analysis arrived later. Third, many of the dimensions not related to use would be difficult to assess because the LIS community does not have commonly accepted comparative metrics. For example, with respect to revenue, assessment remains hazy beyond “bring in more” or “diversify” and DCHO may be hesitant to compare revenue or cost data with others.
The results presented in this work are limited by the scope of the article population, drawn from three different LIS databases in order to capture a global sample of the literature. These would not include all relevant journals, conferences, white papers and other materials. The data set also did not include books, and it is possible that LIS management textbooks might include useful material on organizational sustainability. Claims about the prevalence of dimensions are subject to methodological limits of content analysis.

5. Conclusion

This paper reports on how LIS as a field operationalizes the concept of organizational sustainability for managing digital resources, projects and infrastructures such as digital libraries and repositories over time. Using structured content analysis, the authors evaluated the literature from three LIS databases from 2000 to 2015. Nine significant themes emerged but most of the articles evaluated focus on technology/preservation/standards, management, relationships or revenue generation.

We conducted this analysis because language matters and words engender actions. By introducing a nine dimensional framework of organizational sustainability for DCHO into ongoing conversations in the field, we hope to promote more and better conversations about organizational sustainability. We hope these conversations will lead to productive action and improvements in the arrangements of people and work necessary to keep digital projects and services going over time, given ongoing challenges. By outlining nine dimensions of organizational sustainability, the paper helps organizations that steward digital collections think more broadly about what organizational sustainability encompasses, and it helps them be clear about what they mean when they are referring to organizational sustainability. We also hope the framework will facilitate more cross-institutional, comparative analysis to assist institutions to take a more evidence-driven approach to their long-term sustainability.

References


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Challenges to open peer review

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Abstract

Purpose – The purpose of this paper is to assess what the challenges to open peer review (OPR) are, relative to traditional peer review (TPR).

Design/methodology/approach – By examining select issues within peer review, more broadly, and challenges within TPR, the effectiveness of OPR is questioned.

Findings – Although OPR brings an aspect of transparency, by partially eliminating biases, fear of reprisals and of professional blow-back, either by authors who may be criticized or by competitors, limits the expansion of this peer review model, or its adoption as an industry-wide standard.

Originality/value – Open Science 2.0 boasts of greater openness and transparency and OPR is touted as one tool to achieve this. However, that potential is limited. This limitation needs to be recognized.

Keywords Fairness, Open science, Confidentiality, Competence, PPPR, Replication crisis

Paper type Viewpoint

Faulty traditional peer review likely opened the way to open peer review

Traditional peer review (TPR), as single- or double-blind peer review, has been the mainstay of academic publishing peer review (Walker and Rocha da Silva, 2015). Initially, the purpose of making the identity of the peer reviewer unknown was to offer “unbiased” yet critical perspectives and suggestions to authors, a noble objective that was fine when intellectual exploration was for intellectual satisfaction and scientific discovery. The commercialization of science and information exploited the publication of scientific findings, making the process more competitive, leading some nations to reward publications financially; thereby biasing purely intellectual objectives with non-academic ones. TPR is thus in a crisis. Pre-publication peer review and post-publication peer review (PPPR) are viable solutions to this crisis but only when used alongside TPR, i.e., TPR should not be abandoned, only fortified (Teixeira da Silva and Dobrânszki, 2015). However, the adoption of pre- and post-publication analysis of the literature can only take place when the publisher provides a platform that accommodates for PPPR (Teixeira da Silva et al., 2017). Few might be willing to make this transition because it would add pressure to an already over-burdened editorial board and would involve additional costs and investments. Academia is still far from any standardized policy or implementation regarding how to improve TPR, resulting in a wide variation in peer review quality between journals and publishers. Under such extraneous pressures, TPR has in many cases become biased, and hidden conflicts of interest, fake peer reviewers, fake peer reports and false claims of peer review are increasing (Teixeira da Silva, 2017). In this crisis, voices began to clamor for the identification of peer reviewers’ identities and their peer reports to verify that peer review had in fact been conducted, i.e., to verify the validity of TPR through a transparent process.

Open peer review (OPR), it can be argued, was to some extent born from the failures of TPR to provide a newly desired level of transparency.

What is open peer review and who does it benefit?

OPR involves the use of peer reviewers that disclose their identity to authors and vice versa. In the medical sciences, where human life is directly at stake, it can be strongly argued that OPR fortifies accountability and credibility, while offering tangible credit to the peer reviewer. Early OPR models failed because an opt-out clause invalidated the model and defeated its purpose, i.e., peers during this pre-screening phase could remain anonymous if they wished (Lee, 2012). OPR is also open to commentary from the public because those findings are assumed to ultimately benefit society, but multi-stage OPR,
due to the existence of various stages of checks, requires additional months to complete, making it potentially longer than TPR (Pöschl, 2012), even though this would benefit both science and society.

What challenges does open peer review face?
OPR is no silver bullet to resolving TPR’s crisis. It is one solution, but not one that the majority of academics (authors or editors) might embrace, at least not in its current state, even though the quality of peer review might not change whether reviewers are named or not (van Rooyen et al., 2010). If OPR represents improved competence, openness, transparency, fairness, greater respectful discussion and thus overall author and editorial accountability, at least in theory, then why has it not already been widely adopted?

The first issue relates to confidentiality. There is still a deeply ingrained conservative approach in TPR, senso lato, that it is a “secret” or confidential discussion between academics (authors and peer reviewers) where the editor serves as the moderator and final judge. However, the quality and professionalism of such comments may vary widely. In TPR, these comments take place behind closed doors, and the content of such comments is privy only to the editors. So, the first large barrier is how to evolve the academic culture to embrace a publishing model that employs OPR. The fact that a new peer reviewer rewards system, Publons, offer rewards equally for TPR-based and OPR-based peer review, but does not reveal the actual content of those peer review reports that would allow for independent critical analysis, and subsequent validation or invalidation of those peer review credits, fortifies the notion that this relatively new platform may be serving merely to commodify peer review rather than fortify it, and OPR (Teixeira da Silva and Al-Khatib, 2018).

A core argument in the open science debate is that discussion and communication about research and research findings should be an open process, especially to the public, especially when public funding is being used to finance that research, but not all academics feel the same way. One possibility is that they feel entitled to privacy, which then limits the expansion of OPR. However, is authors’ perception of privacy compatible with their academic responsibility to their research institutes, funders and tax-payers? It is possibly this ideological struggle between an author’s desire for fortified rights to choice vs the loss of those rights in an increasingly competitive commercialized publishing ecosystem (Al-Khatib and Teixeira da Silva, 2017) that may define the direction that OPR takes as Open Science 2.0 heads toward decisive 2020.

Fear is a powerful regulatory emotion, and the fear of criticism (criticizing others and being criticized) is amplified by the existence of the science watchdogs (Teixeira da Silva, 2016). Academics live within precariously sensitive and risky environments, where their relationships with other academics, society, editors and publishers are under constant and increasing scrutiny. A single misstep, a badly phrased idea that may challenge a controversial issue or a critique of another academic could be interpreted as an act of aggression, excessive challenge, unscholarly behavior or worse, rather than as an academic’s freedom of expression. So, academics might feel that exposing their real thoughts as peer reviewers in OPR, even more so when the work the work they are criticizing has flaws, is poorly conducted research or is badly written, even if their criticisms are valid, might open them up to criticism, shaming or even legal challenges by the peers (authors and editors) they are critiquing or by others. Not willing to risk their reputations, careers or suffer public humiliation, the vast majority of academics are thus likely to opt for anonymous TPR rather than OPR. Conversely, authors whose work might be critically assessed in public via OPR might feel shamed or threatened, lose confidence and thus retaliate.
What alternatives or solutions exist to open peer review?
As much as OPR advocates hate to admit it, TPR may still be the best peer review model available yet. Some will likely adopt OPR as their publishing model, but OPR has allowed the TPR movement to enter into a state of reflection, in search of ways to improve it. The first solution to solving the peer review crisis is by fortifying the checks and balances of TPR. This is because at some point TPR-approved literature will be cited in OPR-approved literature, and vice versa. So, professional guidelines, control mechanisms and quality assessment parameters need to evolve and be fortified for both TPR and OPR simultaneously, with both taking PPPR into consideration in their models. OPR needs strict guidelines, mainly related to tone, expression and respect, i.e., how to formulate an argument or a contradictory thought or criticism such that it does not infringe upon personal rights or trigger legal challenges.

Education of peer review skills is essential and is something that few university programs offer. So, how to write peer reports, how to offer positive criticism while maintaining a critical stance, how to be critical of the data and the results that are claimed from stated evidence, as well as communication skills in transmitting ideas are all aspects that are essential to becoming an effective peer reviewer, whether in TPR or OPR. It is likely that many peers would not want to expose their peer reports openly or publicly via OPR, either feeling embarrassed of their weak scientific critique, or even weak linguistic skills, for non-native English speakers. And that is, or should be, their right. However, the for-profit publishing industry is exploitative, expecting more and more from peer reviewers, but offering little in return, either as discounts, skills or rewards (Teixeira da Silva and Katavić, 2016). There are risks in offering non-financial peer reviewer rewards by entities that control aspects of the academic publishing market, such as Publons, which was acquired by Clarivate™ Analytics (Teixeira da Silva and Al-Khatib, 2018).

References


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Building the long bridge between visitors and customers through online general reviews

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Abstract

Purpose – Many reviews on the internet are contributed their time to evaluate which are largely transparent generally; however, How are these information valuable and useful to visitors before making a purchasing decision? As the reason, there is a need to understand the distal path of visitors concern. The purpose of this paper is to evaluate the effects of both perceived useful and valuable motivations on visitors’ willingness to buy in the distal paths.

Design/methodology/approach – Web questionnaire survey.

Findings – Visitors’ confirmation was the beginning to impact the intention to buy through only one distal path, perceived value (PV) and satisfaction.

Research limitations/implications – Even though the author tried his best to design and implement thoughtfully for this research, there are still some limitations. First, the results could be influenced by self-selection bias. The sample of respondents surveyed in this study consisted of young adults (68.90 percent were between the ages 21 and 25 years old), the majority of whom (54.79 percent) were students. Therefore, in the context of this study, the visitors surveyed were young and able to easily access information online. The phenomenon has been, proved by Hsu (2013), found, it still needs to explore further. Second, perceived usefulness did not have a significant impact on satisfaction which consistent with Tao et al. (2009) result. The data represent the response feeling for now; it needs to be explored further. Third, it would also be worthwhile to investigate any obstacles, such as believable (Cheung et al., 2012) that might reduce the intentions to buy of visitors. Finally, recommendations and promotions have also been found to influence visitors’ further purchasing behavior, such as extra buy (Tsao, 2013). These phenomena are worth investigating in future research.

Practical implications – To inspire visitors, information of reviews can be posted by offering positive or negative suggestions (e.g. good or bad experience); managers should improve their products or services from the suggestions of reviews and need to consider the distinctive influences of various aspects of reviews when promoting products and devising e-marketing strategies. Marketers should recruit and filter reviews to write positive suggestions of their own products or service. IS practitioners should post the reviews might need to provide more detailed information (e.g. the reasons of like or dislike). The posted information from reviews should be accurate, particularly aiming at visitors who are motivated by reviews’ suggestions. All proposed measures are particularly important for visitors with sufficient reviews effects. Greater transparency of reviews might be achieved by more explicit reviews information (e.g. via like or dislike statements).

Social implications – The result provides a basis to generate concrete advice for owners about reviews concern to enhance visitors’ PV. It seems sensible to pursue two strategies: first, enhance the visitors’ PV to trigger motivation forward, and second, inspire the visitors to progress smoothly in the visiting stage.

Originality/value – The results of the expectation-confirmation theory applied to reviews recommendations how important to employ for enterprises. These reviews were either directly given by experienced users or at least validated with their help to visitors. Therefore, the value is building the distal bridge between visitors and customers through online general reviews.

Keywords Perceived value, Distal mediators, Expectation-confirmation theory (ECT), Technology acceptance model (TAM)

Paper type Research paper

1. Introduction

Online general reviews (shortened to reviews) of products and services are available on the internet increasingly. Reading such reviews has become an important aspect of customers’ purchasing process (Dellarocas et al., 2010). Also reviews refer to recommendations made to consumers based on their past buying behavior and on the stated or implied
preferences of other (Benlian et al., 2012). Of these rising issues about shopping online, it has attracted growing academic attention due to its popularity and unconventional operating mechanisms (Chang and Wang, 2011). Compared to real stores, in which content is provided by the clerks, the emergence of user experience online has indeed changed conventional ways of how information transparency. Reviews can be defined as peer-generated product or service evaluations posted on the websites of companies or third parties (Mudambi and Schuff, 2010). Customers often inquire hundreds of reviews to confirm product-related information. Past-related studies named as expert reviews (Chen and Xie, 2008), online recommendation systems (Gretzel and Fesenmaier, 2006), online customer product reviews (Tsao, 2013) and travelers’ adoption of information from online reviews (Filieri and McLeay, 2014). Those studies have shown that reviews have a positive influence on sales (Ghose and Ipeirotis, 2011). Korfiatis et al. (2012) discovered that the readability of a review had a greater effect on how the review was rated by readers than its length; in addition, hotel booking intentions and perception of trust in online reviews (Sparks and Browning, 2011), the effect of online customer reviews on new product sales (Cui et al., 2012) and the effects of content type, source and certification logos of online travel reviews (Sparks et al., 2013). It is extremely helpful reviews received higher scores than those considered less helpful. Accordingly, anyone with internet access can search and browse virtual stores for free including reviews. The internet has changed work and the personal lives of people around the world (Lim and Teo, 2005). Customers will seek opinions before buying. Customers often need to know and confirm product-related information in order not to buy inadequate or more expensive. Therefore, the reviews have become a key competitive tool to push visitors buy further. However, is this information confirmed valuable and useful by visitors before making a purchasing decision? Due to this reason, there is a need to understand the visitors concern.

The content perceived value (PV) is defined by Zeithaml (1988) as the overall assessment of the reviews of a product based on the visitors’ perceptions of what is received and what is given in E-store (Chang and Tseng, 2013) and online shopping (Wu et al., 2014). It also has been identified one of the major determinants of continued behavior (Chiu et al., 2012). Reviews, who have participated in shopping, may post the feelings by sharing their experience about a specific product or service after purchasing (Mann and Stewart, 2000). Additionally, although the reviews’ experiences sharing take time and effort, they rarely obtain corresponding earnings. However, they have responsibilities to tell other people to know their transactions including happy or unhappy. Recently, an increasing number of papers have showed the reviews’ participation behavior that customers’ overall evaluation of a product or service and its relationship with confirmation, satisfaction and intention (Lin and Wang, 2006), and PV has been found to be an important factor of satisfaction with regard to bookselling websites (Valvi and West, 2013) and continuance intentions regarding internet protocol television (Lin et al., 2012). Prior to making a purchase decision, customers will read reviews which discuss consumers’ suggestions and opinions of the relevant products. Generally, reviews can enhance the customers’ PV of the product and encourage the customer to continuously make a purchase. Needless to say, reviews are innovative marketing weapons through which to achieve effective product promotion.

The expectation-confirmation theory (ECT) was developed by Oliver (1980) to explain attitudes by comparing with a given attitude and subsequent confirmation. The ECT has gained response in explaining user satisfaction and predicting IS continuance intention to use (Bhattacherjee, 2001; Chiu et al., 2005; Venkatesh et al., 2011; Halilovic and Cicic, 2013; Oghuma et al., 2016). According to the ECT, people follow a sequential process to move on purchase intention. According to Halilovic and Cicic (2013), the process begins prior to evaluate the reviews remarks where people compare with an initial expectation of the product or service. After the initial understanding, they form perceptions about the
usefulness, satisfaction and value of the product or service. Therefore, applying to this theory, visitors will visit the online reviews before purchasing. All of them want to make sure the products are worthy to buy. The feelings of satisfaction of visitors are a function of confirmation from online reviews. Furthermore, customers’ satisfaction impacts their purchase intentions. Many studies have employed ECT, such as Liao et al. (2009) explained user behaviors with regard to information system acceptance and continuance; and in an e-learning system (Lee, 2010). Thong et al. (2006) also found that users’ confirmation of continued information technology usage behavior impacted on perceived usefulness (PU) of this technology; in addition, they also found that confirmation impacted their satisfaction. Furthermore, customers’ satisfaction was mainly result of their confirmations (Roca et al., 2006). Chou et al. (2012) obtained the same results regarding individual differences every time by using enterprise resource planning (ERP). PU is also a significant factor affecting customers’ satisfaction and intention to purchase or repurchase (Kim, 2010). Kim (2012) investigated the relationship between online consumers’ PU and their intention. Therefore, the visitors’ perceptions of usefulness were impacted by their confirmations and influenced their satisfaction and intention to buy. Although all of these studies provide insight into the features and contribution intention, little practical and quantitative data have been evaluate visitors from reviews before making a purchasing decision. Therefore, the paper proposed the visitors’ confirmations were the beginning motivation to impact the intention to buy through two distal paths.

This paper uses the ECT to build a bridge between visitors and products through reviews. Therefore, the main contribution of this paper is the confirmation of visitors’ views of technology (i.e. their perceptions of its usefulness) and their psychology (i.e. their perceptions of value and satisfaction) through distal mediating effects affecting their intention to buy after reading reviews. Apparently, the paper composed quality value, emotional value and value for money (first order) into PV (second order) regarding visitors’ intention to buy after reading reviews’ suggestions, and evaluated the results with the target coefficient the ratio of $\chi^2$ of the first-order model to the $\chi^2$ of the second-order model (Doll et al., 1994) to prove the validity of the model more concretely. The rest of the paper is organized as follows. I review the related work that including literature review and hypotheses. The third section introduces the methodology including questionnaire, pretest, sample and check nonresponse bias. In the fourth section, I introduce the data set including target coefficient, reliability, evaluates the hypotheses, multiple distal mediated effects and effect sizes. Finally, the paper discusses managerial implications and outline opportunities for further research.

2. Literature review and hypotheses

2.1 Reviews of products or services

Reviews are one of the most vital sources of information for purchasing (Dellarocas et al., 2010; Lee et al., 2011). Reviews are written by experts (Chen and Xie, 2008). Recommendation systems (Gretzel and Fesenmaier, 2006) and online recommendations (Tsao, 2013) trigger customers’ hidden motivations. Reviews come from any service provided by well-known electronic sales sites, such as blogs (Shiau and Kuo, 2010), Amazon (Mudambi and Schuff, 2010) and so on. For example, reviews posted online regarding eBay or Amazon can affect buyers’ expectations concerning their potential interactions with those sellers. Comments such as “Lightning fast delivery!”, “Sloppy packaging” and “The quality is fantastic, but the transfer speed lags badly” can affect buyer expectations. As most reviews are written by non-professional authors, their quality tends to vary (Moghaddam et al., 2011). In the Korean demilitarized zone, tourists’ emotional value impacted their satisfaction (Lee et al., 2007). Filieri and McLeay (2014) found the trust influenced the adoption and word of mouth in traveler’s reviews, however, they are missing intention to buy. Finally, PU of technology is
an important variable for recommendations of reviews with regards to online shopping. Is this information of reviews valuable and useful to persuade visitors further purchasing? Therefore, this study sought to confirm that with regard to reader perceptions of reviews, the variables of quality value, emotional value, value for money and PU are important factors in terms of customers’ satisfaction and intention to purchase.

Suggestions from reviews of products or services critically influence the decision-making processes of customers (Mudambi and Schuff, 2010). A number of studies have attempted to evaluate the impact of review content from a variety of perspectives in order to predict the impact of reviews on sales and their PU by using random forest-based classifiers (Ghose and Ipeirotis, 2011), and to evaluate the content quality of reviews (Korfiatis et al., 2012). These studies revealed that products and consumer types have moderating impacts (Zhu and Zhang, 2010). These studies made a significant effort to quantify the reviews, including quantification of their ability to trigger the motivations of visitors. For purchase products or services, it will be confirmed the information provided by reviews and lead to intention to purchase through distal mediators. The research model is proposed in Figure 1.

2.2 Expectation-confirmation theory (ECT)
ECT has been employed widely in information-related domains (Thong et al., 2006; Roca et al., 2006; Liao et al., 2009), such as online brokerage (Bhattacherjee, 2001), e-learning system (Lee, 2010) and ERP (Chou et al., 2012). The importance of ECT is growing. The process organized by Doong and Lai (2008) to reach customers’ repurchase intentions as follows: first, prior to purchasing a specific product or service, consumers form an initial expectation. Second, a perception of performance is developed from experience. Third, the performance from reviews perceived by visitors is compared with their initial expectations to assess whether those expectations are being met (confirmation). Fourth, visitors’ satisfaction develops according to this confirmation or does not develop due to a lack thereof; and fifth, satisfied consumers may exhibit repurchasing intentions, while dissatisfied customers may decide not to continue purchasing the product or service. ECT holds that customers intention to buy a product or service which is determined mainly by their satisfaction with prior buy of that product or service (Oliver, 1980). Satisfaction is viewed as the core to building intention to buy of continuous behavior. Satisfaction was
initially defined as the summary psychological state resulting when the emotion surrounding confirmed expectations is coupled with the consumer’s prior expectations about the consumption (Oliver, 1981). The definition emphasizes visitors psychological or affective states were influenced by confirmation after inquiring reviews. Hence, a high baseline of confirmation tends to enhance visitors’ satisfaction, while low confirmation reduces consequent satisfaction after inquire reviews.

Individual confirmation influenced satisfaction in the context of information technology continuance (Thong et al., 2006), and the information technology adoption behavior life cycle (Liao et al., 2009). Finn et al. (2009) showed that users’ confirmation had an impact on their satisfaction with e-services related to banks, credit cards and airline tickets. Recently, a great deal of evidence has shown that consumers’ confirmations act as antecedents of satisfaction, such as in regards to their satisfaction with web-based services (Lee and Kwon, 2011), mobile data services (Kim, 2010) and e-learning (Lee, 2010). More recently, authors (Lin et al., 2012) integrated value-based adoption and the ECT model in internet protocol television continuance intention and found that users’ confirmation impacted on their satisfaction. Shin (2011) showed that e-book users’ confirmation impacted their gratification (satisfaction), and that their satisfaction impacted, in turn, on their continuance intentions. Koo et al. (2011) pointed out that knowledge expectation together with knowledge confirmation significantly affected end users’ satisfaction. Users’ confirmation impacted their satisfaction, and then satisfaction influenced intention with regard to using web-based services (Lee and Kwon, 2011) and e-learning systems (Lee, 2010). These studies provide supports for the confirmation-satisfaction-intention to buy association derived from ECT. This leads to the following hypotheses:

H1. Visitors’ confirmation from reviews is positively associated with their satisfaction.

H2. Visitors’ satisfaction with reviews is positively associated with their intention to buy.

2.3 Perceived usefulness
PU is one factor of the technology acceptance model that has been clearly shown to explain and predict an individual’s intention to act and acceptance with regard to a given system or technology (Davis, 1986; Davis et al., 1989; Yu et al., 2005). PU refers to the prospective user’s belief that using a specific technology will increase his or her job performance. In this study, PU refers to the degree to which the visitors believed that reading reviews would increase their inquiring the information before purchase. Many empirical studies have demonstrated that customers’ confirmation impacted PU with regards to mobile data services (Kim, 2010). More recently, Chang and Zhu (2012) also found that the users’ confirmation impacted on PU for intention to build relationship regarding social networking sites in China. Lee (2010) found that PU of e-learning systems impacted users’ satisfaction and intention to use. Yoon and Kim (2007) indicated that users’ PU influenced intention to use wireless LAN and mobile internet devices (Hong et al., 2006). Kim (2010) found that users’ PU and satisfaction are formations of the mobile data service continuance intention. Kang and Lee (2010) also pointed out that PU impacted customers’ satisfaction of online service continuance. Indeed, PU is a set of specific beliefs that reflect the fulfillment of visitors’ needs. These studies provide supports for the relationships between PU and ECT. These lead to the following hypotheses:

H3. Visitors’ confirmation with reviews is positively associated with their PU.

H4. Visitors’ PU with reviews is positively associated with their satisfaction.

H5. Visitors’ PU with reviews is positively associated with their intention to buy.
2.4 Perceived value (PV)

According to Zeithaml (1988), redefined PV as the total assessment of the information of a product based on the online reviews of what was received and what was given. It is an important measure of customers’ overall evaluation for product or service (Bolton and Drew, 1991). It is a function of a “get” component (the benefits a buyer derives from a seller’s offering) and a “give” component (the buyer’s monetary and non-monetary costs of acquiring the offering) (Lin and Wang, 2006). An empirical analysis of franchisees found that emotional value, quality value and monetary value of PV influenced their satisfaction (Grace and Weaven, 2011). According to Sweeney and Soutar (2001), emotional value is defined as the feelings or affective states about information that the reviews generate; quality value refers as the comments of the reviews with consistency and quality; and value for money is the suggestions for product given by reviews are worthy to buy. The visitors consider reading reviews as the “get” component and spend money in the future as the “give” component. Turel et al. (2007) deconstructed PV into quality value, emotional value and value for money of user acceptance in wireless short messaging services. In this study, the quality value reflected the content of the reviews. The emotional value reflected the enjoyment and pleasure derived from getting reviews. The value for money reflected the reviews were worth. Therefore, the visitors feel suggestions of the reviews are qualified, enjoyable and worth for money then they will regard the reviews as more valuable.

The current paper evaluated the three factors into one construct (PV) with a target coefficient (a coefficient of the second order construct for first order) after reading reviews’ suggestions. These studies provide supports for the quality value, emotional value and value for money comprised the PV. These lead to the following hypotheses:

H6. Visitors’ high quality value regard to the reviewers lead to greater perceptions of value.

H7. Visitors’ high emotional value leads to greater perceptions of value.

H8. Visitors’ high value for money leads to greater perceptions of value.

Prior studies found that users’ perceptions of value impacted on their satisfaction and continuance intentions regarding internet protocol television; they also found that users’ confirmation impacted on the perception of value via perceived benefits (Lin et al., 2012). PV and satisfaction in mobile commerce contexts had strong relationships (Lin and Wang, 2006). Kim and Niehm (2009) discovered that users’ perceptions of value influenced loyalty intentions in apparel retailing. The PV affected the students’ satisfaction with their travel behavior (Gallarza and Saura, 2006) and diners in Korean restaurants (Ha and Jang, 2010). Also, cumulative insights from prior studies support the general notion that PV contributes to customers’ satisfaction (Chang and Wang, 2011). Therefore, visitors feel that reviews are valuable then their satisfaction and intention to buy will increase. These studies provide supports for the relationships between PV and ECT. These lead to the following hypotheses:

H9. Visitors’ confirmation with reviews is positively associated with their perception of value.

H10. Visitors’ perception of value with reviews is positively associated with their satisfaction.

H11. Visitors’ perceptions of value with reviews are positively associated with their intention to buy.

Past studies have shown that satisfaction mediates on behavioral intention (Finn et al., 2009), and behavioral intentions in a Taiwanese leisure setting (Chang and Polonsky, 2012). Overall satisfaction is a function of confirmation. PV was also found to be a significant
mediator of perceived quality, price and willingness to buy (Sweeney et al., 1999). Lee et al. (2012) thought that PU was a mediator between the price and intention to use. Unfortunately, there is a lack of distal mediated effects that PU and PV to intention to buy through satisfaction after reading reviews. Given these supports, there could exist two distal paths from visitors’ confirmation on intention to buy. These lead to the following hypotheses:

\[ H12a. \text{ There exists one distal mediated path from visitors’ confirmation} \rightarrow \text{PU} \rightarrow \text{satisfaction on intention to buy.} \]

\[ H12b. \text{ There exists another distal mediated path from visitors’ confirmation} \rightarrow \text{PV} \rightarrow \text{satisfaction on intention to buy.} \]

3. Methodology

3.1 Questionnaire

The items of seven constructs were translated into Chinese to fit this research context. A six-point Likert scale was used with response values ranging from 1 for “strongly disagree” to 6 for “strongly agree” to response clearly indicate a positive or negative feeling. The constructs of confirmation and satisfaction were adopted and translated from Kim’s (2010) items, with three items for each used to indicate the degree of visitors’ feeling of reading the suggestions from reviews. The constructs of quality value, emotional value and value for money were adopted and modified from the Turel et al.’s (2007) scale, with three, three and two items, respectively, to indicate the degree of visitors’ perceptions of value from the reviews. The construct of PU was adopted and modified from Hausman and Siekpe’s (2009) scale, with three items indicated the degree to which visitors’ felt that reading the reviews was useful. Finally, the construct of intention to buy was adopted and modified from Schierz et al.’s (2010) scale with two items used to indicate the degree of visitors’ willingness to buy a product or service after reading reviews. A single, negatively worded question was included to decrease the probability of common method bias (Podsakoff et al., 2003). For example, “the information provided by reviews was worse than I expected” of confirmation is negative word to decrease the probability of common method bias.

3.2 Sample

Data collection was conducted via a survey website (www.mysurvey.com.tw/reviews) in Taiwan during the whole year of 2013. Data collection of this survey, I hired three assistants to send invitations to the survey website to the targeted participants via e-mail, Facebook and LINE. The invitation got 292 participants. Among these respondents, 54.45 percent were male, while 45.55 percent were female. Regarding the age of the respondents, 58.90 percent were between the ages of 21 and 25 years old, indicating that the most active internet users are young adults. With regards to the education levels of the respondents, 2.74 percent completed pre-high school education, 7.53 percent completed high school, 80.14 percent attended university and 9.59 percent attended graduate school. Regarding the participants’ monthly incomes, 32.3 percent reported earning between NT$10,001 and NT$30,000. On average, 36.60 percent of the participants reported spending between NT$701 and NT$1,100 per month on products after the suggestions of reviews. The types of industry or vocations the respondents were involved in included: high tech, 6.51 percent, manufacturing, 13.01 percent, services, 11.64 percent, students, 54.79 percent and others, 14.05 percent. The respondents’ experience levels in using e-commerce were less than three years (1.7 percent), 3–6 years (9.9 percent), 7–10 years (29.8 percent) and more than ten years (58.6 percent). The sample was a little narrow, however, according to InsightXplorer (2013),
the most internet people with vocation was students (92.1 percent). Also Hsu (2013) pointed out the major consumers for online shopping are college students in Taiwan even when their income is limited, it is showed the phenomena for now in Taiwan. The type of merchandise of the respondents reported after reading the reviews were cosmetic (53.8 percent), food (29.8 percent), clothes (10.3 percent), entertainment (3.1 percent) and the others (3.1 percent). The most two frequent websites were yahoo (34.9 percent) and group buy (53.8 percent). It approaches to be appreciable for several different types of merchandise in differing websites.

3.3 Nonresponse bias

The paper examined the sample data for evidence of nonresponse bias using two analyses. Following the procedures suggested by Armstrong and Overton (1977), a test was performed to identity any statistically significant differences in the responses of late (79 users) vs early respondents (213 users) using gender and industry type. The $\chi^2$ tests comparing the categories across the two groups revealed no significant differences for education ($\chi^2 = 1.811$; $\chi^2_{0.05,3df} = 7.815$) or industry type ($\chi^2 = 6.648$; $\chi^2_{0.05,7df} = 14.067$). The test indicated no significant differences between the two groups: education and industry type to indicate no systematic nonresponse bias for the survey data. Second, the paper compared the distribution of returned questionnaires to the population distribution (InsightXplorer, 2013; male: 53.00 percent and female: 47.00 percent) and found no significant differences ($\chi^2 = 0.247$; $\chi^2_{0.05,1df} = 3.841$). The result showed the sample was generalized to the population.

4. Results

4.1 Reliability and validity

This paper evaluated data with the Cronbach’s $\alpha$ of seven constructs to test the reliability. Using factor analysis showed the convergent validation and correlation analysis was used to test discriminant validity. Finally, a test to determine the significance of each path of constructs was performed with Amos 18.0. Second, the paper used Harman’s one-factor test, for which all of the principal constructs were entered into a principal component analysis to test common method bias (Podsakoff et al., 2003). Evidence for common method bias does not exist when a general (first) construct accounts for the majority of the covariance among all of the constructs. The results showed that the first (largest) factor accounted for 45.557 percent of it. Thus, no single factor accounted for the majority of the covariance in the data. Then, Cronbach’s $\alpha$ was used to evaluate the measurement accuracy, as recommended by Nunnally and Bernstein (1994); the constructs ought to exceed 0.7 to pass the threshold of the reliability test for social science research. Cronbach’s $\alpha$ values of all the constructs passed the reliability test, such as confirmation at 0.958; PU at 0.893; quality value at 0.908; emotional value at 0.920; value for money at 0.898; satisfaction at 0.917; and intention to buy at 0.882. Third, convergent and discriminated validity were examined to ensure data validity (Fornell and Larcker, 1981). This paper used principal component factor analysis with varimax rotation to extract nine constructs based on the eigenvalue greater than 1 and loading factor of 19 items greater than 0.6. These seven constructs explained 75.535 percent of the variance. Moreover, composite reliability (CR) was used to measure the internal consistency, which ranged from 0.809 to 0.916. The average variance extracted (AVE) was used to measure the variance to the measurement error captured by the indicators, which range from 0.587 to 0.732. All of the above recommended cutoff levels of 0.70 and 0.50, respectively. The paper showed that the larger the value of the square multiple correlation, the better the reliability of the item. Discriminant validity could be assessed using the guidelines suggested by Fornell and Larcker (1981). The square root of each construct’s AVE was larger than its corresponding correlation coefficients with other constructs, illustrating good discriminant validity, as shown in Tables I and II.
4.2 Testing of the hypotheses
Amos 21.0 tested the hypotheses and obtained the path coefficients of the model. The results indicated a good overall fit of the model. The \( \chi^2/df = 2.196 \) for the model fit was less than 3. The criteria of goodness of fit (GFI = 0.910), adjusted goodness of fit (AGFI = 0.914), comparative fit index (CFI = 0.944) and incremental fit index (IFI = 0.944) were all suggested by Hair (2009). The root-mean-square error of approximation was also satisfactory (0.041 < 0.05). The structural model fit was also good. The path coefficients of the proposed model were as follows: first, visitors' confirmation positively impacted on their perceptions of PU, satisfaction and PV from reading the reviews (\( \beta = 0.616, t = 6.488, p < 0.001; \beta = 0.638, t = 3.358, p < 0.001; \beta = 0.716, t = 7.457, p < 0.001 \)), explaining 56 percent of the variance. Evidently, customers' higher levels of confirmation regarding products they read about in reviews led, in general, to higher PU, satisfaction and value. Therefore, \( H_1, H_3 \) and \( H_9 \) were supported. Second, customers' perceptions of quality value, emotional value and value for money in first order were influenced positively by their perceptions of value in second order from reading reviews of the product (\( \beta = 1.000, p < 0.001; \beta = 1.240, t = 7.772, p < 0.001; \)).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Factor loading</th>
<th>CR</th>
<th>AVE</th>
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<td>CONF1</td>
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<td>1.194</td>
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<td>1</td>
<td>6</td>
<td></td>
<td></td>
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<tr>
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<td>CONF2</td>
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<td></td>
<td>MV_2</td>
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<td></td>
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<tr>
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<td>SA_3</td>
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<td>1.057</td>
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<td>1</td>
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</tr>
<tr>
<td>INT</td>
<td>INT_1</td>
<td>4.661</td>
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<td>1</td>
<td>6</td>
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<td></td>
</tr>
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<td></td>
<td>INT_2</td>
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<td>1.086</td>
<td></td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table I. Scale reliabilities

Table II. Discriminate validity by correlation analysis with AVE

4.2 Testing of the hypotheses
Amos 21.0 tested the hypotheses and obtained the path coefficients of the model. The results indicated a good overall fit of the model. The \( \chi^2/df = 2.196 \) for the model fit was less than 3. The criteria of goodness of fit (GFI = 0.910), adjusted goodness of fit (AGFI = 0.914), comparative fit index (CFI = 0.944) and incremental fit index (IFI = 0.944) were all suggested by Hair (2009). The root-mean-square error of approximation was also satisfactory (0.041 < 0.05). The structural model fit was also good. The path coefficients of the proposed model were as follows: first, visitors' confirmation positively impacted on their perceptions of PU, satisfaction and PV from reading the reviews (\( \beta = 0.616, t = 6.488, p < 0.001; \beta = 0.638, t = 3.358, p < 0.001; \beta = 0.716, t = 7.457, p < 0.001 \)), explaining 56 percent of the variance. Evidently, customers' higher levels of confirmation regarding products they read about in reviews led, in general, to higher PU, satisfaction and value. Therefore, \( H_1, H_3 \) and \( H_9 \) were supported. Second, customers' perceptions of quality value, emotional value and value for money in first order were influenced positively by their perceptions of value in second order from reading reviews of the product (\( \beta = 1.000, p < 0.001; \beta = 1.240, t = 7.772, p < 0.001; \)).
β = 1.166, \( t = 5.658, p < 0.001 \). Clearly, reading reviews impacted customers’ perceptions of quality value, emotional value, and value for money. Hence, \( H6–H8 \) were supported. Third, visitors’ PU and value impacted on their satisfaction from reading the reviews (\( \beta = -0.096, \ t = -0.171, \ p > 0.05; \ \beta = 0.963, \ t = 2.808, \ p < 0.001 \)), explaining 41.4 percent of the variance. The result is consistent with Tao et al. (2009) found in college students to continue using business simulation games in Taiwan. Thus, only \( H10 \) was supported. Fourth, customers’ PU, satisfaction and value impacted on their satisfaction from reading the reviews (\( \beta = -0.008, \ t = -0.171, \ p > 0.05; \ \beta = 0.302, \ t = 2.323, \ p < 0.05, \ \beta = 0.897, \ t = 5.763 \)), explaining 56 percent of the variance, illustrating their increased willingness to buy products or services based on reading reviews. Hereafter, \( H2, H5 \) and \( H11 \) were supported surprisingly. The empirical results indicated that 10 of the 11 hypotheses were supported. The results for the structural model are summarized in Table III.

### 4.3 Multiple distal mediated effects

The steps of multiple distal mediated test involved ordinary regression techniques suggested by Fletcher (2006). This section describes a simple distal mediation process followed by the estimation of the standard error of the indirect effect and partial effect vs full mediation. The model involved in two distal mediated paths is depicted in Figure 2. The following steps entail the evaluation of distal mediation.

**Step 1 – Evaluation of indirect effects.** The model depicted to show the two distal causal paths. There are confirmation→PU→satisfaction→intention to buy for path 1 (path 1: solid bold line) and confirmation→PV→satisfaction→intention to buy for path 2 (path 2: dotted bold line). The models can be represented by the following equations:

\[
Y = \tau X + e_1, \tag{1}
\]

\[
Y = \tau' X + fM_1 + cM_2 + e_2, \tag{2}
\]

\[
M_2 = eX + bM_1 + e_3, \tag{3}
\]

\[
M_1 = aX + e_4, \tag{4}
\]

de where \( M_1 \) means the first mediator; \( M_2 \) means the second one; and \( a, b, c, e, \) and \( f \) are the paths coefficients.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate</th>
<th>SE</th>
<th>( t )-value</th>
<th>( p )</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA ← Confirmation</td>
<td>0.638</td>
<td>0.190</td>
<td>3.358</td>
<td>***</td>
<td>( H1 ) supported</td>
</tr>
<tr>
<td>PU ← Confirmation</td>
<td>0.616</td>
<td>0.095</td>
<td>6.488</td>
<td>***</td>
<td>( H3 ) supported</td>
</tr>
<tr>
<td>PV ← Confirmation</td>
<td>0.716</td>
<td>0.096</td>
<td>7.457</td>
<td>***</td>
<td>( H9 ) supported</td>
</tr>
<tr>
<td>QV ← PV</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV ← PV</td>
<td>1.240</td>
<td>0.159</td>
<td>7.772</td>
<td>***</td>
<td>( H7 ) supported</td>
</tr>
<tr>
<td>MV ← PV</td>
<td>1.166</td>
<td>0.206</td>
<td>5.658</td>
<td>***</td>
<td>( H8 ) supported</td>
</tr>
<tr>
<td>SA ← PU</td>
<td>-0.008</td>
<td>0.046</td>
<td>-0.171</td>
<td>0.864</td>
<td>( H4 ) not supported</td>
</tr>
<tr>
<td>SA ← PV</td>
<td>0.929</td>
<td>0.331</td>
<td>2.808</td>
<td>**</td>
<td>( H10 ) supported</td>
</tr>
<tr>
<td>ITOB ← PU</td>
<td>0.103</td>
<td>0.046</td>
<td>2.242</td>
<td>*</td>
<td>( H5 ) supported</td>
</tr>
<tr>
<td>ITOB ← SA</td>
<td>0.302</td>
<td>0.087</td>
<td>3.233</td>
<td>*</td>
<td>( H2 ) supported</td>
</tr>
<tr>
<td>ITOB ← PV</td>
<td>0.897</td>
<td>0.156</td>
<td>5.763</td>
<td>***</td>
<td>( H11 ) supported</td>
</tr>
</tbody>
</table>

Table III. Result of hypotheses

**Notes:** *\( p < 0.05; **p < 0.01; ***p < 0.001 \)
Equation (1) represents the total effect ($\tau$) of $X$ on $Y$. In this case, $\tau$ is the total effect of confirmation on intention to buy. Equations (2) – (4) represent the mediated effect of $X$ on $Y$. For example, Equations (2) – (4) represent the mediated effect of confirmation on intention to buy. In structural equation modeling (e.g. LISREL [44]), Equations (2) – (4) are estimated simultaneously. There are two pairs of three indirect paths from $X$ to $Y$. Therefore, the indirect effect in this set of equations is not simply the product of paths, but is equal to the sum of all the indirect paths: $a_1b_1c + af_1 + ec$ (the solid bold line) and $a_2b_2c + af_2 + ec$. The mediated effect is equal to the total indirect effect: $a_1b_1c + af_1 + ec + \tau$ and $a_2b_2c + af_2 + ec + \tau'$. It should be readily seen that the total effect of $X$ on $Y$ ($\tau$) will be small when there are many variables mediating the relationship of $X$ and $Y$. In other words, the more distal the relationship of $X$ and $Y$ is, the lower the power to detect the total effect and the greater the need for increased sample size. Table IV shows the effect and standard error for the specific indirect ($a_1b_1c$, $af_1$, $ec$), ($a_2b_2c$, $af_2$, $ec$) and direct ($\tau'$) effects of confirmation.

Step 2 – Evaluation of standard error of indirect effects. The model involves a distal mediation process; the computation of the standard error can be generalized from the standard error of the product of two paths using the multivariate delta method [93]. The standard error of the indirect effect ($abc + af + ec$) is computed with Equation (5).

**Notes:** The model depicts distal effect of confirmation on intention to buy mediated by perceived usefulness and satisfaction or mediated by perceived value and satisfaction. $a_1$, $b_1$, and $f_1$ are the coefficients of path 1. $a_2$, $b_2$, and $f_2$ are the coefficients of path 2. $c$ is the coefficients of satisfaction and intention to buy. $e$ is the coefficients of confirmation and satisfaction.

**Notes:** The model depicts distal effect of confirmation on intention to buy mediated by perceived usefulness and satisfaction or mediated by perceived value and satisfaction. $a_1$, $b_1$, and $f_1$ are the coefficients of path 1. $a_2$, $b_2$, and $f_2$ are the coefficients of path 2. $c$ is the coefficients of satisfaction and intention to buy. $e$ is the coefficients of confirmation and satisfaction.

**Figure 2.** The distal causal paths

**Table IV.** Indirect effect estimation

<table>
<thead>
<tr>
<th>Path</th>
<th>$X \rightarrow M_1$</th>
<th>$M_1 \rightarrow M_2$</th>
<th>$M_2 \rightarrow Y$</th>
<th>$X \rightarrow M_2$</th>
<th>$M_1 \rightarrow Y$</th>
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</thead>
<tbody>
<tr>
<td>$\tau'$</td>
<td>$a_1$</td>
<td>$b_1$</td>
<td>$c$</td>
<td>$e$</td>
<td>$f_1$</td>
</tr>
<tr>
<td>Path i (solid bold line), $i=1$</td>
<td>0.616</td>
<td>-0.008</td>
<td>0.302</td>
<td>0.638</td>
<td>0.103</td>
</tr>
<tr>
<td>SE</td>
<td>0.095</td>
<td>0.046</td>
<td>0.087</td>
<td>0.190</td>
<td>0.046</td>
</tr>
<tr>
<td>Path i (dot bold line), $i=2$</td>
<td>0.716</td>
<td>0.929</td>
<td>0.897</td>
<td>0.201</td>
<td>0.642</td>
</tr>
<tr>
<td>SE</td>
<td>0.096</td>
<td>0.316</td>
<td>0.156</td>
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</table>

**Notes:** $a_1$, $b_1$, and $f_1$ are the coefficients of path 1; $a_2$, $b_2$, and $f_2$ are the coefficients of path 2; $c$ is the coefficients of satisfaction and intention to buy; $e$ is the coefficients of confirmation and satisfaction.
The detail data are shown in Table V:

\[
S_{(abc+af+ec)} = \sqrt{S_{abc}^2 + S_{af}^2 + S_{ec}^2 + 2 \times (S_{abc,af} + S_{abc,ec} + S_{af,ec})},
\]

where:

\[
S_{abc} = \sqrt{a^2 b^2 S_c^2 + a^2 c^2 S_b^2 + b^2 c^2 S_a^2},
\]

\[
S_{af} = \sqrt{a^2 S_f^2 + f^2 S_a^2},
\]

\[
S_{ec} = \sqrt{e^2 S_c^2 + e^2 S_e^2},
\]

\[
S_{abc,af} = bcf S_a^2 + a^2 b S_{af},
\]

\[
S_{abc,ec} = ac^2 S_{be} + abe S_{c},
\]

\[
S_{af,ec} = ae S_{cf},
\]

\[
S_{be} = \sqrt{b^2 S_e^2 + e^2 S_b^2}.
\]

**Step 3 – Testing the specific indirect effect.** The standard error in Equation (5) is then used for hypothesis testing or construction of confidence intervals in the usual manner. There is adequate evidence to suppose that the indirect effect of a distal mediation process is not normally distributed, diminishing the utility of this approximated standard error in both hypothesis testing and the construction of symmetrical confidence intervals (Bollen and Stine, 1990). In Table VI, I calculated the \(Z\) value of the specific indirect effect and the

<table>
<thead>
<tr>
<th>Path</th>
<th>(S_{af})</th>
<th>(S_{ec})</th>
<th>(S_{cf})</th>
<th>(S_{be})</th>
<th>(S_{a,b,c,af})</th>
<th>(S_{a,b,c,ec})</th>
<th>(S_{a,b,c,af+ec})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path 1</td>
<td>0.030</td>
<td>0.080</td>
<td>0.017</td>
<td>0.029</td>
<td>0.000</td>
<td>0.006</td>
<td>0.002</td>
</tr>
<tr>
<td>Path 2</td>
<td>0.141</td>
<td>0.091</td>
<td>0.275</td>
<td>0.046</td>
<td>0.042</td>
<td>0.072</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**Table V.**
Standard error of indirect effect

<table>
<thead>
<tr>
<th>Variable</th>
<th>Path</th>
<th>SE</th>
<th>(Z)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a_{bc})</td>
<td>Path 1</td>
<td>0.001</td>
<td>(0.006)</td>
<td>(-0.173)</td>
</tr>
<tr>
<td></td>
<td>Path 2</td>
<td>0.134</td>
<td>0.048</td>
<td>2.770</td>
</tr>
<tr>
<td>(af)</td>
<td>Path 1</td>
<td>0.063</td>
<td>0.013</td>
<td>4.915</td>
</tr>
<tr>
<td></td>
<td>Path 2</td>
<td>0.642</td>
<td>0.141</td>
<td>4.554</td>
</tr>
<tr>
<td>(ce)</td>
<td></td>
<td>0.193</td>
<td>0.067</td>
<td>2.860</td>
</tr>
</tbody>
</table>

**Table VI.**
Specific indirect effect
standard errors of abc, af and ec to test whether or not the mediated effect exist. The paper investigated that bold line from the confirmation did not pass through the distal mediators (PU and satisfaction) to intention to buy. It was found that the path from confirmation →PV→satisfaction→intention to buy was sufficient. In other words, only one distal path (path 2) existed: confirmation→PV→satisfaction→intention to buy.

Step 4 – Evaluation of partial vs full mediation. The model addressed the issue of full vs partial mediation. As depicted in Figure 2, partial vs full mediation entails whether the estimation of paths e, f, and r′ are significant or not. In other words, if e, f, and r′ are each non-significant, one might conclude full mediation and that these paths should not be estimated in the model. If the paths are significant, then one has partial mediation, provided the indirect effect is itself significant. There are three methods to assess mediation: ordinary least squares, structural equation modeling and bootstrapping. Bootstrap procedures are now available in a wide variety of software platforms (Shrout and Bolger, 2002; Fletcher, 2006). Bootstrap techniques provide alternative estimates of variances and distributions for unstandardized or standardized estimators of direct and indirect effects of Table VI. Perhaps the most consistent finding is the asymmetric distribution of the bootstrap estimates when the sample is small. Given the widespread use of the symmetrical normal and t distributions in the classical tests, there is a potential for incorrect inferences when the assumptions for the classical tests are not met. The bootstrap confidence intervals reflected these factors. Table VII showed that the effect of confirmation on intention to buy from PV and satisfaction is a partial distal mediated effect. That means that the visitors’ confirmation after reading reviews must be mediated via PV and satisfaction to have an impact on intention to buy.

5. Discussion and implications
5.1 Summary of the results
A total of 292 respondents answered a questionnaire assessing the impact, through distal mediators of various constructs on intention to buy in the context of reviews. These observations strengthen the relationships between ECT and PV in the new model. As a result of the AMOS analysis, 10 of the 12 hypotheses were supported. Interesting found, only one distal path from confirmation to intention to buy was found to exist. The results were consistent with the findings of Thong et al. (2006) found in the context of information technology continuance, Liao et al. (2009) in the information technology adoption of life cycle and Lee and Kwon (2011) in web-based services. The paper differs from other general intention models because it investigated two distal paths to be highly relevant to causal steps on intention to buy. Unfortunately, only one distal path existed from confirmation to intention to buy. Relatedly, PV was also found to be one of the distal mediators in the causal path. For now every application must be useful that it will last longer. Therefore, visitors could not

<table>
<thead>
<tr>
<th>Variables</th>
<th>Point estimate</th>
<th>Product of coefficients</th>
<th>Bias-Corrected 95% CI</th>
<th>Percentile 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation → intention direct Effects (τ')</td>
<td>0.221</td>
<td>0.907</td>
<td>0.244</td>
<td>0.204</td>
</tr>
<tr>
<td>Perceived value → intention (f2)</td>
<td>1.219</td>
<td>0.184</td>
<td>6.625</td>
<td>0.548</td>
</tr>
<tr>
<td>Confirmation → satisfaction (e)</td>
<td>0.276</td>
<td>0.546</td>
<td>0.505</td>
<td>−1.829</td>
</tr>
</tbody>
</table>

Note: r′ is the direct path

Table VII. Result of distal mediating effect for path 2 (dot line)
concern whether reviews are useful. Specifically, PV was composed of quality value, emotional value and value for money. Therefore, the paper is not only investing the distal mediators but also proved that the second-order model was better than the first-order model with regard to the target coefficient.

5.2 Implications for practice
Based on the findings of this study, I would like to point out worthy considerations for theory development. The resulting provides a basis to generate concrete advice for owners about reviews concern to enhance visitors’ PV. It seems sensible to pursue two strategies: first, enhance the visitors’ PV to trigger motivation forward, and second, inspire the visitors to progress smoothly in the visiting stage. To inspire visitors, information of reviews can be posted by offering positive or negative suggestions (e.g. good or bad experience); managers should improve their products or services from the suggestions of reviews and need to consider the distinctive influences of various aspects of reviews when promoting products and devising e-marketing strategies. Marketers should recruit and filter reviews to write positive suggestions of their own products or service. IS practitioners should post the reviews might need to provide more detailed information (e.g. the reasons of like or dislike).

The posted information from reviews should be accurate, particularly aiming at visitors who are motivated by reviews’ suggestions. All proposed measures are particularly important for visitors with sufficient reviews effects. Greater transparency of reviews might be achieved by more explicit reviews information (e.g. via like or dislike statements). As shown above, the results of the ECT allowed me to derive reviews recommendations how important to employ for enterprises. These reviews were either directly given by experienced users or at least validated with their help to visitors. Proactively, e-venders can build reviews to attract visitors to become customers by providing qualified products, a friendly interface and critical reviews mechanism, etc. Academics should take into account for marketing strategies and purchasing models relating in concrete applications, for example, brand new technologies. Therefore, the reviews have become a vital and competitive tool to enhance visitors’ willing to buy.

5.3 Limitations
Even though I tried my best to design and implement thoughtfully for this research, there are still some limitations. First, the results could be influenced by self-selection bias. The sample of respondents surveyed in this study consisted of young adults (58.90 percent were between the ages of 21 and 25 years old), the majority of whom (54.79 percent) were students. Therefore, in the context of this study, the visitors surveyed were young and able to easily access information online. The phenomenon has been proved by Hsu (2013) found, it still needs to explore further. Second, PU did not have a significant impact on satisfaction which consistent with Tao et al.’ (2009) result. It is the 292 of responses’ feelings for now; it needs to be explored further. Third, it would also be worthwhile to investigate any obstacles, such as believable (Cheung et al., 2012) that might reduce the intentions to buy of visitors.

Finally, recommendations and promotions have also been found to influence visitors’ further purchasing behavior, such as extra buy (Tsao, 2013). These phenomena are worth investigating in future research.

References


Further reading


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Building online citizen engagement for enhancing emergency management in local European government

The case of the November 2015 Paris attacks

Maria del Mar Gálvez-Rodríguez, Arturo Haro-de-Rosario, Manuela García-Tabuyo and Carmen Caba-Pérez

Department of Business and Economics, University of Almería, Almería, Spain

Abstract

Purpose – The purpose of this paper is to examine European citizen engagement for enhancing emergency management and, more specifically, in the context of the terrorist attacks which occurred in Paris, France on November 15, 2015. To do so, two main research questions are raised. First, are there differences in the levels of citizen engagement between the country affected, France, and other European countries? Second, what factors foster a high level of citizen engagement in France?

Design/methodology/approach – First, a comparative content analysis of the Facebook pages of local governments in France and other capital cities of the European Union (EU) was carried. Second, a multivariate regression analysis was performed.

Findings – Although the level of online citizen engagement was greater in France than in the other EU cities analyzed, similarities were detected in the messages sent, responses and moment of participation. Moreover, there are certain types of online social behavior that encourage interactive conversations among citizens as well as between citizens and their local governments.

Practical implications – This research enables local governments to understand the similarities and differences between citizens and local governments from the affected country and those from outside it when using social media to engage in emergency management. It also provides further insight for managers of local governments in the country affected with regards to the need to be aware of the influence of online collective behavior that emerges from the information they publish. As a result, the attainment of a high level of citizens’ participation in their social media can differ.

Originality/value – This paper advances in the scarce knowledge of high levels of online engagement (conversational interactions) in emergency situations.

Keywords Participation, Facebook, Crisis, Crisis informatics theory

Paper type Research paper

The current issue and full text archive of this journal is available on Emerald Insight at: www.emeraldinsight.com/1468-4527.htm

The seven coordinated terror attacks in Paris the night of Friday 13 November 2015 left at least 130 people dead and hundreds wounded. In response to this massacre, a state of emergency was declared across the country to help fight terrorism. Social media was the place where millions of people around the world first heard about it[1].

Introduction

Although shocking crisis situations such as natural disasters and terrorist attacks have occurred in several European countries, there is a clear lack of recent strong evidence of citizens’ reactions on the use of social media in such countries. In this respect, the most of the evidence comes from the USA (Reuter et al., 2016). Moreover, there is no doubt on the leading role that local governments have played in the management of any emergency situation (Shen and Chu, 2014). However, most of the public sector studies focusing on the use of social media for improving disaster response are carried out at a national level rather than at a sub-national level (Yu et al., 2017).
To overcome an emergency situation, it is crucial to engage the public with the aim of strengthening the capacity of the community to successfully carry out the four phases of emergency management: mitigation, preparedness, response and recovery (Kurian et al., 2017). The term engagement is “an acknowledgement that interactants are willing to give their whole selves to encounters. Engagement assumes accessibility, presentness, and a willingness to interact” (Taylor and Kent, 2014, p. 387). This is in accordance with Graham et al. (2015), who stated that giving citizens a participatory space in emergency management fosters the expanded knowledge, shared learning, personal responsibility and increased social capital. As a result, citizenship more resilient and prepared in such moments of threat is generated.

Current studies on emergency situations and online information have enriched the literature with fresh findings such as the propose of new methods and models to detect emergencies and manage public online opinion (Du et al., 2017; Yu et al., 2017), the identification of the web technologies most used by citizen-based response organizations in crisis situations (Lai, 2017) or identification of the themes that most emerge in social media along all the phases of emergency management (Kurian et al., 2017). However, there is still a lack of attention on the different reactions of online engagement between citizens from both the country where the crisis occurs and those from outside the country affected. Furthermore, there are only few studies focusing on the drivers of a high level of citizen online engagements, that is interactive conversations (ICs), during crisis situations.

Hence, this study aims to analyze European citizen engagement in emergency situations and, more specifically, with regards to the events shortly after the terrorist attacks which occurred in Paris, France in November 2015. To do so, this paper posits two main research questions:

**RQ1.** Are there differences in the levels of citizen engagement between those within the country affected, France, and other European countries?

**RQ2.** What factors foster a high level of citizen engagement in France?

The contributions made by this paper are several. Up to now, the knowledge regarding citizens' response via social media is little, and the few studies published mainly address the first two levels of engagement (clicking actions and text comments). Hence, this study contributes to go a step further and advance toward the highest level of online engagement, which is the generation of ICs. Likewise, the literature has neglected comparative analyzes of social media in emergencies, and with this research, the view of both the country affected (France) and external reactions of European Union (EU) citizens is covered. In addition, this research contributes to the lack of empirical studies focused on which factors should local government take into account to monitor and foster online citizens engagement during emergency management situations.

**Literature review**

*Social media use in emergency situations*

Previous research on the use of social media during crises has emphasized the important operational and emotional support roles of such technologies. In particular, in connecting people, updating the information and providing reassurance about safety (Pohl et al., 2016). In this regard, the free expression of feelings and emotions over the deaths and wounded, and the anger toward those responsible have been salient features and common themes in social media analysis (Al-Saggaf and Simmons, 2015).

Regarding the type of emergency, social media has been used, among others, in earthquakes (Yates and Paquette, 2011), storms (Lachlan et al., 2016) and riots (Panagiotopoulos et al., 2014).
Likewise, in epidemics (Seltzer et al., 2015), floods (Al-Saggaf and Simmons, 2015), shooter incidents (Mazer et al., 2015) and tsunamis (Ichiguchi, 2011).

According to Alexander (2014), seven lines of research concerning the use of social media in the emergencies field can be identified: listening to public debate; monitoring situations; extending emergency management; crowd sourcing and collaborative development; creating social cohesion; furthering causes (including charitable donations); and enhancing research. In all cases, it is widely considered that in emergency situations, social media can improve communication, citizen engagement and trust (Al-Saggaf and Simmons, 2015).

The role of governments in emergency management via social media
The growing use of social media during emergency situations provides, on the one hand, new information sources for the government and, on the other, viable solutions for the problems plaguing information dissemination and communications (White et al., 2009). Authors such as Graham et al. (2015) show that social media gives the government the ability to inform and seek opinions from relevant publics in real time, which is especially important during emergencies. Despite the possibilities offered by social media to governments in emergency management, McCarthy and Yates (2010) explained that some sectors of society fear that the government might track or invade the privacy of citizens who do decide to help.

There are few studies that have examined the use of social media for emergency management at a local government level (Shen and Chu, 2014). Sandoval and Gil (2012) believed that although collaboration is the most important function of social media at a local government level, this is rarely achieved. Nevertheless, the possible exception to this respect can be in emergency situations. In this sense, local governments can use social media to facilitate the mass redistribution of announcements and emergency alerts, which also allow citizens to interact with them (Shen and Chu, 2014). Moreover, Graham et al. (2015) highlighted that social media has very useful attributes for managing emergencies as it enables local governments to communicate with their citizens in a frequent, open, quick, effective and targeted way. Consequently, the particular relationship between social media, the heightened emotions associated with crises and local government–citizen collaboration warrants further research.

Levels of social media engagement and characteristics
In social media management for enhancing public participation, aspects from the message sent by the government and the response received from citizens should be taken into account (Heverin and Zach, 2012; Phethean et al., 2015; Cvijikj and Michahelles, 2013; Ureña et al., 2014; Bonsón et al., 2015).

With respect to the “message sent” by the government, several authors highlight the relevance of identifying the content type with the aim of observing what kind of information is of most interest to citizens (Heverin and Zach, 2012). Media type used in the post is also important as it can include rich multimedia data such as links, videos or photos (Bonsón et al., 2015).

Pertaining to the “response,” three levels are identified. Level 1 refers to actions that require “clicking” to complete the interaction, such as the “liking” and “sharing” actions in Facebook. These are considered to be the first level as they are small moves of support that can be performed easily and, therefore, little effort and time is needed (Luarn et al., 2015).

Level 2 corresponds to the text comments generated by the post sent. Here, the participation is higher as it involves greater effort and implies the expression of opinions into a logical order and writing them down (Bonsón et al., 2017). Moreover, for the better
understanding of this level, the reactions in terms of content type of comments (Heverin and Zach, 2012) and attributes such as the sex of the user (Lachlan et al., 2016) and number of commentators per post (Phethean et al., 2015) should be examined.

Level 3 refers to ICs which embrace replies generated from a comment made (Guo and Saxton, 2014). This action is highly interactive and it represents evidence of a strengthened relationship (Phethean et al., 2015). In this regard, whether the conversation is initiated by the public authorities or, in contrast, by citizens, they should also be examined (Mergel, 2013).

Moreover, another relevant aspect is the moment of participation which implies the association between the moment the post is published and the moment where the response is performed (Cvijikj and Michahelles, 2013). In this respect, Ureña et al. (2014) noted the usefulness of identifying whether the response is made during the week or on weekends and the level of coincidence between post published and the interaction received.

**Theoretical framework and hypothesis**

The crisis informatics theory (Hagar, 2006) helps to explain the role that social media plays in the new ways of citizens engagement that emerge during crisis situations, as a result of the interconnectedness of people, organizations, information and technology (Hagar, 2015). In particular, social media is considered as a backchannel or peer-to-peer communications tool that favors the generation of wide-scale interactions. This implies interactions amongst a large bunch of citizens, willing to engage for a good cause. The different interactions lead to diverse collective behavior patterns (Hughes et al., 2008). The wide-scale interactions can produce astonishing results for emergency management such as collective intelligence, which means distributed groups of people solving complex problems (Palen et al., 2009).

To observe citizen online engagement and the social media convergence that emerge from it, this theory notes the importance of paying a close attention to the micro-level interactions (Vieweg et al., 2008). In this regard, the ICs are the most micro-level interactions of online engagement (Phethean et al., 2015). Hence, diverse are the authors who recommend ICs as a measure of a helpful online engagement (Nikolai et al., 2015; Phethean et al., 2015) because from them, it can deploy dialog and relationship building (Hagar, 2013). Consequently, ICs can foster greater understanding among collectives that are formed in emergency situations.

Looking at factors that favor ICs and regarding prior literature on crisis informatics theory, we can highlight the geographic proximity. This is due to the fact that closeness to the place of the disaster along with information technologies could make citizens most near to the disaster more interested in starting or being part of ICs than those citizens in peripheral zones (Palen et al., 2009). It is also due to social media activity, as it increases during crisis situations and, in turn, it fosters the apparition of more engage users interested in carrying out long-term relationships in such virtual environments (Hughes and Palen, 2009) such as IC. As mentioned above, different types of online convergent behavior appear in crisis situations (Hughes et al., 2008) and in this respect, it is not clear that all online behaviors lead to the same deepness of the interactions. In addition, the fluidity of communication should be considered in the generation of online interactions. This is because of a high flow of communication which indicates that users who respond are interested in the issue addressed (Hagar, 2015), and consequently, that could be a great predictor for the generation of ICs.

There is no doubt that public authorities need to consider the inclusion of social media as an additional and valuable communication tool for emergency management (Sutton et al., 2008). In this respect, it is worth noting that there is a scarcity of knowledge on how public authorities can foster and manage citizens’ engagement in crisis situations, especially with regards to studies based on empirical analysis
(Hughes, St Denis, Palen and Anderson, 2014). Hence, this study aims to advance in the understanding of features of sociotechnical change that can influence citizens' engagement with the social media of local government during crisis situations.

Taking into consideration previous research and in line with Laswad et al. (2005), this study does not pursue an analysis of all the factors studied in the literature; hence, some of the relevant factors that match the objectives of its analysis are analyzed. In line with the second research objective, the analysis of factors that boost a high level of citizen engagement (that is Level 3: IC) via the social media of French local governments during the terrorist attacks which occurred in Paris, the following factors will be analyzed: “geographical proximity of citizens to terrorist attacks” “social media activity,” “types of online convergent behavior” and “fluidity of communication.”

**Geographical proximity of citizens to terrorist attacks**

In crisis situations, social media is becoming a useful tool for citizens near the disaster and those outside it, as in both cases citizens go online to seek and provide information. However, the intensity of “wide-scale interactions” can vary from those people more directly affected by the disaster and those peripheral citizens (Palen and Vieweg, 2008; Palen and Liu, 2007). This could be due to, even in the presence of web technologies, the fact that disaster places will continue to have a role in citizen communications because of the meaning inherent in the place; because they target the right audience for certain messages; or because they more readily afford the presentation of components of emotional character (Palen et al., 2007). Consequently, when citizens near the place of disaster exchange information, they could be more prone to carry out ICs.

At a local government level, Panagiotopoulos et al. (2014) noted that the distribution of social media tweets about an emergency situation is not equal across a country. In particular, their outcomes indicate that local governments from areas not directly affected were more active in the sending of tweets regarding the crisis situation than those from the most affected areas. Thus, it would be interesting to observe the “citizens’ side” and examine how far geographical proximity fosters online citizens’ engagement in social media of local governments involved in crisis situations. Hence, the following hypothesis is proposed:

**H1.** The proximity of citizens to a terrorist attack influences a high level of engagement in the social media of French local governments in emergency situations.

**Social media activity**

Frequency in sending messages, namely activity in the use of social media, is a relevant factor for dynamizing the two-way communications (Palen et al., 2010). However, its effect for not only fostering a response message but also for gaining ICs is not clear. Analyzing publicly available tweets after Hurricane Gustav and Ike, Hughes and Palen (2009) stated that although the number of messages sent increases crisis situations, the ICs were fewer than in conventional situations. This is because people serve as “information hubs” which implies that there are citizens who actively collect and deploy information; however, many others “participate” in the communication in a more peripheral fashion (Palen and Liu, 2007). However, examining also Twitter and the case of citizen-based response organizations after Hurricane Sandy, Lai (2017) identified greater conversations interaction right after the disaster than later.

Moreover, it is worth mentioning that citizens prefer Facebook to Twitter when deciding to participate in local government issues (Haro-de-Rosario et al., 2018). In addition, under a conventional situation, Sáez-Martin et al. (2015) found a positive relation between local governments’ activity and citizens’ dialogue through Facebook pages.
Hence, it would be logical to expect that this result also occurs under the crisis situation context. Hence, an active use of Facebook, via sending messages, could foster a high engagement (that is to generate greater micro-level interactions, ICs). Accordingly, the following hypothesis is proposed:

**H2.** Social media activity positively influences a high level of engagement in the social media of French local governments in emergency situations.

*Types of online convergent behavior*

In crisis situations, citizens interchange messages in social media to seek information for themselves as well as look for ways to provide information and assistance (Hughes et al., 2008). These attitudes in the virtual environment lead to observable collective behaviors such as displays of helping, being anxious, returning, supporting, mourning, exploiting and being curious (Hughes et al., 2008). However, the collective behaviors bring different discussions to address, and consequently they can vary with the likelihood of the generation of ICs among them.

In the local government context and under conventional situations, previous studies, focused on citizens attitudes in social media, have indicated that citizens who are more critical publish and respond more often (and therefore are more engaged) than citizens who agree with the government’s actions (Mergel and Bretschneider, 2013). Stated another way, the level of citizen engagement can increase or decrease depending on the type of citizens’ reaction to the information disclosed in local governments’ social media (Ibaro-de-Rosario et al., 2018). Therefore, under a crisis situation context, it would be interesting to observe to what extent the different types of online convergent behavior affect the volume of interactions they generate from them (IC). Thus, the following hypothesis is proposed:

**H3.** Types of online convergent behavior influence a high level of engagement in the social media of French local governments in emergency situations.

*Fluidity of communication*

Social media is an excellent “backchannel communication” tool (Sutton et al., 2008) or instant peer-to-peer communication mechanism, and consequently in crisis situations, citizens, via social media, can increase their active engagement in the information production and distribution, emerging new and more meaningful ways of citizens participation in emergency management (Hughes, Peterson and Palen, 2014).

The flow of information or the speed with which a message is responded could be an indicator of the impact that the message has sparked in the audience (Palen et al., 2010) and, consequently, a signal for the influence of the message to make citizens to participate not only to give a response but also for involving in a fruitful conversation. As a result, it could lead to acts of collective intelligence or initiatives of the public that help in solving complex problems in crisis situations (Keim and Noji, 2011).

Hence, the fluidity of communication via social media is a key factor to consider when monitoring the adequate use of social media during emergency situations (Charlwood, 2012). This is because the fluidity of communication in social media might lead to ICs among citizens or between citizens and emergency organizations. Therefore, local governments should take into consideration the factors that predict the level of success in obtaining a high level of engagement. Accordingly, the following hypothesis is proposed:

**H4.** Fluidity of communication positively influences a high level of engagement in the social media of French local governments in emergency situations.
Methodology

RQ1: comparative analysis
To determine the differences in the social media engagement between the citizens of France and of other European countries when the Paris terrorist attacks occurred, a content analysis was conducted. According to previous studies on the use of social media in emergencies (St Denis et al., 2014), the type of content analysis mainly implemented in this study was deductive as the information was codified into pre-defined categories. In particular, the classification of this study corresponds with the literature review of Section 2.3.

This coding scheme has two main categories, the “message sent” and the “response,” which, in turn, have sub-categories with the aim of allowing deeper analysis within each category (St Denis et al., 2014). In particular, the message sent presents three sub-categories that gather information regarding the content, media of the message and moment of sending. With respect to the responses, three levels of response were established in accordance with the levels of engagement identifed in the literature review. These levels of response, in turn, contain other categories that identify the type of content of the comment; attributes of commentators; and the moment of response (see Tables II–IV). Nevertheless, the type of content that emerges in both the messages sent and comments is analyzed in an open-coded manner, in line with the previous researchers who noted that it is better to classify the themes according to the information found in the study (Kurian et al., 2017). The classification of both content types is exclusive, which implies that each message or response is assigned just one theme, in line with Lachlan et al. (2016).

Moreover, when performing the analysis, a limit of 50 posts and replies per day in each of the cases was established, in accordance with similar studies in social media (Bonsón et al., 2015).

The coding was hand coded by three coders who worked independently following a previous dialogue among them, ensuring agreement in the procedure of scoring (Graneheim and Lundman, 2004). To check this assumption, Scott’s $\pi$ coefficient of agreement was implemented and the inter-rater reliability score obtained in the content analysis was 0.84. In addition, to identify the absence or presence of an item, a dichotomous system was used, with the exception of “most frequent date of post” and “average hour of the post sent.” In those cases, the coders noted the dates and hour, and in the aggregate results, the mode and median are indicated.

RQ2: regression analysis
To respond to RQ2, a multivariate regression analysis was performed in line with Haro de Rosario et al. (2018), who used this method in order to answer a similar research question albeit related to the public sector.

The dependent variable selected to measure a high level of citizen engagement via social media was the ICs that are calculated based on the information taken in Level 3, that is, replies made to the comments made in each message or post published. As pointed out by Mergel (2013), this conversation can be initiated by either governments or citizens. Therefore, IC is the sum of total conversations initiated by both parts.

With regards to the independent variables, according to the four hypotheses outlined in Section 3, Table I shows each independent variable, its measurement and expected relation. In addition, it appears appropriate to consider that the use of control variables plays a central role in research about citizenship behaviors, personality, leader–member exchange or human resource, among others, and the majority of control variables used converge around the same simple demographic factors, such as gender or age (Bernerth and Aguinis, 2016). Accordingly, the age of citizens was included as a
control variable, differentiated in the three ranges used by the Statistical Office of the EU (Eurostat, 2014).

All statistical calculations were carried out using STATA Version 14. The calculation applied for the model is given by the following expression:

\[ IC = \beta_0 + \beta_1 \text{Proximity} + \beta_2 \text{Activity} + \beta_3 \text{Convergent behaviour} + \beta_4 \text{Flow} + \beta_5 \text{Age} + e, \]

where \( \beta_0 \) is the constant term, \( \beta_j \) is the vector coefficient to be calculated and \( e \) is the random error, assumed to be independent and identically distributed, with a mean value of 0.
Sample
For the purpose of this study, two samples corresponding to the social media of local governments from France and the rest of EU countries were selected. With respect to the French sample, the largest local governments in France were selected. This criterion is in line with previous studies that noted that these type of entities are more likely to manage these technologies (Sáez-Martín et al., 2015) and thus can be a good indicator of national trends. Large cities, that is, cities with populations greater than 100,000, were considered in accordance with Rosen and Resnick (1980). Under this criterion, a total of 39 French cities were detected.

Regarding the European group, the social media of local government in capital cities from EU countries, that is, 28 cases, was detected. From that sample, 27 entities had a presence in Facebook, albeit only 21 showed an active account, “active” being defined by the UK Government Cabinet Office (2009) as those with a minimum of three posts per day.

In line with Panagiotopoulos et al. (2014), the period of analysis included the days following the emergency. The attacks occurred on November 13, 2015 and, therefore, the analysis period was seven days from that date, i.e., from November 13-19, 2015. In total, 698 messages and 516,919 responses, corresponding to clicking actions (513,451), text comments (3,403) and ICs Level 3 (65), were analyzed.

Results
RQ1: French vs European online citizen engagement after the Paris terrorist attacks
Tables II–IV show the results of the comparative analysis concerning citizens’ reactions and engagement with the social media of local governments in emergency conditions. Starting with the “message sent,” during the seven days after the Paris attacks, over half of the posts published by French local governments (the country affected) focused on the terrorist attacks, while in others local governments in the EU, the messages regarding that issue were less than 12 percent.

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messages sent</td>
<td>468</td>
<td>230</td>
</tr>
<tr>
<td>No reference to the terrorist attack</td>
<td>49.79%</td>
<td>88.26%</td>
</tr>
<tr>
<td>Reference to the terrorist attack</td>
<td>50.21%</td>
<td>11.74%</td>
</tr>
<tr>
<td><strong>Content types</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informative</td>
<td>32.22%</td>
<td>25.93%</td>
</tr>
<tr>
<td>Solidarity</td>
<td>61.92%</td>
<td>74.07%</td>
</tr>
<tr>
<td>Humanitarian aid</td>
<td>0.42%</td>
<td>0.00%</td>
</tr>
<tr>
<td>To convey safety and calm</td>
<td>2.09%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Patriotism</td>
<td>3.35%</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Media types</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>27.41%</td>
<td>14.81%</td>
</tr>
<tr>
<td>Links</td>
<td>8.49%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Video</td>
<td>2.70%</td>
<td>7.41%</td>
</tr>
<tr>
<td>Photos</td>
<td>61.39%</td>
<td>77.78%</td>
</tr>
<tr>
<td><strong>Moment of sending</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most frequent date of post (Mode)</td>
<td>November 14, 2015</td>
<td>November 14, 2015</td>
</tr>
<tr>
<td>During the week</td>
<td>49.36%</td>
<td>22.22%</td>
</tr>
<tr>
<td>Weekend</td>
<td>50.64%</td>
<td>77.78%</td>
</tr>
<tr>
<td>Average hour of the post sent (Median)</td>
<td>13:59</td>
<td>15:11</td>
</tr>
<tr>
<td>Within working hours</td>
<td>57.87%</td>
<td>22.22%</td>
</tr>
</tbody>
</table>

Table II. Comparative analysis: messages sent
Within the aspects of the message sent and regarding content types, the study highlights that in both groups analyzed, the content most published was related to the expressions of solidarity and the management of solidarity events. The second most used content type was related to informative content referring to the damages provoked by the attacks and, in the case of France, to notify the decisions taken regarding public events programmed during that period. It is worth noting that French local governments used very little social media to manage humanitarian aid but in the cases detected, this was focused on fostering donations, while that type of content was not identified in the local governments from other EU capital cities.

Regarding media type, both the local governments from the country affected and their partners from the EU coincided principally using photos in the messages sent. Both groups also used texts but to a much lesser extent. Additionally, there was very little implementation of videos and links, with links being non-existent within the European group.

With respect to the moment of sending, in analyzing the seven days right after the terrorist attacks, it was observed that the 14th of November was the day when local governments from the country affected (France) and outside the country (EU) sent the
highest volume of posts. However, while in the French case most of the posts published were within working hours, the local governments from EU capital cities mostly posted at the weekend and out of working hours. In average terms, along the seven days of analysis, French local governments published at 13:59 hours, while in the EU local governments analyzed, the publishing time was later, specifically at 15:11 hours.

Regarding the “response,” in both cases (France vs EU) citizens were more likely to interact via clicking actions (Level 1) than the text comments (Level 2) or ICs (Level 3). However, French citizens were much more active in the use of social media to engage with their local government immediately after the terrorist attacks (see Table III).

Delving further into “clicking actions,” the interactions most used in both cases were those showing support, using the “like” button; however, the use for emoji-like faces is very low with “sadness” being the emoji most selected. The second most used interaction for the virality of the information was the “share” button.

In the “text comments” and pertaining to the content type of the comment, among the ten themes identified, the content used most often by French citizens and their counterparts in the EU capitals was comments of solidarity. To a lesser extent, French citizens used social media to ask or give information, to criticize the actions taken by local governments and to convey sentiments. In contrast, the local governments from other EU capitals received fewer comments expressing gratitude and criticism of the actions taken by local government. However, there was a very low level of usage of the platform in order to convey sentiments regarding the Paris terrorist attacks.

Regarding the attributes of responders, in both cases, women were more active in using social media to engage in the information posts by local governments. As to the moment of response, it is worth noting that in both cases, citizens showed quick response times to the messages sent as these took place on the same day as the information was posted. However, the time of response differs, in average terms, in the seven days after the attacks with French citizens participating early in the afternoon (15:22) and those from other EU capitals engaging later on in the afternoon (18:22).

Pertaining to “interactive conversations,” in general terms, the conversations were more often initiated by citizens rather than by local governments and occurred within the day

<table>
<thead>
<tr>
<th>Level 3 of interactivity “interactive conversations”</th>
<th>France</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversations initiated by local government</td>
<td>62</td>
<td>3</td>
</tr>
<tr>
<td>Moment of response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the week</td>
<td>35.48%</td>
<td>33.33%</td>
</tr>
<tr>
<td>Weekend</td>
<td>64.52%</td>
<td>66.67%</td>
</tr>
<tr>
<td>Average hour of the comment (Median)</td>
<td>13:57</td>
<td>18:44</td>
</tr>
<tr>
<td>Coincidence (same day comment sent and reply)</td>
<td>96.77%</td>
<td>66.67%</td>
</tr>
<tr>
<td>Delay in reply (at least one day)</td>
<td>3.23%</td>
<td>33.33%</td>
</tr>
<tr>
<td>Working hours</td>
<td>56.45%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Responses per post</td>
<td>1.19</td>
<td>1.33</td>
</tr>
<tr>
<td>Conversation initiated by citizens</td>
<td>471</td>
<td>28</td>
</tr>
<tr>
<td>Moment of response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the week</td>
<td>40.76%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Weekend</td>
<td>59.24%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Average hour of the comment (Median)</td>
<td>13:59</td>
<td>17:37</td>
</tr>
<tr>
<td>Coincidence (same day comment sent and reply)</td>
<td>85.99%</td>
<td>67.86%</td>
</tr>
<tr>
<td>Delay in reply (at least one day)</td>
<td>14.01%</td>
<td>32.14%</td>
</tr>
<tr>
<td>Number of responses</td>
<td>3.04</td>
<td>3.82</td>
</tr>
<tr>
<td>Made by the person who initiated the conversation</td>
<td>80.17%</td>
<td>73.83%</td>
</tr>
<tr>
<td>Made by other citizens</td>
<td>19.83%</td>
<td>26.17%</td>
</tr>
</tbody>
</table>

Table IV. Comparative analysis: response Level 3

Online citizen engagement: 2015 Paris attacks
when the comments were made. However, French local governments demonstrated a more active attitude in providing feedback to the comments made by citizens. Hence, it seems that the local governments affected were more interested in establishing meaningful relationships with their citizens during the emergency.

**RQ2: factors explaining online citizen engagement after the Paris terrorist attacks**

Before entering the explanatory phase, Table V summarizes the descriptive statistics of the variables. Furthermore, the relationships between the independent variables that influence the generation of ICs via Facebook were analyzed.

Table VI shows the Pearson correlation matrix obtained. Among the explanatory factors, three weak-medium correlations were found between the factors thanks and patriotism, critical terrorist and patriotism, and adult and old. These correlations were lower than 0.8, which according to Neter et al. (1996) are not indicative of problems of multicollinearity. Nevertheless, the variance inflation factor (VIF) was used in order to assess to what extent the variance of an estimated regression coefficient increases if the explanatory variables are correlated. The VIF values above 10 indicate the absence of independence among the variables (Neter et al., 1989). Thus, after examining Table VII, it can be concluded that the variables do not present problems of multicollinearity.

In order to respond to **RQ2**, and after confirming the compliance of the initial hypotheses of the model, the multivariate regression analysis was conducted (see Table VII). The resulting model was statistically significant (\(F = 223.28^{**}\)) and the explanatory capacity, measured by adjusted \(R^2\), was 97.43 percent. Additionally, Shapiro–Wilk \(W\) normality test indicated that residuals are normally distributed (see Table VII), and according to Alexopoulos (2010), the residuals of a good multivariate regression analysis should be normally distributed. Furthermore, STATA Link test did not detect specification problems in the model (see Table VII).

With respect to **H1**, results did not allow to consider proximity as a predictor variable for the generation of ICs. This result is not in line with previous research studies that noted differences in the level of engagement with the Twitter accounts of local governments during crisis situations (Panagiotopoulos et al., 2014). On the other side, “wide-scale interactions” generated in social media (Palen and Vieweg, 2008) could overcome the barrier of location, resulting in the creation of equally high levels of involvement, via ICs, both in the impact zone and in the rest of the cities of the country affected.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC</td>
<td>12.8717</td>
<td>16.6704</td>
<td>0.00</td>
<td>83.00</td>
</tr>
<tr>
<td>Proximity</td>
<td>5.6147</td>
<td>1.1798</td>
<td>2.37</td>
<td>6.84</td>
</tr>
<tr>
<td>Activity</td>
<td>0.5280</td>
<td>0.2133</td>
<td>0.12</td>
<td>1.00</td>
</tr>
<tr>
<td>Thanks</td>
<td>4.6756</td>
<td>7.2535</td>
<td>0.00</td>
<td>27.00</td>
</tr>
<tr>
<td>Solidarity</td>
<td>33.9189</td>
<td>70.8630</td>
<td>0.00</td>
<td>423.00</td>
</tr>
<tr>
<td>Critical terrorist</td>
<td>2.5405</td>
<td>4.6523</td>
<td>0.00</td>
<td>23.00</td>
</tr>
<tr>
<td>Critical policy</td>
<td>2.5135</td>
<td>4.8683</td>
<td>0.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Critical LG reaction</td>
<td>5.5945</td>
<td>12.2098</td>
<td>0.00</td>
<td>71.00</td>
</tr>
<tr>
<td>Patriotism</td>
<td>6.1351</td>
<td>9.8887</td>
<td>0.00</td>
<td>35.00</td>
</tr>
<tr>
<td>Convey sentiments</td>
<td>10.1351</td>
<td>19.3938</td>
<td>0.00</td>
<td>94.00</td>
</tr>
<tr>
<td>Info.</td>
<td>15.8648</td>
<td>21.2500</td>
<td>0.00</td>
<td>109.00</td>
</tr>
<tr>
<td>Support LG actions</td>
<td>3.1351</td>
<td>3.7724</td>
<td>0.00</td>
<td>14.00</td>
</tr>
<tr>
<td>Flow</td>
<td>0.7626</td>
<td>0.1900</td>
<td>0.21</td>
<td>1.00</td>
</tr>
<tr>
<td>Young</td>
<td>0.2176</td>
<td>0.0673</td>
<td>0.00</td>
<td>0.33</td>
</tr>
<tr>
<td>Adult</td>
<td>0.1794</td>
<td>0.0619</td>
<td>0.00</td>
<td>0.27</td>
</tr>
<tr>
<td>Old</td>
<td>0.5274</td>
<td>0.1573</td>
<td>0.00</td>
<td>0.62</td>
</tr>
</tbody>
</table>

*Table V.*

Descriptive statistics
### Table VI.

<table>
<thead>
<tr>
<th></th>
<th>IC</th>
<th>Prox.</th>
<th>Activity</th>
<th>Thanks</th>
<th>Solidarity</th>
<th>Critical terrorist</th>
<th>Critical policy</th>
<th>Critical LG reaction</th>
<th>Patriotism</th>
<th>Convey sentiments</th>
<th>Support LG actions</th>
<th>Flow</th>
<th>Young</th>
<th>Adult</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prox.</td>
<td>0.252</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>0.467**</td>
<td>0.129</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thanks</td>
<td>0.388*</td>
<td>0.220</td>
<td>0.449**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solidarity</td>
<td>0.852**</td>
<td>0.374</td>
<td>0.399*</td>
<td>0.467**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical terrorist</td>
<td>0.442**</td>
<td>0.162</td>
<td>0.305</td>
<td>0.438**</td>
<td>0.294</td>
<td>1</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical policy</td>
<td>0.418**</td>
<td>0.265</td>
<td>0.359*</td>
<td>0.552**</td>
<td>0.331* 0.375*</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Critical LG reaction</td>
<td>0.403*</td>
<td>0.166</td>
<td>0.382**</td>
<td>0.097</td>
<td>0.289 0.099 0.229</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patriotism</td>
<td>0.308</td>
<td>0.289</td>
<td>0.316</td>
<td>0.690**</td>
<td>0.213 0.655**</td>
<td>0.262 0.154 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convey sentiments</td>
<td>0.103</td>
<td>0.117</td>
<td>-0.101</td>
<td>0.227</td>
<td>-0.008 -0.073</td>
<td>0.498** -0.125 -0.001</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Info</td>
<td>0.788**</td>
<td>0.084</td>
<td>0.416*</td>
<td>0.100</td>
<td>0.470** 0.288</td>
<td>0.292 0.165 0.110</td>
<td>0.073 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support LG actions</td>
<td>0.468**</td>
<td>-0.039</td>
<td>0.358*</td>
<td>0.240</td>
<td>0.258 0.546</td>
<td>0.176 0.343* 0.446**</td>
<td>-0.110 0.370* 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td>0.208</td>
<td>0.026</td>
<td>0.075</td>
<td>0.055</td>
<td>0.102 0.190</td>
<td>0.142 0.094 0.174</td>
<td>0.133 0.207 0.255</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>-0.374*</td>
<td>-0.352</td>
<td>-0.144</td>
<td>-0.152</td>
<td>-0.387* -0.018</td>
<td>-0.197 -0.322 -0.127</td>
<td>-0.075 -0.107 -0.316</td>
<td>-0.267 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>0.414**</td>
<td>0.060</td>
<td>0.018</td>
<td>0.271</td>
<td>0.280 -0.021</td>
<td>0.057 0.031 0.061</td>
<td>0.004 0.420** 0.118</td>
<td>-0.101 -0.302 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old</td>
<td>-0.136</td>
<td>0.352*</td>
<td>0.006</td>
<td>-0.149</td>
<td>-0.043 0.024</td>
<td>0.105 0.113 -0.140</td>
<td>0.082 -0.383* -0.001</td>
<td>0.226 -0.410** -0.646**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** *, **Significant at 0.05 and 0.01 levels, respectively

Online citizen engagement: 2015 Paris attacks
The social media activity variable \((H2)\) showed a non-significant effect on the IC dependent variable. Hence, the publication of a large number of posts by French local governments, relating to the 2015 Paris attacks, cannot explain the generation of ICs or a high level of engagement. This finding does not coincide with similar previous investigations which are focused on Twitter usage in crisis situations in the US context (Hughens and Palen, 2009; Lai, 2017) or studies focused on the Facebook activity of European local governments in routine situations (Sáez-Martín et al., 2015).

\[H3\] was confirmed with outcomes supporting the online convergent behaviors that emerge in crisis situations, thanks to information and communication technologies (Hughes et al., 2008) leading, in turn, to different levels of online social interactions. In particular, citizens who published critical comments of both the terrorists responsible for the attacks and the actions taken by the local government created a collective online behavior that positively influenced the high level of online engagement achieved in the Facebook pages of French local governments. This finding is also in line with previous research studies that point out that citizens who are more critical of local government actions are more likely to lead citizens’ participation in the social media of such entities, albeit their studies were developed in routine situations (Mergel and Bretschneider, 2013). In addition, the results reveal that those citizens who use local governments’ Facebook pages to convey their sentiments of fear or sadness as well as to seek or provide relevant information also generate high levels of social interactions in the aforementioned social media.

Concerning \(H4\), conclusive results were not found about the effect of fluidity of communication in obtaining a high level of online engagement in the Facebook pages.
of French local governments. Thus, it seems that the advantage that social media possesses as a “backchannel communication” tool, when providing a fast two-way communication, is not significant for the enhancement of ICs. These results are in line with previous authors who express that a high level of activity in the social media of local governments does not necessarily lead to a greater level of citizens’ participation on the social media of such entities (Bonsón et al., 2017).

Conclusion and implications

In view of the results obtained in the messages sent, French local governments published more posts focused on the Paris terrorist attacks than other local governments from EU capitals. Therefore, the use of social media in emergency situations is much more intense in the country affected than in neighboring countries. Moreover, while previous authors state that among European emergency service staff, the use of social media is principally for informative purposes (tips and safety advice) (Heverin and Zach, 2012), this paper adds that, in the case of the Paris terrorist attacks, most posts published expressed solidarity and gave information about solidarity events, even when external reactions were taken into account.

In addition, coinciding with previous studies focused on the country affected by an emergency (Hofmann et al., 2013), both groups analyzed coincided in sending the highest volume of posts on the day after the attacks, and principally in using photos in their posts, in line with Bonsón et al. (2015). In this regard, the results of both the internal and external reactions not only support the literature but also provide a more global view.

According to the responses analyzed, with regards to French local governments, French citizens were much more engaged with Facebook than the rest of citizens analyzed. Thus, this study shows that, given the quick response of citizens, local governments from the country affected could use social media as an emergency management tool. It seems that the level of engagement grows under emergencies. However, still citizens are more likely to interact via clicking actions, than via text comments or ICs, in line with previous studies (Bonsón et al., 2017).

Moreover, while EU citizens are apparently more interested in making comments of solidarity and gratitude, French citizens also tried to resolve sentimental needs, obtaining similar reactions to those of US citizens in the social media of universities following shooting incidents (Heverin and Zach, 2012). However, these findings not coincide with the case of the social media of US emergency management organizations in which citizens express more comments regarding status update, criticism, recommendation and request (Kurian et al., 2017).

Regarding the generation of ICs, it is worth noting that conversations were much more likely to be initiated by citizens than by local governments. Therefore, although governments should seek meaningful relationships with their citizens (St Denis et al., 2014), this task is still in progress. However, this study gives fresh insights as it evidence that in local governments affected by an emergency, the concern for having a better understanding of the community increases.

Under the lens of crisis informatics theory, this paper provides greater understanding on what factors foster citizen engagement in crisis situations. In particular, while previous authors stand out that social media is influencing the creation of new patterns of citizens’ behavior in emergency situations (Hughes et al., 2008), this paper advances in identifying which type of online collective behaviors fosters dialogic social interactions, specifically, ICs in the local governments Facebook pages. In this respect, from the ten online collective behaviors identified, four of them present significant influence. Two of them are related with citizens’ critical reactions and, in particular, to terrorists and to the actions taken by local governments with regard to the attack. Too, citizens who use social media to convey their sentiments of fear or sadness as well as to seek or provide relevant information are more likely to foster ICs among citizens and between citizens and their local governments.
The outcomes also reveal that although crisis situations boost the activity of social media (Hughens and Palen, 2009), this “dynamic effect” does not ensure a high level of online engagement and more specifically that concerning to citizens interactive conversation in Facebook pages of local governments. In addition, the power of social media in fostering “wide-scale interactions” (Palen and Vieweg, 2008) which allows to develop collective intelligence to solve complex problems during crisis situations (Vieweg et al., 2008) seems to be confirmed in this paper. This is because outcomes show that citizens’ online engagement across the country is not subject to geographical proximity of citizens to the terrorist attacks. Hence, helpful and resolute ICs can occur among citizens and in dialogue with local governments across the country affected.

Hence to recap, this study advances previous literature for several reasons. The study confirms that local governments both from country affected and peripheral European countries use Facebook as a mechanism to support the “recovery phase” and more specifically as a dissemination tool to express empathy more than for carrying out response activities that need cooperation or collaboration between these public administrations and citizens.

In addition, this study fosters the measurement of online engagement taking into account the ICs, because unlike other type of interactions, the generation of ICs implies willing participants to dialog and be involved in decision-making processes. In this respect, local governments, even when they are under crisis situations, show very little compromise with establishing ICs, with even lower interest by those outside the country affected. On the contrary, the information posted by local governments generates discussion among citizens, principally during their leisure time. In particular, this study provides fresh insights into the issues that spark interest and generates online engagement, in particular when citizens condemn the attacks, assess how the local government is addressing the emergency and in the interchanging of feelings and informative aspects of the event.

Regarding practical implications, to start, in crisis situations, findings reveal that there is a high fluidity of communications or in other words the messages post by local government get a quick response from citizens. Consequently, these entities should use social media for fostering the cooperation of citizens in such situations. Furthermore, there is a clear need of greater awareness not only to achieve engagement in sending informative post with the right format and the right moment, but also to pay greater attention of giving a feedback on citizen comments. Hence, the social media management by local governments under crisis situation is still improvable. They need to give greater importance of tracking citizens online opinions. Local governments have to be aware that they have requested the opinion to their citizens. Taking ICs into consideration must be part of local governments strategies to reach a greater understanding between such entities and its citizens in emergency situations.

In addition, local governments should bear in mind that the cultivation of strong relationships with citizens in emergency situations is not dependent on the proximity of citizens affected by the disaster nor the high fluidity of communications, in terms of the speed of citizens’ response to the messages from local governments. Likewise, there is no need to saturate citizens with numerous posts concerning the disaster, so perhaps “rethink” in few but very informative messages.

Finally, future lines of research should advance the characteristics of engagement in emergency situations albeit in other contexts. Furthermore, based on crisis informatics theory, this field of research strongly needs more empirical studies that contribute to advancing the analysis of factors that allow for the greater understanding of how to generate a higher level of citizen engagement for enhancing emergency management through web technologies.

Note
1. www.bbc.com
References


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Social media environments effect on perceived interactivity
An empirical investigation from WeChat moments

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Abstract
Purpose – The purpose of this paper is to treat WeChat moments as social media environments and applies the research model to explore the effect of social media environments on perceived interactivity from the perspective of environmental psychology.
Design/methodology/approach – This paper proposes social media environments as effective stimuli for future participation in online social interactions. First, two cues of social media environments (user-to-system cues and user-to-user cues) can be important antecedents of users’ perception of interactivity. Second, users’ intention of future participation in online social interactions can be influenced by three dimensions of perceived interactivity (action control, connectedness and responsiveness). Using data from 334 users of WeChat moments, the authors conduct partial least squares analysis to validate the research model.
Findings – The results indicate that both technological and social environments positively affect three dimensions of perceived interactivity, respectively, including action control, connectedness and responsiveness. Moreover, actual findings also suggest that higher perceived interactivity increases users’ intention of future participation in online social interactions.
Originality/value – This work contributes to in-depth research on the relationships between social environments and perceived interactivity. Besides, this paper demonstrates that both technological and social cues of social media environments are significant elements in simulating users’ internal experience and behavioral intention. The main conclusions of this study can be valuable to social media developers and managers.
Keywords Social media, Environmental psychology, Perceived interactivity, Partial least squares (PLS), Future participation, WeChat moments
Paper type Research paper

1. Introduction
Social media has deeply changed interpersonal communication and interaction, which combine the user-generated content with social networking. The growing availability and popularity of social media has significantly increased the importance of online social interactions. Online social interactions occur in many different settings which allow a high degree of interactivity, especially multiuser domains. Online social interactions enable individuals to manage self-presentation or receive feedback from peers. Through these exchanges of information, individuals can gain socio-emotional support and satisfaction in the social media (Jiang et al., 2013). Moreover, such interactions are characterized by a significant degree of social influence, which

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means that the individual becomes identified with and emotionally attached to the social media as well as interactions in the communication.

Nowadays, the growing influence of social media is evidenced by the number of people who use it. Most of the internet users are using social media and the number is growing steadily (Kwahk and Park, 2018). Because of easy adoption and voluntary participation, social media provides a powerful platform for online social interaction. At the same time, online social interactions can influence social media users significantly in many ways, from sharing opinions on diversity issues to influence decisions and relationships (McKenna et al., 2002). Although such interactions occupy considerable amounts of users’ time, they still have intention to further participate. So, there is increased interest in understanding how social media environments impact users’ online social interactions behavior.

The dynamic, ubiquitous and real-time interactivity enabled by social media significantly influence interpersonal communication. Interactivity reflected the degree to which communicating parties act on each other, on the communication medium, and on the message (Liu and Shrum, 2002). From a perception-based perspective, Thorson and Rodgers (2006) defined perceived interactivity as the extent to which users perceive their experience as simulation of interpersonal interaction and sense they are in the presence of a social other. In this study, we view the interaction between communicating parties from an interpersonal communication perspective and the interaction in social media environments.

Social media provides users with a way for direct interaction, which constitutes an ideal environment for interpersonal communication. In addition, social media environments also offer unique features such as openness, two-way communication and feedback (Kwahk and Park, 2016). Under this circumstance, users might be influenced by two types of environmental cues: user-to-system (US) cues and user-to-user (UU) cues. These two characteristics capture key features of the social media environment. Compared with traditional media, social media put more emphasis on the interaction between peers (DeWan and Ramaprasad, 2014). Clearly, both environmental cues can impact the perceived interactivity of users. The effective use of the system helps achieve high-quality communication, thus enhancing interactivity (Ou et al., 2014). So, we regard perceived effective use of the system as US cues. As social context has unique characteristics including interpersonal relationships which are common to social media (Liu, 2010), the UU cues underlying the interpersonal interaction in social media environment are worth to explore. However, few works have been conducted to examine this line. This present study seeks to fill this gap. We draw on the perspective of environmental psychology to theorize how the characteristics of social media environments improve users’ perceived interactivity and how such perception subsequently affects their intention to participate in future interaction activities.

The remainder of this paper is structured as follows. First, we outline the environmental psychology perspective as theoretical base underlying our research. Second, we introduce the research model and propose several hypotheses regarding how social media environments and perceived interactivity are related. Third, we describe the methodology of the study and present the results of data analysis. Finally, we discuss theoretical and managerial implications, the limitations of this study, and future research directions.

2. Theoretical background

2.1 WeChat moments
WeChat was published in China by Tencent company that has attracted 902m active users as of 2017, up to 17 percent from 2016. The WeChat has become one of the most heated topics within the last five years and its every upgrade has successfully attracted attention from various academia, industries and enterprises. The well-known WeChat moments is an additional function embedded in the WeChat, which enable users to convert their living conditions and state of mind into the form of tests, photos or videos and then post on moments.
According to the data analysis of Tencent, the average daily traffic of WeChat moments has reached 2bn and propagation efficiency of WeChat moments is three times larger than the portals (Zhang, 2015). Thus, understanding the reason why users so interactive in WeChat moments has both theoretical and practical implications.

WeChat moments facilitate users’ online social interaction, and make such communication more convenient and efficient. Compared with instant messaging services, WeChat moments provide an exchange channel for WeChat friends to broadcast information about what they are reading, thinking about or experiencing in their daily lives, and their WeChat friends can comment and like these information. Compare with other social interaction platforms, such as Q-zone and Micro Blog, WeChat moments is more private as only WeChat friends can view, comment and like their shared information and only common friends can see such interactions. This leads to the relationships between WeChat friends are more familiar and close. Moreover, in order to better protect user privacy, WeChat moments impose several restrictions on information diffusion process. First, each user is limited to have no more than 5,000 friends. The maximum number of friends largely avoids the information overloads caused by many followers or fans. Second, two users cannot view each other’s shared information if they are not connected as friends. This access control makes the online social interaction only among the acquaintances. Third, user can choose visible friends and viewable time when post contents. These rights try to reduce any unnecessary information sharing.

To sum up, WeChat moments is an online social interaction platform with complete functions that enable users to contact with their friends regardless of time and space. Such relatively small and intimate online social networks make users more sensitive to interpersonal relationships. Therefore, the UU cues of social media environments may play more in social interactions on WeChat moments. Therefore, we conduct research based on WeChat moments is reasonable.

2.2 An environmental psychology perspective
In order to better understand the effect of social media environments on perceived interactivity, we explore such influence from the perspective of environmental psychology. Environmental psychology is the branch of psychology that is concerned with the influences of the environment on psychological processes and behavior of the people in that environment (Uhrich and Koenigstorfer, 2009). From this viewpoint, perceived interactivity, as users’ psychological experience, in online social interactive process can be impacted by social media environments. That is, social media environments can produce powerful and direct causal influence on perceived interactivity of users. In addition, environments not only play a critical role as the antecedent of perceived interactivity but also afford opportunities for future action (Russell and Ward, 1982). So, environmental psychology perspective is helpful in understanding the reason why users so interactive in social media environments, such as WeChat moments.

Given that most environmental psychological research examines the important environmental constructs and processes. Setting which has features and components that can be perceived can be interpreted as an environment (Mehrabian, 1976). In this regard, it is important to note that context can be described in terms of physical, economic and social domains (Winkel et al., 2009). Thus, this study examined environmental stimulus from two dimensions: US and UU. Specifically, US cues are regarded as physical environmental stimulus and UU cues are considered as social environmental stimulus. The detailed reasons are listed as the following. First, US cues reflect the users’ perception of social media system. The effective use of the system helps achieve high-quality communication, which is an important indicator of social media system (Ou et al., 2014). So, perceived effective use of the system is selected to represent the quality of perceived US cues. Second, UU cues reveal users’ perception of social relationships. Perceived closeness mainly reflects the emotional bonding among users, thus enhancing interactivity in social media (Ng, 2013).
Therefore, perceived closeness of peers is suitable to represent the quality of perceived UU cues. Both cues can be understood as users’ dynamic perception of surroundings. Interactivity conceptions have been commonly regarded as a successful critical marketing factor in online environments (Kim et al., 2015). So, this study aims to examine the determinants of perceived interactivity in online social interactions from the perspective of environmental psychology. Perceived interactivity, as a fundamental psychological perception processes in online social interaction, sheds light on behavior of the people in social media environments. The level of perceived interactivity in social media facilitates interpersonal contact and exchange of opinions, further may fortify the interactive experience and enhance sense of intimacy between users (Wang et al., 2015). Besides the understanding of contexts and meanings, the levels of interactivity always with a two-way communication, a high degree of synchronization and control over the interactions (Hao et al., 2016). Interactivity refers to the users’ subjective perception of high-quality interaction within the communication. It encompasses three dimensions: active control, two-way communication and synchronicity. Such three dimensions of interactivity were initially theorized, operationalized and measured by Liu (2003), subsequently being adapted by Teo et al. (2003), Lowry et al. (2009) and Ou et al. (2014). Based on previous research on perceived interactivity, we still use three constructs as the dimensions of perceived interactivity in our study. However, in order to adapt the social media environments, we adjust the three dimensions into active control, connectedness and responsiveness (Zhao and Lu, 2012). To be specific, active control reflects the degree of an individual felt in control over the interaction process through WeChat moments with other users. While focusing on the reciprocal nature of perceived interactivity in social media environments, as a social media service system, WeChat moments provide a communication channel for users to present their thought and daily lives instead of instant messaging. Connectedness describes a user’s relationships and the sense of connectedness and belonging they experience with others on WeChat moments (Valkenburg and Peter, 2009). Responsiveness reveals the extent to which users perceived how fast and frequently their peers respond to their posts on WeChat moments (Zhao and Lu, 2012). Both of these two dimensions have captured the characteristic of perceived interactivity in social media environments.

3. Research model and hypotheses
This study introduces antecedents and resulting factors of perceived interactivity and empirically verifies the relationships between them. In terms of the factors influencing perceived interactivity, this study posits that US cues and UU cues of social media environments will have significant direct effects on perceived interactivity. While perceived effective use of WeChat moments represents the perceived quality of US cues and perceived closeness of peers are introduced as perceived UU cues. Furthermore, an attempt is made to show the impacts of three dimensions of perceived interactivity (action control, connectedness and responsiveness) on users’ intention to participate in future interaction activities. In this section, the key components of the research model and their interrelationship are addressed. Figure 1 depicts the research model for this study.

3.1 Effects of US cues
US cues emphasize the extent to which a user believes that the effective use of the system in social media environments can facilitate communications among users, as the social media tools are actively used to collaborate and share ideas (Balakrishnan and Gan, 2016). In this study, perceived effective use of WeChat moments represents the perceived quality of US cues. Because perceived interactivity can be viewed as something that a user recognized after using a technology or going through a process (Lowry et al., 2009),
It means that the effective use of WeChat moments contribute to users’ perceived interactivity in online social interactions.

In US cues, active control is mainly reflected the degree to which a user felt free of the effect in using a particular system (Davis, 1989). An interactive system should allow users to control over the system itself. It means that users of WeChat moments would be expected to have better experience in learning the system and adapting to new versions of the services. We propose that perceived effective use of WeChat moments will improve the perception of users in control over the social media platform, which can be interpreted as the positive relationship between perceived effective use of WeChat moments and active control. More specifically, if a user felt easy to share his or her thought and experience through WeChat moments, as well as like or comment peers’ posts, more freedom he or she would feel in such interaction. This suggests the following hypothesis:

\[ H1a. \] Perceived US cues manifested as perceived effective use of WeChat moments are positively related to the active control dimension of perceived interactivity.

In recent years, people have become a part of increasingly extensive social groups facilitated by the social media. The possibility of the social media system being used as a channel to develop a sense of social connectedness has been suggested (Köbler et al., 2010). Nowadays, more and more people spend large amounts of time on social media, such as WeChat moments, where they can experiment with self-expression and presentation and interact with their friends. So it is reasonable to propose effective use of WeChat moments enhances users’ feeling of connectedness. When they are able to connect to each other without any system problems, they may feel it is convenient to communicate and get a feeling of being connected. Therefore, based on the discussion above, we have the following hypothesis:

\[ H1b. \] Perceived US cues manifested as perceived effective use of WeChat moments are positively related to the connectedness dimension of perceived interactivity.

System plays an important role in the interaction between social media users. Responsiveness is one fundamental factor in the information delivery process, which reflects the efficiency of interaction (Parasuraman et al., 1985). The effective use of the system is positively associated with the responsiveness, as it saves users’ time and enhances the perception of interactivity. For example, if a user found the effective use of WeChat moments, he or she will experience the efficient communication. Thus, we expect that perceived effective use of WeChat moments will enhance the responsiveness dimension of
perceived interactivity – the more effective use of the system, the more efficient in online social interaction. According, the following hypothesis is proposed:

\[ H1c. \] Perceived US cues manifested as perceived effective use of WeChat moments are positively related to the responsiveness dimension of perceived interactivity.

### 3.2 Effects of UU cues

From the perspective of environmental psychology, social environments represented by UU cues can trigger users' affectively reaction in online social interaction. In other words, UU cues can drive the corresponding perceptions and evaluations during interactivity activities in WeChat moments. Thus, this link could also view as the positive relationship between the quality of UU cues and users' perceived interactivity, including active control, connectedness and responsiveness. In our study, perceived closeness of peers represents the quality of UU cues. Perceived closeness of peers mainly reflects the emotional bonding between peers, not only concerning the intense liking and moral support from their social media friends, but also the ability to tolerate the mistakes of their friends (Ng, 2013). Past research suggests that interactivity was associated with affinity or closeness in feeling (Sundar et al., 2003). So it is reasonable to propose that the closeness of peers influences users' perceived interactivity in online social interactions.

In interactive activities, users should be able to exert control on the information exchange, including information sent and information received (Liu, 2003). The perception of the closeness of peers can enable not only to understand, but also to control the communication process. Specifically, users may present their thought and daily life through posting and give feedback to their peers through commenting and liking. Users who perceived closeness with peers are most likely experience active control in these interactions. Therefore, when users have more close friends with WeChat moments, they will feel easier to participate in interactions because they can control the communicative process. Thus, we have the following hypothesis:

\[ H2a. \] Perceived UU cues manifested as perceived closeness of peers are positively related to the active control dimension of perceived interactivity.

Emotional closeness is an important aspect of interpersonal interactions and relationships. It is worth noting that ongoing closeness promotes relational longevity (Ledbetter et al., 2009). The self-disclosure on WeChat moments can be controlled by private management. Before posting information, users can select friends who can see their shared contents and who cannot. That is, users with close relationships might receive more information shared by each other. Therefore, users who perceive strong peer closeness are more likely to have a feeling of interconnection than those with weaker peer closeness. Based on the discussion above, we have the following hypothesis:

\[ H2b. \] Perceived UU cues manifested as perceived closeness of peers are positively related to the connectedness dimension of perceived interactivity.

People have fundamental interpersonal relations orientation toward others based on affection need, which is the need to have close relationships with someone (Schutz, 1958). In order to maintain such close relationships, people will seek opportunities to interact with others. So if users find information shared by their close friends in WeChat moments, they would be more active in responding such message. At the same time, the information sender could perceive more responsiveness because of the fast and frequent feedback from their close friends. This suggests the following hypothesis:

\[ H2c. \] Perceived UU cues manifested as perceived closeness of peers are positively related to the responsiveness dimension of perceived interactivity.
3.3 Effects of perceived interactivity

In the context of online social interaction, cognitive involvement has shown to increase users’ intention (Kirk et al., 2012). From the perceptual perspective, previous studies have demonstrated that interactivity is associated with positive outcomes such as interaction quality and intention (Zhao and Lu, 2012). Motivational influences discover that people’s intention drives he or she to perform the certain behavior. Participation behavior can be manifested as direct interpersonal interactions in WeChat moments, and intention of future participation can be deemed as the willing to continuous share and respond information in WeChat moments. Moreover, users’ intention of future participation is highly related to the existence and development of the social media platform. Thus, we focus on the influencing factors of users’ intention of future participation and notice the positive relationships between users’ perceived interactivity and intention of future participation. That is, users perceive interactivity is high when they interact with peers in WeChat moments, they will be more likely to further participate in such interaction. This leads to the following hypotheses:

H3. The active control dimension of perceived interactivity is positively related to users’ intention to participate in future interaction activities.

H4. The connectedness dimension of perceived interactivity is positively related to users’ intention to participate in future interaction activities.

H5. The responsiveness dimension of perceived interactivity is positively related to users’ intention to participate in future interaction activities.

3.4 Control variables

In order to explain the differences among individuals or situations, we also included several control variables that the literature indicates affects future participation intention. These variables include demographic variables, use experience, frequency of use and the quantity of peers.

4. Research methodology

4.1 Instrument

To operationalize the conceptual model, a survey instrument was created and most items were adapted from existing measures in the related literature. In order to refine the instrument to our research contexts, we consulted with several researchers and doctoral students on the meaningfulness and readability of each items. Then, as this study was conducted in China, the original English instruments were translated into Chinese through translation and back-translation process with the help of them. After refinements, the survey questionnaire used comprised two sections. The first section includes six constructs. Perceived effective use of WeChat moments was measured by four items adapted from Ou et al. (2014) with some modifications to account for differences in the social media contexts. For the measurement of perceived closeness of peers, first three items were adapted from Ng (2013) and last two items were self-created. In our study, we employed the three commonly used dimensions of perceived interactivity: active control, connectedness and responsiveness. Thereinto, active control was measured by four items adapted from Liu (2003), connectedness was measured by three items adapted from Lee (2005) and responsiveness was measured by three items adapted from Ridings et al. (2002). Intention of future participation was measured by three items adapted from Zhang et al. (2015) that manifested the participation intention of co-creation in the future. All items were measured by a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). The second section contains respondents’ demographics (gender, age, education) and the use of WeChat moments (experience, frequency, peers quantity).
The detail measurements of principal constructs are shown in Appendix 1. Finally, the survey instrument was pretested among a group of 52 users of WeChat moments. Analysis of data shows that the Cronbach’s $\alpha$ are all above 0.7, which indicates internal consistency of the constructs.

### 4.2 Data collection

To test the model empirically, we conducted an online survey for data collection to reach a wider group of participants of different demographics. The URL of the final questionnaire was distributed through WeChat in two weeks during December 2015. First, the URL was spread to several Group Chats (based on interest, college, shopping and so on) in WeChat. Second, group members were encouraged to share the URL link to their WeChat moments. In this way, the users who have received the questionnaire have experience with using WeChat moments, so, they are the targeted participants. To stimulate propagation, we gave out red packets in Group Chats. To promote responses, we provided one opportunity of a lottery after completing the questionnaire. To avoid the possibility of multiple survey participation, each respondent had his or her IP address recorded for filtering purposes.

In total, 372 filled questionnaires were received for this study. However, 38 questionnaires were excluded due to invalid responses, including those with all same answers and those who had no experience in using WeChat moments. Thus, a total of 334 usable questionnaires were yielded. To estimate the non-response bias, we compared the composition of the first 100 and late 100 responses. Results showed that no significant differences were found. Among the respondents, 50.3 percent were males and 49.7 percent were females. Most of the respondents were from ages 21–40. Thereinto, 84.1 percent had used WeChat moments more than one year and 76.3 percent reported that they use WeChat moments every day. Table I shows the summary of respondent demographic information.

<table>
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<th>Measure</th>
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<td></td>
<td>Female</td>
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<td>Less than 50</td>
<td>52</td>
<td>15.6</td>
</tr>
<tr>
<td></td>
<td>50–100</td>
<td>99</td>
<td>29.6</td>
</tr>
<tr>
<td></td>
<td>100–200</td>
<td>93</td>
<td>27.8</td>
</tr>
<tr>
<td></td>
<td>More than 200</td>
<td>90</td>
<td>26.9</td>
</tr>
</tbody>
</table>

Table I. Demographics of the research sample
5. Data analyses and results

The analysis procedure for this study includes two stages. In the first stage, the measurement model test was conducted to verify the reliability and validity of the instrument. In the second stage, the structural model was tested to estimate the hypothesized relationships. Smart PLS Version 2.0 was used for data analysis. It is appropriate for our study because partial least squares approach is a component-based statistical technique for causal modeling and has less stringent sample size and indicator distribution requirements.

5.1 Measurement model test

To assess the measurement model, we examined internal consistency, convergent validity and discriminant validity. Confirmatory factor analysis (CFA) was used to assess the reliability and validity of the scales. Cronbach’s α and composite reliability (CR) are two criteria of internal consistency as both alpha and CR values of 0.70 or above (Chin, 1998). As shown in Table II, α values range from 0.864 to 0.926, and CR values range from 0.902 to 0.953, showing acceptable reliability. Convergent validity indicates that items under the same construct should be highly correlated. Acceptable convergent validity of measurement scales is achieved if all the indicators are significant and their loading exceed 0.70, and average variance extracted (AVE) value exceeds 0.50 at the same time (Fornell and Larcker, 1981). Table III shows that all item loadings for their corresponding constructs were above the desired level. The AVE values in Table II ranges from 0.648 to 0.871, which are greater than the threshold value. Both values show satisfactory convergent validity.

While discriminant validity refers to the extent to which constructs should differ from each other as conceptualized. In order to examine discriminant validity, this study compared the square root of each construct’s AVE to correlations with other constructs based on Fornell and Larcker (1981). As shown in Table IV, the square root of each factor’s AVE is larger than its corresponding correlation coefficients with other factors. In addition, principal component factor analysis with Varimax rotation indicated that all items had high factor loadings in their corresponding constructs and low cross-loadings on other constructs (see Table III), indicating a satisfactory level of discriminant validity.

Self-reported data on two or more variables collected from the same source have the potential to lead to common method variance. Thus, we used two tests to assess the extent of common method bias in this study. First, we performed Harman’s one-factor test to ensure that there were insignificant relationships among the causal variables. All the indicators in this study were entered into an exploratory factor analysis (EFA) using principal component analysis (Podsakoff et al., 2003). This test resulted in six factors with eigenvalues greater than one, the largest of which explained 43.62 percent of the variance. Second, we introduced a common method factor whose indicators included all the principal constructs’ indicators in the PLS model, then calculated each indicator’s variance substantively explained by the principal construct and by the method (Liang et al., 2007). As can be seen in Table V, all substantive factor loadings were statistically significant at p < 0.001, the average of which was 0.871, while 21 of 22 method

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>SD</th>
<th>α</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective use of moments (EUM)</td>
<td>5.595</td>
<td>1.166</td>
<td>0.890</td>
<td>0.924</td>
<td>0.752</td>
</tr>
<tr>
<td>Perceived closeness of peers (PC)</td>
<td>5.300</td>
<td>1.200</td>
<td>0.864</td>
<td>0.902</td>
<td>0.648</td>
</tr>
<tr>
<td>Active control (AC)</td>
<td>5.386</td>
<td>1.095</td>
<td>0.890</td>
<td>0.924</td>
<td>0.752</td>
</tr>
<tr>
<td>Connectedness (CONN)</td>
<td>5.340</td>
<td>1.030</td>
<td>0.903</td>
<td>0.939</td>
<td>0.838</td>
</tr>
<tr>
<td>Responsiveness (RES)</td>
<td>4.940</td>
<td>1.220</td>
<td>0.891</td>
<td>0.932</td>
<td>0.821</td>
</tr>
<tr>
<td>Intention of future participation (IFP)</td>
<td>5.295</td>
<td>1.178</td>
<td>0.926</td>
<td>0.953</td>
<td>0.871</td>
</tr>
</tbody>
</table>

Table II. Descriptive statistics and reliability coefficients for constructs
factor loadings are insignificant. Further, all the indicators’ substantive variances are substantially greater than their method variances. Based on above evidence, common method bias should not be a problem for this study.

5.2 Structural model test

In a PLS structural model, paths are considered as standardized beta weights in a regression analysis (Chin, 1998). In Figure 2, the standardized coefficients and their significance are illustrated with each hypothesis. The test results show that 47.8 percent of the variance in intention of future participation can be explained by the proposed structural model including the control variables.

As expected, there were significant and positive relationships between perceived effective use of WeChat moments and action control ($\beta = 0.281$, $t = 4.480$), connectedness ($\beta = 0.332$, $t = 6.245$) and responsiveness ($\beta = 0.241$, $t = 3.933$), respectively. This means that perceived US cues of social media environments improve users’ inner feeling of perceived interactivity. That is, more effective use of WeChat moments, the more interactive experience in online social interaction. As such, $H1a$–$H1c$ were supported.
Moreover, perceived closeness of peers also plays significant influential role on action control ($\beta = 0.328$, $t = 5.386$), connectedness ($\beta = 0.362$, $t = 6.321$) and responsiveness ($\beta = 0.308$, $t = 6.128$), respectively. This means that perceived UU cues of social media environments enhance users’ psychological experience of perceived interactivity. That is, users who build more close and affinity interpersonal relationships in WeChat moments will

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Substantive factor loading ($R_1$)</th>
<th>$R_1^2$</th>
<th>Method factor loading ($R_2$)</th>
<th>$R_2^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective use of moments (EUM)</td>
<td>EUM1</td>
<td>0.909***</td>
<td>0.734</td>
<td>-0.071</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>EUM2</td>
<td>0.934***</td>
<td>0.789</td>
<td>-0.063</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>EUM3</td>
<td>0.844***</td>
<td>0.782</td>
<td>0.055</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>EUM4</td>
<td>0.782***</td>
<td>0.704</td>
<td>0.078</td>
<td>0.003</td>
</tr>
<tr>
<td>Perceived closeness of peers (PC)</td>
<td>PC1</td>
<td>0.805***</td>
<td>0.659</td>
<td>0.008</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PC2</td>
<td>0.889***</td>
<td>0.691</td>
<td>-0.075</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>PC3</td>
<td>0.793***</td>
<td>0.631</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PC4</td>
<td>0.768***</td>
<td>0.626</td>
<td>0.029</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PC5</td>
<td>0.768***</td>
<td>0.636</td>
<td>0.037</td>
<td>0.000</td>
</tr>
<tr>
<td>Active control (AC)</td>
<td>AC1</td>
<td>0.794***</td>
<td>0.73</td>
<td>0.082</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>AC2</td>
<td>0.995***</td>
<td>0.829</td>
<td>-0.113***</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>AC3</td>
<td>0.867***</td>
<td>0.729</td>
<td>-0.018</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>AC4</td>
<td>0.808***</td>
<td>0.72</td>
<td>0.055</td>
<td>0.001</td>
</tr>
<tr>
<td>Connectedness (CONN)</td>
<td>CONN1</td>
<td>0.887***</td>
<td>0.828</td>
<td>0.03</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>CONN2</td>
<td>0.882***</td>
<td>0.819</td>
<td>0.031</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>CONN3</td>
<td>0.927***</td>
<td>0.795</td>
<td>-0.045</td>
<td>0.001</td>
</tr>
<tr>
<td>Responsiveness (RES)</td>
<td>RES1</td>
<td>0.865***</td>
<td>0.816</td>
<td>0.057</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>RES2</td>
<td>0.924***</td>
<td>0.855</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>RES3</td>
<td>0.931***</td>
<td>0.793</td>
<td>-0.06</td>
<td>0.002</td>
</tr>
<tr>
<td>Intention of future participation</td>
<td>IFP1</td>
<td>0.872***</td>
<td>0.864</td>
<td>0.07</td>
<td>0.002</td>
</tr>
<tr>
<td>(IFP)</td>
<td>IFP2</td>
<td>0.961***</td>
<td>0.84</td>
<td>-0.054</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>IFP3</td>
<td>0.948***</td>
<td>0.852</td>
<td>-0.031</td>
<td>0.000</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>0.871</td>
<td>0.760</td>
<td>0.000</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table V. Common method bias analysis

![Figure 2](image_url)
get more interactive experiences in online social interaction. Thus, $H2a–H2c$ were supported. Further, as important antecedents of intention of future participation, action control ($\beta = 0.244, t = 4.801$), connectedness ($\beta = 0.250, t = 4.335$) and responsiveness ($\beta = 0.322, t = 7.156$) are significantly associated with intention of future participation. This suggests that users’ internal states affect their behavioral intention. More specifically, if a user felt favorable interactive experience in WeChat moments, his or her intention of future participation in online social interaction will be relatively high. Thus, the data analysis results provide support for $H3–H5$. Additionally, the links between control variables and intention of future participation are all not significant.

6. Discussions and implications

6.1 Discussion of findings

The actual findings of this study provide new insights about social media environments influence specific to WeChat moments users. The research model, estimated using data from WeChat moments, finds good overall support. The results evidenced that two cues of social media environments (US cues and UU cues) have strong and positive effects on three dimensions of perceived interactivity (active control, connectedness and responsiveness). Moreover, the relationships between perceived interactivity and intention of future participation are all found to be significant. This means that user perceptions regarding the social media environments are very influential on their evaluation of interactivity and further impact their intention of future participation in online social interactions.

There are some differences between this study and previous studies. First, this study conducted the research from the perspective of environmental psychology, and hypothesized links between social media environments and intention of future participation through three aspects of perceived interactivity which is different with previous research models. In fact, even though this research model was not proposed in previous studies, such research perspective is consistent with prior research that identified the effectiveness of environmental stimuli in users’ psychology and behavior (e.g. Deng and Poole, 2010; Song et al., 2014). The found results show that social media environments have strong and positive effects on three aspects of perceived interactivity. In addition, the effects of perceived interactivity on intention of future participation were all found to be significant. These indicate that perceived interactivity play a mediating role in the relationship between social media environments and users’ behavioral intention.

Second, as this study investigated users’ intention of future participation from the perspective of environmental psychology, we took two cues of social media environments into consideration and hypothesized their effects on three aspects of interactivity. Many previous studies mainly focus on the effect of technological environments and its effect on users’ internal experience, and results from such research validate that technological environments have positive effects on users’ perception of interactivity (Zhao and Lu, 2012). However, as many other studies do, social environment which is inevitable in online social interactions should be taken in consideration in social media environments. We found the results suggest that the UU cues of social media environments represented by the perceived closeness of peers have positive effects on perceived interactivity, which reveals interpersonal relationships play a key role in online social interactions.

Third, the forementioned results bear out our suppositions that both technological and social environments contribute to the perception of interactivity in online social interactions, and have further impact on users’ intention of future participation. Moreover, the data analysis results show perceived UU cues have stronger effect on action control ($\beta = 0.328$), connectedness ($\beta = 0.362$) and responsiveness ($\beta = 0.308$) than perceived US cues ($\beta = 0.281, \beta = 0.332, \beta = 0.241$, respectively). This finding suggests that perceived
UU cues are more important than perceived US cues for stimulating perceived interactivity. It is understandable that although technological advance can improve users’ internal interactive experience, close interpersonal relationships is a major driver in online social interactions.

6.2 Theoretical implications
Overall, this study contributes to our understanding of user behavior in online social interactions in the following ways. From a theoretical perspective, first, we successfully show that perceived interactivity should be employed to study the intention of future participation in online social interactions. Although perceived interactivity is widely tested in computer-mediated communication (Ou et al., 2014), little research has examined the potential relevance of perceived interactivity in understanding the predictors of users’ intention of future participation in online social interactions, especially in WeChat moments, which is a very prevalent social media platform in China.

Second, from the perspective of environmental psychology, we consider social media environments in two cues: US cues and UU cues. Perceived effectiveness of WeChat moments refers to the technological environments, while perceived closeness of peers is related to the social environments. As further as we known, no study has empirically validated the direct effect of the antecedent UU cues on the determinants of perceived interactivity. In addition, our results show that perceived UU cues have a stronger effect on three aspects of perceived interactivity than US cues. As such, taking interpersonal relationship as social environments into consideration is essential to predicting users’ future participation behavior in online social interactions.

6.3 Practical implications
Understanding the role of perceived interactivity in social media environments can provide developers and managers with a competitive edge in the social media business. Frist, we recommend that social media designers and operators continue to pay attention to the development of technology. As was revealed, technological environments play a significant role in enhancing the perception of interactivity. Perceived effective use of social media is helpful in increasing transfer costs and retaining the existing users, which are indirect promotion for users’ continuous intention (Maeker et al., 2016). So, providers might advance network externalities and improve response speed to create relatively satisfying technological environments for online social interactions.

Next, our findings suggest that interpersonal relationships have impact on the perception of interactivity from the environmental psychology perspective. It means that providers should develop social media not just focus on technological factors but social elements. Thus, providers should be helpful in fulfilling their users’ need for social connection and enhancing their interpersonal relationships. Through embedding various social features to create relatively close social media environments, such close interpersonal relationships in online social interactions might enhance users’ perception of interactivity and promote their willingness of communication and interaction.

6.4 Limitation and future research
Although our findings provide several useful implications for theory and practice, the study still faces several limitations. First, with respect to external validity, this is an empirical analysis and the data came from users of WeChat moments in China. However, it is reasonable to believe that technological environments and social environments are both important in different cultural backgrounds or in different social media contexts. Interpersonal relationships are crucial in online social interactions. Also, it should be
claimed that the results of this study might be different if the model was retested in different social media platforms. To increase generalizability, future researches need to consider sampling views from more platforms or countries.

Second, with respect to the variances of the research model, the intention of future participation in online social interactions cannot be fully assessed. Future studies could extend the research model to include different user psychological variables as causes or moderators, such as social support, social presence and trust.

Finally, our study only considered two characteristics of social media environments as the antecedent variables and each cue only has one variable. In fact, conducting interactions in social media is a complex process. In this process, numerous aspects of social media environments might have impact on users’ psychological experience. Hence, to achieve a better understanding, future studies could investigate a broader scope of social media environments, such as user-to-content cues and introduce more variables in US cues and UU cues.

References


Liu, Y. and Shrum, L.J. (2002), “What is interactivity and is it always such a good thing? Implications of definition, person, and situation for the influence of interactivity on advertising effectiveness”, *Journal of Advertising*, Vol. 31 No. 4, pp. 53-64.


Appendix

Construct Items

**Effective use of moments**
- EUM1: The WeChat moments is an effective channel for me to communicate with peers
- EUM2: The WeChat moments has provided a good platform to interact with peers
- EUM3: The WeChat moments has helped me a lot in further acquaintance with peers
- EUM4: The WeChat moments has provided a good seek and share information channel among peers

**Perceived closeness of peers**
- PC1: My friends often share contents on WeChat moments
- PC2: Many contents on my WeChat moments are shared by my friends
- PC3: It is easy to find contents shared by my friends on WeChat moments
- PC4: I feel a sense of closeness when see contents shared by my friends on WeChat moments
- PC5: I feel a sense of intimacy when see contents shared by my friends on WeChat moments

**Active control**
- AC1: While I was in WeChat moments, I could choose freely what I wanted to see and share
- AC2: While using the WeChat moments, I had absolutely control over what I can do
- AC3: While using the WeChat moments, my actions decided the kind of experience I got
- AC4: I felt that I had a lot of control over my using experience in WeChat moments

**Connectedness**
- CONN1: Users of WeChat moments share their experience and feelings with peers through this communication tool
- CONN2: Users of WeChat moments benefit from their peers using this channel
- CONN3: Users of WeChat moments share a common bond with peers who are using this platform

**Responsiveness**
- RES1: When I'm using WeChat moments, peers are very responsive to my posts
- RES2: When I'm using WeChat moments, I can always count on getting a lot of responses to my posts
- RES3: When I'm using WeChat moments, I can always count on getting responses to my posts fairly quickly

**Intention of future participation**
- IFP1: I intend to further participate in interactions on WeChat moments
- IFP2: The likelihood that I will further participate in interactions on WeChat moments is very high
- IFP3: I am interested in participating in further interactions on WeChat moments

Table AI. Questionnaire items

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Subject analysis of LIS data archived in a Figshare using co-occurrence analysis

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Abstract

Purpose – Based on the data from Figshare repositories, the purpose of this paper is to analyze which research data are actively produced and shared in the interdisciplinary field of library and information science (LIS).

Design/methodology/approach – Co-occurrence analysis was performed on keywords assigned to research data in the field of LIS, which were archived in the Figshare repository. By analyzing the keyword network using the pathfinder algorithm, the study identifies key areas where data production is actively conducted in LIS, and examines how these results differ from the conventional intellectual structure of LIS based on co-citation or bibliographic coupling analysis.

Findings – Four major domains – Open Access, Scholarly Communication, Data Science and Informatics – and 15 sub-domains were created. The keywords with the highest global influence appeared as follows, in descending order: “open access,” “scholarly communication” and “altmetrics.”

Originality/value – This is the first study to understand the key areas that actively produce and utilize data in the LIS field.

Keywords Figshare, LIS, Research data, Pathfinder network

Paper type Research paper

1. Background and purpose

Genome big data analysis is a new technology paradigm used to analyze and predict the cause of diseases, and to help develop customized medicines. Data analysis in the field of biotechnology is being applied as a core technology leading the Fourth Industrial Revolution in medicine and healthcare. In academic research, the opening of research data not only improves the transparency of research through the reproduction and verification of research results, but also promotes scientific development through sharing and reusing.

The articles or research reports analyzing the data were submitted and published as final research results, but the research data itself have not been submitted and published, but have been retained by researchers. However, diverse policies to open data are being announced in the Open Science paradigm, with the aim of increasing the verifiability and reusability of research results. The OECD Principles and Guidelines for Access to Research Data from Public Funding stipulate that publicly funded research data are public good and should be publicly available (Organization for Economic Co-operation and Development, 2007). They also encourage people to submit a plan to expand public access to research data from government agencies whose development spending is greater than $100m per year (The Office of Science and Technology Policy, 2013). In total, 14 US federal agencies, including Department of Health and Human Services, Education and Commerce, require researchers to submit a data management plan (DMP) for research data (STEEP, 2017). In Japan, the Japan Institute of Science and Technology announced an open science policy recommending the establishment of a DMP on research data produced by public research in April 2017 (Japan Science and Technology Agency, 2017).

These tides have inspired the creation of the Research Data Alliance, a community organized around the aim of developing data sharing technologies and policy. Another organization is DataCite (www.datacite.org/whydata), which aims to create a
contribution certificate system for data producers by tracking their impact. Repositories for publishing and storing data have also grown – there are now more than 2,000 repositories operating in 67 countries (re3data.org).

The amount of research data published in the field of life sciences has become overwhelming (Borgman, 2012), and the rate of citation is high in the social sciences (Robinson Garcia et al., 2016; Cho, 2016). In the field of biotechnology, genomic data is overwhelming, but demographic data, health and employment data included in the social sciences are widely used due to their interdisciplinary nature. Identifying the subject areas in which research data are actively produced and utilized can be meaningful for improving predictions about the academic prospects that research data will facilitate in the future.

LIS is an interdisciplinary practical science discipline that absorbs and generates new areas and technologies from documentation and library science to LIS, according to the demands of the times and development of technology. In recent times, in many iSchools, data science is being established as an important sub-domain to provide customized education tailored to the big data environment. Informetrics, one of the major areas of LIS, examines the structure of knowledge through computer processing based on research data about bibliometrics, scientometrics and webometrics data. Informetrics not only has a high internal citation rate, but is also attracting attention from other data-based research fields (Lee, 2015).

This study analyzes which research data are actively produced and shared in the interdisciplinary field of LIS. The subject data repository is active in the field of life sciences, but it is not in the field of LIS. Therefore, this study is based on Figshare, which has the largest amount of data among the multidisciplinary field repositories registered in the Data Citation Index. Figshare was initiated to reduce the time and expenses of other researchers to do similar experiments by disclosing research by-products that researchers did not formally publish. Figshare started as an experiment of a PhD student to distribute research results in a new way rather than a traditional academic publishing method and is now operated by Digital Science. Figshare follows the COPE (Principles of transparency and best practice in scholarly publishing) and has adopted Creative Commons as a license. It is also compatible with the DataCite Metadata Schema, OAI-PMH and receive the DataCite DOI at the same time as publication, so research data can be quoted as if it were a traditional citation (Cho, 2017).

In this study, based on data from Figshare repositories, the network analysis is performed using the pathfinder algorithm through co-occurrence word analysis of subject keywords. The aim is to understand the key areas that actively produce and utilize data, and how the data-based findings differ from the existing intellectual structure of LIS.

However, this study has the following limitations. Research data can be archived through a variety of repositories such as institutional repositories, so there may be a limit to explaining the entire intellectual structure with Figshare alone. Nonetheless, the reason for choosing Figshare is that institutional repositories still mainly archive the end result of a study, such as an article, rather than a by-product of research like research data. Moreover it may be inefficient to investigate all institutional repositories where LIS researchers are likely to archive research data. In the future, if a subject data repository is activated in LIS field, a more comprehensive and generalized research result can be derived. However, this study try to open the door of research in this field by exploring the subject field of research data in the field of LIS through the most comprehensive data repository that covers all fields.

2. Methods of research

2.1 Data collection methods

Figshare was initiated to reduce the time and expenses of other researchers to do similar experiments by disclosing research by-products that researchers did not formally publish. Besides, Figshare provides statistical data on research data usage, it is also a major source of information on Altmetrics, an alternative research impact assessment system.
Figshare divides research data into nine data types (F: figure, M: media, D: data set, F: fileset, Po: poster, Pa: paper, Pr: presentation, T: thesis and C: code). Various types of by-products, such as posters, codes and media, as well as paper, and these types of gray literature, are included in the scope of the research data. Although the definition and scope of research data varies slightly from organization to organization, DataCite (2012) defines it as a by-product of studies recorded in various media such as statistical records, sound sources, media and images as well as factual data based on observation, experimentation. In addition, data papers and gray literatures are recognized as categories of research data, and unique identifiers are assigned. In this study, all types of data covered by Figshare are analyzed without missing. Since there is no independent subject data repository in the LIS field, the only alternative for analyzing LIS field research data are considered to be Figshare which is the largest data repository as multi-disciplinary subject repository. Figshare also displays the subject and type of research data, so users limit the type or subject field of data for extracting required data. This study limits the subject field to “category: Library and Information” on the Figshare, from which it extracted keywords of 659 cases. Keyword pre-processing was performed using a knowledge matrix (http://mirian.kisti.re.kr/km/km.jsp) to integrate similar concept and the words with a high frequency of occurrence were selected among the similar concept words.

2.2 Data analysis method
Using COOC (http://cafe.daum.net/wnets), a data analysis software developed by J.Y. Lee, this study generated a co-occurrence matrix based on the keyword data. The co-occurrence matrix generated by the cosine value formed pathfinder network using WNet software, which is a weighted network analysis program also developed by J.Y. Lee. A pathfinder network is a network created by removing paths that violate triangular inequalities with all weighted links created. In addition to effectively expressing the whole structure, like traditional methods of multidimensional scale and cluster analysis, pathfinder network analysis is able to express a detailed structure more clearly (Lee, 2006a). This study also uses parallel nearest neighbor clustering (PNNC) to sort and organize keywords. PNNC can effectively represent clusters on the pathfinder network (Lee, 2006b). Although in the analysis of general social network, the degree centrality, closeness centrality, and betweenness centrality are more commonly used. These centralities do not take into account the link weights between keywords. Therefore, nearest neighbor centrality (NNC), the mean association, the mean profile association and triangular betweenness centrality (TBC) are commonly used in the citation analysis (Lee, 2006c). In this study, NNC is used to represent local centrality, and TBC is used to represent the global centrality index. NNC is measured by the close connectivity between the nodes, and TBC is measured by the degree of binding that one node mediates to other nodes. In addition, this study visualized the network through NodeXL and displayed the parallel nearest neighbor clustering (PNNC) cluster based on the visualization of the network, and analyzed how clustering of the topics of research data in the field of LIS built on Figshare.

3. Precedent research
Studies about research data typically focus on researchers’ perceptions about sharing and management (Kim and Nam, 2012; Kim, 2012; Kang, 2017; Michener, 2015) and citation of research data (Kim et al., 2017; Robinson Garcia et al., 2016; Cho, 2016; Torres-Salinas and Martin-Martin, 2013; Force and Robinson, 2014). Choi (2017) have extracted keywords based on the research data of sociology established in DCI, and then performed network analysis. In data-based sociology, the most highly active center of the field is public health and psychology, which is unlike the conventional sociological intellectual structure based on bibliographic data. On the other hand, although the subject of the research data was not
analyzed, study has been conducted analyzing the type and form of the research data constructed in the field of the LIS. Borrego and Garcia (2013) extracted the journal from ISI Journal Citation Reports and analyzed the characteristics of the research data that were deposited in an online journal system. They reported that data attached to the journal of LIS were mainly provided in text format as an additional description of the methodology.

4. Research results highly occurring keywords and global and regional centrality

As a result of analyzing 2,473 keywords assigned to 659 research data in the field of LIS in the Figshare, 1,071 unique keywords appeared and all research data were assigned more than one keywords. Non-subject terms, such as “R,” “sketch note,” and “video abstract,” were removed. In the case of “research data,” it is identified subject term associated with other keywords such as “open data,” “RDM,” “DMP,” “data journal” and “data citation” rather than being used for researcher’s personal management. So this study did not exclude this keyword. And then network analysis was performed based on 68 keywords that appeared at least five times. The most frequently occurring keywords were “open access” (102), “research data” (87), “scholarly communication” (52), “article processing charges” (47), “bibliometric” (37) “libraries” (33), “Jisc” (27), “open science” (26), “citation” (26), “publishing” (24), “open data” (23) and “institutional repositories” (23).

This study generates a co-occurrence matrix using COOC, based on high-occurrence keyword, and analyze pathfinder network using WNet. The results of the analysis are explained below.

TBC of a keyword describes a main keyword’s global impact and correlation with other keywords. TBC shows the degree of binding that one node mediates to other nodes and shows the global influence. As shown in Table I, “open access,” “scholarly communication” and “altmetrics” are presented in this order. Subject concepts related to open science can be said to have broad relevance to other subject fields in LIS. On the other hand, the NNC presented in Table II represents the regional centrality by measuring the close connectivity between the nodes, which shows high values of “scientific journals,” “altmetrics,” “article processing charges (APC)” and “information literacy.” These keywords pair with strong relationships: for example, “scientific journals–peer review,” “altmetrics–bibliometrics,” “article processing charges–open access” and “information literacy–mooc.”

Figure 1 shows the results of calculating the scatter plot based on global and regional centrality standardization scores. “altmetrics,” located at the upper right of the map, has high global and regional centrality. From a data perspective, it is not only influential in LIS as a whole, but also locally related to “bibliometrics” on informetrics. “altmetrics” is an alternative metrics to the existing methodology of evaluating research impact, which means a way of evaluating the social influence of research through various sources, such as social

<table>
<thead>
<tr>
<th>Node</th>
<th>TBC</th>
<th>rTBC(0~1)</th>
<th>NNC</th>
<th>rNNC(0~1)</th>
<th>NNs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open access</td>
<td>507</td>
<td>0.22931</td>
<td>2</td>
<td>0.02985</td>
<td>Article processing charges</td>
</tr>
<tr>
<td>Scholarly communication</td>
<td>444</td>
<td>0.20081</td>
<td>2</td>
<td>0.02985</td>
<td>Institutional repositories</td>
</tr>
<tr>
<td>Altmetric</td>
<td>427</td>
<td>0.19313</td>
<td>3</td>
<td>0.04478</td>
<td>Bibliometrics</td>
</tr>
<tr>
<td>Publishing</td>
<td>203</td>
<td>0.09181</td>
<td>1</td>
<td>0.01493</td>
<td>Scholarly communication</td>
</tr>
<tr>
<td>Research data</td>
<td>196</td>
<td>0.08865</td>
<td>1</td>
<td>0.01493</td>
<td>RDM</td>
</tr>
<tr>
<td>Libraries</td>
<td>146</td>
<td>0.06603</td>
<td>0</td>
<td>0</td>
<td>Librarian</td>
</tr>
<tr>
<td>Bibliometrics</td>
<td>118</td>
<td>0.05337</td>
<td>2</td>
<td>0.02985</td>
<td>Scientometrics</td>
</tr>
<tr>
<td>Open science</td>
<td>94</td>
<td>0.04251</td>
<td>2</td>
<td>0.02985</td>
<td>Astrophysics</td>
</tr>
<tr>
<td>Citation</td>
<td>89</td>
<td>0.04025</td>
<td>1</td>
<td>0.01493</td>
<td>Astrophysics</td>
</tr>
</tbody>
</table>

Note: TBC, triangular betweenness centrality

Table I. Global centrality
network service, media reports and reference management tools. In recent times, a large amount of data have been produced and shared to verify the altmetrics as a new research impact evaluation system. Figshare contains a great deal of data for evaluating research impact and degree of altmetrics about journals and articles. Meanwhile, "Open access" and "scholarly communication," which showed a high degree of global centrality, could be indicated to have a similar tendency, though not with as high a regional centrality as "altmetrics." The concepts not only exert an overall level of influence because of the wide range of relations, but also have a medium level of cohesion on specific fields. "Open access" is a new paradigm that promotes academic development through the smooth sharing and

<table>
<thead>
<tr>
<th>Node</th>
<th>TBC</th>
<th>rTBC(0−1)</th>
<th>NNC</th>
<th>rNNC(0−1)</th>
<th>NNs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific journals</td>
<td>18</td>
<td>0.00814</td>
<td>4</td>
<td>0.0597</td>
<td>Peer review</td>
</tr>
<tr>
<td>Altmetric</td>
<td>427</td>
<td>0.19313</td>
<td>3</td>
<td>0.04478</td>
<td>Bibliometrics</td>
</tr>
<tr>
<td>Article processing charges</td>
<td>27</td>
<td>0.01221</td>
<td>3</td>
<td>0.04478</td>
<td>MOOC</td>
</tr>
<tr>
<td>Information literacy</td>
<td>3</td>
<td>0.00136</td>
<td>3</td>
<td>0.04478</td>
<td>Open access</td>
</tr>
<tr>
<td>Open access</td>
<td>507</td>
<td>0.22931</td>
<td>2</td>
<td>0.02985</td>
<td>Article processing charges</td>
</tr>
<tr>
<td>Scholarly communication</td>
<td>444</td>
<td>0.20081</td>
<td>2</td>
<td>0.02985</td>
<td>Institutional repositories</td>
</tr>
<tr>
<td>Bibliometrics</td>
<td>118</td>
<td>0.05337</td>
<td>2</td>
<td>0.02985</td>
<td>Scientometrics</td>
</tr>
<tr>
<td>Open science</td>
<td>94</td>
<td>0.04251</td>
<td>2</td>
<td>0.02985</td>
<td>Astrophysics</td>
</tr>
<tr>
<td>Institutional repositories</td>
<td>84</td>
<td>0.03799</td>
<td>2</td>
<td>0.02985</td>
<td>Scholarly communication</td>
</tr>
<tr>
<td>Metadata</td>
<td>43</td>
<td>0.01945</td>
<td>2</td>
<td>0.02985</td>
<td>Data reuse</td>
</tr>
</tbody>
</table>

Table II. Local centrality

Note: NNC, nearest neighbor centrality

Source: Created with NodeXL (http://nodexl.codeplex.com)
distribution of information by improving commercial academic information distribution structure. Research data about open access journals, APC and the like are disclosed in this subject on Figshare. “Scholarly communication” is also an area where there is an active discussion on open data and open science, with the aim of streamlining scholarly communication and meeting information technology and media transformation.

On the map, there are many keywords that have a strong influence only locally, which is because the NNC is high but the TBC is low. These terms, such as “article processing charges,” “information literacy” and “scientific journals,” are scattered on the map and indicated by a little big circle.

### 4.1 Keyword clustering and network maps

As shown in Table III, the algorithm PNNC – based on the Pathfinder Network – was applied and the analyzed keywords were divided into 15 subgroups. Those subgroups can be categorized into four larger clusters, which we identify as “Open Access,” “Scholarly communication,” “Data science” and “Informetrics.” The 15 subgroups are categorized as follows: BG1 (Open Access) includes G1 “open access” and G15 “scholarly publications finance.” BG2 (Data science) includes G2 “research data,” G7 “data science,” G12 “data sharing and management,” and the G13, G14 “semantic web, linked data.” BG3 (Scholarly Communication) includes G4 “academic communications,” and G8 “scholarly publications.” The final BG4 (Informetrics) includes G3 “informetrics,” G5 “library,” G6 “open science”.

<table>
<thead>
<tr>
<th>Big Group</th>
<th>Group</th>
<th>Key Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG1: Open Access (197)</td>
<td>G1: open access (187)</td>
<td>open access, article processing charges Jisc, Wellcome Trust, open access week</td>
</tr>
<tr>
<td></td>
<td>G15: scholarly publications finance (10)</td>
<td>higher education finance, academic publishing finance</td>
</tr>
<tr>
<td>BG2: Data Science (251)</td>
<td>G2: research data (147)</td>
<td>research data, rdm, academic libraries, training, workflow, flowchart</td>
</tr>
<tr>
<td></td>
<td>G7: data science (55)</td>
<td>digital humanities, metadata, repositories, data reuse, comics, Figshare</td>
</tr>
<tr>
<td></td>
<td>G12: data sharing and management (19)</td>
<td>data sharing, data management, copyright</td>
</tr>
<tr>
<td></td>
<td>G13: semantic web (18)</td>
<td>semantic web, collaboration, Implementation of VIVO</td>
</tr>
<tr>
<td></td>
<td>G14: linked data (12)</td>
<td>digital libraries, linked data</td>
</tr>
<tr>
<td>BG3: Scholarly Communication (151)</td>
<td>G4: academic communication (114)</td>
<td>scholarly communication, publishing institutional repositories, Google scholar science communication</td>
</tr>
<tr>
<td></td>
<td>G8: scholarly publishing (37)</td>
<td>academic publishing, Scholarly Publishing Monash University, Africa</td>
</tr>
<tr>
<td>BG4: Informetrics (454)</td>
<td>G3: Informetrics (174)</td>
<td>Altmetric, bibliometrics, ORCID, scientometrics, twitter, research evaluation Plos</td>
</tr>
<tr>
<td></td>
<td>G5: library (80)</td>
<td>Libraries, librarian, socialmedia, information systems</td>
</tr>
<tr>
<td></td>
<td>G6: open science (90)</td>
<td>open science, citation, open data, network astrophysics</td>
</tr>
<tr>
<td></td>
<td>G9: mendeley (17)</td>
<td>Mendeley, readers</td>
</tr>
<tr>
<td></td>
<td>G10: academic journals (63)</td>
<td>Journals, research, public, peer review, impact, visualization, pubmed, scientific Journals, assessment, data</td>
</tr>
<tr>
<td></td>
<td>G11: information literacy and social media (30)</td>
<td>Wikipedia, MOOC, social media, information literacy</td>
</tr>
</tbody>
</table>

Table III. Group

261
BG4 “Informetrics” showed the highest frequency, with 454 occurrences among big clusters, followed by BG2 “Data science,” with a frequency of 251 occurrences. In the subgroups, the largest cluster is G1 “open access (187)” and then G3 “informatics (174),” G2 “research data (147)” and G4 “scholarly communications (114)” are the next largest. These findings indicate that many research data have been found to be distributed around “Open access,” “Data science” and “Informetrics” fields.

Meanwhile, BG1, BG3 and BG4 were found to have the highest global centrality keywords – “open access,” “scholarly communication” and “altmetrics.” These three nodes are indicated as a triangle on the map. Even though the frequency of occurrence of BG2 “Data science” was found to be the second largest within the big group, it was found that there is no keyword that has global influence. BG1 and BG4 also have keywords with high regional centrality, in addition to keywords that have global influence. BG4 has “scientific journal” and “information literacy” in addition to “altmetrics,” which is circled on the map. BG1 includes “article processing charge(APC),” which is the cost paid by the authors to publish their article on the open access journal. As APC is a key element of the gold-road methodology for realizing open access, much of the data about the costs that academic institutions pay to APC are produced.

5. Discussion and conclusion
This analysis is based on the research data and shows a detail area of LIS regarding which generation of research data is actively made. Although there is a limit to explain the intellectual structure of the entire research data generated in the field of LIS, it will be necessary to explain how this result differs from the intellectual structure of traditional LIS, which has been performed based on bibliographic or co-citation analysis.

Many researchers have examined the intellectual structure of the LIS, mostly through co-citation or bibliographic coupling analysis. Park and Jung (2013), in their study on author bibliographic coupling analysis, pointed out that LIS has the following subfields: “library management/policy,” “information service,” “general library information science,” “classification,” “cataloging,” “information search,” “digital library,” “media,” “Informetrics,” “automatic classification/index/abstract,” “school library,” “information distribution/copyright,” “user research,” “bibliography,” “information system/database,” “information education,” “metadata,” “records management / preservation,” “ontology” and “web/internet.” In the 2000s, they indicated that topics that are broadly linked to other subject areas were “library management/policy” and “information service.” And Cho (2011) has shown that the highest frequency of research is about “public library” and “university library.” “Evaluation” and “education” are related to various other subjects in LIS fields. In recent years, the terms “Web” and “classification” have shown a higher relative frequency than before, and research about the terms “user” and “public library” were associated with terms from more diverse subjects than before. Äström (2007) showed “information search and retrieval” areas were found to be significant in LIS study from 1995 to 1999. However, in 2000–2004, area of “information retrieval” declined, while “informetrics” increased greatly. As a result of examining the intellectual structure of LIS by author co-citation and journal co-citation analysis, Moya-Anegon et al. (2006) indicated that an author map of LIS could be divided into two fields: “informetrics” and “information retrieval.” Lee (2015) also identifies “informetrics,” which includes intellectual structure analysis and citation information analysis, as a new research frontier.

To summarize, in the analysis of intellectual structure based on co-citation or bibliographic coupling, traditional LIS fields such as “library management,” “policy” and “education” responsible for forming the main domain and growth of “information science,” especially
“informetrics,” is an emerging front. When analysis of subject field based on research data, information science areas such as “Open Access,” “Data Science,” “Informetrics” and “Scholarly Communication” appear as major domains. Traditional library science subfields were less prevalent. Although the field of “informetrics” occupied an important area in data-based as well as the paper-based intellectual structure, keywords about “citation analyses” and “impact,” which occurred frequently on bibliometric analysis (Lee, 2015), did not occur frequently in this analysis. Instead, “altmetrics,” which was absent in the past, not only appeared frequently in research data but also showed a high degree of local and global centrality. Research data in the field of LIS are generated and shared in subject areas in which it is possible to perform data-based research, as well as in emerging fronts.

Since the Open Science Policy, which recommends the establishment of DMP for public funded research, the research data management system has been activated. However, research data management and recycling consciousness were not completely established especially in humanities and social sciences fields. The shared research data as presented in this study appeared to be related to the open science area, such as open access and scholarly communication, rather than traditional LIS field. In other words, in the field of LIS, many researchers who study about innovation policies and technical issues of scholarly communication, disclosure of information on the internet share the research data actively rather than researchers who study about traditional library management and service areas. The intellectual structure of the LIS identified with published journals articles is found to cover a vast range of areas such as library management, information services, policy and education, but it has been found that the sharing of research data is not seem to be done evenly in all LIS area. Anyway in the future, if a data repository of the LIS subject field is created or an institutional data repository is activated and an environment is created to collect research data effectively, a comprehensive analysis that can be generalized could be studied.

References


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Problematic and extensive YouTube use: first hand reports

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Abstract
Purpose – The purpose of this paper is to present brief YouTube life stories to learn about how extensive
users experience YouTube use and manage (or fail to manage) their use. It also explores the consequences of
different types of extensive use.
Design/methodology/approach – In this paper, a biographical approach was used. Nine students who
used YouTube for two or more hours every day were guided to tell life stories of their introduction to
YouTube, subsequent use and critical events associated with YouTube use. Thematic analysis distinguished
between non-problematic, compulsive and addicted users. Three single case life stories illustrate the
experiences of users in each category.
Findings – These extensive YouTube users tell similar stories of informal learning from early interaction
with the platform. For some, extensive YouTube use became problematic; for others, it remained functional.
Similar to other social platforms, users unable to regulate use became compulsive users and some users can
become addicted. While the symptoms of YouTube addiction are similar to other online addictions, compulsive
YouTube use is driven more by algorithm-generated content chaining than overt social interaction.
Originality/value – The paper introduces life stories as a way to present case studies of social media use. The
distinction between extensive, but functional, and problematic YouTube use illustrates how extensive social media
use is not necessarily dysfunctional. User education for self-regulation of YouTube use is recommended.

Keywords Social media, Case studies, User behaviour, Compulsive use, YouTube use

Paper type Research paper

Introduction
The online video sharing site, YouTube, has become a place to share videos not only for
entertainment but also to gather information and aid learning. Unlike social network services
(SNS) such as Facebook, YouTube is a social media platform where user engagement centres
around content sharing rather than social interaction (Kuss and Griffiths, 2011). The nature of
user participation in YouTube is, therefore, different from participation on Facebook and other
social platforms; as Jenkins and Carpentier (2013) observe, social participation in YouTube is
actually “minimalist” (p. 10). The difference between YouTube, with its emphasis on content
engagement, and socially engaging internet platforms such as Facebook (Wang et al., 2017)
and Twitter (Hwong et al., 2017; Wang et al., 2017) has been recognized in literature that
discusses the advantages of use, but largely ignored in the literature of problematic use until
very recently (Balakrishnan and Griffiths, 2017; Klobas et al., 2018; Kuss and Griffiths, 2011).
Failure to distinguish between SNS and different types of social media has hampered research
to the extent that there is still no reliable way to diagnose use-related problems as serious as
addiction (Andreassen et al., 2016; Kuss and Griffiths, 2011).

The University of Malaya Equitable Society Research Cluster provided financial support for research
assistance and project team meetings under Project RP021-14SBS.
To date, most scholarly writing specific to YouTube use has taken a positive point of view, emphasizing the valuable role it can play in supporting informal and self-directed learning about a wide range of topics (Lee et al., 2017; Rosenthal, 2018). This stream of YouTube research tends to take the view of an instructor, resource or platform provider. This paper, on the other hand, firmly takes the perspective of the YouTube user by exploring extensive YouTube use in users’ own terms.

YouTube use
The YouTube platform permits users to upload videos (user-generated content, UGC) and to watch videos for entertainment and information, link to related and popular videos, express appreciation or disapproval or comment on videos posted by others. YouTube usage is very widespread, with 72 per cent of the population of the USA using it in 2016, and one billion hours of content watched daily across the globe in 2017 (YouTube, 2017). In 2016, educational videos were the third most commonly viewed type of content, after music and entertainment videos (Statista, 2017).

Although individual users can upload their own videos, much of YouTube’s content is uploaded by commercial providers rather than individuals (Fuchs, 2017). Individual use of YouTube is therefore dominated by content watching and engagement in content loaded by others. Although there is the potential for users to form a “content community” around shared content interests (Kaplan and Haenlein, 2010), YouTube is not considered a platform for social or cultural participation (Jenkins and Carpentier, 2013; Kaplan and Haenlein, 2010; Kuss and Griffiths, 2011).

Explaining YouTube use
Explanations of YouTube usage draw on the uses and gratifications theory (U&G) of media choice which argues that consumers choose to follow a medium based on its ability to satisfy their needs (gratifications) including needs for entertainment, information, relaxation and social interaction (Blumler and Katz, 1974; McQuail, 1986). In its ideal form, U&G assumes that consumers (users) have agency to choose between different sources, that the media they choose contribute to (but do not necessarily fulfil) gratification and that their choices are influenced by context (Littlejohn et al., 2016). Studies of electronic media use tend, however, to take a medium-centric approach which seeks to understand users’ motivations for use of a specific medium, with little or no consideration of choices available, user exercise of agency or differences in use context.

Studies of individual users’ motivations to use YouTube have differentiated motivation to contribute content (including clicking the like and unlike buttons, sharing a link with friends and uploading content) from motivations for viewing content uploaded by others. Khan (2017) observed that US university students shared links from an “information giving” motive, while their content consumption was motivated primarily by need for relaxation and entertainment. Nonetheless, students and members of the public do use YouTube to meet needs for information and learning, even when other resource choices might be available to them (Klobas et al., 2018; Rosenthal, 2018).

Adoption of only the use motivation (gratification) element of U&G has several limitations. By ignoring the nature of agency, user choice and context, use can appear to be dictated by the medium, rather than influenced by the interaction of the user, the choices available to the user and the context within which use might take place. U&G studies tend also to be cross-sectional, drawing inferences about needs and gratifications from quantitative data gathered at a given point in time, even though usage choices might well be influenced by the individual’s use history and experiences of use over time. Contextual concerns were taken up by Chiang and Hsiao (2015), but use history and experiences over time are yet to be studied.
Problematic YouTube use

The primarily positive view of YouTube taken in the literature has been challenged by recent studies of the potential for YouTube use to be problematic for its users. Klobas et al. (2018) found that compulsive YouTube use is stronger among Malaysian university students who are strongly motivated to use the platform for entertainment, but less likely among students who are strongly motivated to use it for information and learning. Balakrishnan and Griffiths (2017) observed that Indian university students’ inclination to create content was more strongly associated than inclination to view content with YouTube addiction. They also observed that inclination to view content was only weakly influenced by expectation of social gratification, but more strongly influenced by process gratification (use for entertainment and to pass the time). The approach taken in these studies is consistent with Andreassen et al. (2016) who concluded that psychological disorders (including compulsion and addiction) associated with use of internet platforms are more likely to be application-specific rather than generic to the internet or SNS.

Distinguishing functional from problematic YouTube use

The generic work on problematic SNS use adopts several different terms ranging from the generic “problematic” and “too much” or “excessive” use to the specific, “compulsive” use and “addiction” (Balakrishnan and Griffiths, 2017; Chou and Hsiao, 2000; Griffiths, 2005; Jia and Jia, 2009; Kim and Davis, 2009; Laconi et al., 2014). These categories overlap to some degree and there are apparent inconsistencies. Some authors have found that problematic use is correlated with extensive use (Al-Harrasi and Al-Badi, 2014; Leung and Lee, 2012), but there is no evidence that extensive use is necessarily problematic. This generic literature provides a background for research specific to YouTube. It establishes a basis for distinction between two primary form of problematic use, compulsive use and addiction. It also suggests that extensive YouTube use need not be problematic.

For this study, a distinction is therefore made between extensive but functional (non-problematic) YouTube use and problematic use. Extensive use is defined for this study as daily use for sufficient time that usage can reasonably be considered to be outside the norm for the population of interest.

Compulsive YouTube use is defined as use that is extensive because the user is unable to limit or control the time spent on the platform. Compulsive use is governed by “inability to self-regulate” (Klobas et al., 2018, p. 130). This definition is consistent with definitions of compulsive use of other internet platforms (Hsiao, 2017; Klobas et al., 2018; Kuss and Griffiths, 2011).

YouTube addiction is more difficult to define without entering into debate about the clinical disorder of addiction. Indeed, Balakrishnan and Griffiths (2017) do not define it, but rather refer to the works of scholars who have studied Facebook, SNS and internet addiction. Several authors provide detailed lists of the characteristics of addiction to networked technologies, based on clinical criteria for psychological and psychiatric diagnosis of addiction (Andreassen et al., 2016; Caplan, 2010; Griffiths, 2005; Laconi et al., 2014; Schneider et al., 2016; Weinstein et al., 2014; Young, 1998). Symptoms of addiction to an internet platform include preoccupation with the platform, inability to limit use despite repeated attempts and significant negative consequences (such as diminishing scholastic results, loss of a relationship or loss of a job). Thus, YouTube addiction is likely to have components of extensive use associated with preoccupation with the platform and compulsive use associated with poor self-regulation, but an element of harm must be present if usage is to be considered symptomatic of addiction.

This paper explores extensive YouTube use and the potential for extensive use to be functional, compulsive or symptomatic of addiction. To do so, it adopts more elements of U&G than previous studies to move beyond study of use motivation alone to observe use history, context and the user’s exercise of agency and choice.
Materials and methods
The topical life story biographical method was used in this study. Life stories can be gathered by interview and often focus on a specific topic or part of a person’s life (Minichiello et al., 2008). This study focused on that part of each participant’s life associated with their YouTube use. As Minichiello et al. (2008) point out, this approach assumes that people are able to make sense of their own lives, at the same time as permitting a researcher to guide the interview(s) and subsequent interpretation of the data according to a theory or framework. The framework adopted in this study draws on U&G and the literature of extensive and problematic social platform use to identify different types of extensive YouTube use (including functional, compulsive and addictive) in the context of the users’ stories of their YouTube use over time.

Life story studies are qualitative inquiries designed to illustrate a phenomenon of interest in the voice of a person who has lived it. This approach provides a richer picture of the phenomenon than can be provided in answers to the structured questions that guide quantitative studies. Extensive samples are, therefore, not sought or used. Instead, the trustworthiness of the data depends on demonstration that each voice whose story will be told holds the characteristics that define the framework positions to be illustrated (in this study, extensive but functional use, compulsive use and addiction), the richness of the stories told and the researchers’ ability to make sense of the stories in light of what is already known (e.g. from the literature). This section explains how potential participants were identified, life stories were gathered and use categories were identified.

Participants
Nine participants were recruited from among business students at a prominent Kuala-Lumpur based Malaysian research university. The lead researcher visited two classes and invited students who were using YouTube more than two or three hours a day to contact her confidentially after class. The initial four volunteers were interviewed and snowball sampling led to the recruitment of five additional participants. In total, there were seven male and two female participants, including undergraduate and postgraduate, full time and part time and domestic and international students, as shown in Table I. Qualitative data analysis distinguished non-problematic extensive use from compulsive use and addiction, as explained below.

Interviews
Biographical interviews were guided by open-ended questions designed to provoke spontaneous responses, uncover a diverse range of experiences and reduce interviewer bias.

<table>
<thead>
<tr>
<th>Alias</th>
<th>Gender</th>
<th>Age</th>
<th>Nationality</th>
<th>Level</th>
<th>Enrolment status</th>
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</thead>
<tbody>
<tr>
<td>Nina</td>
<td>F</td>
<td>26</td>
<td>F</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Stella</td>
<td>F</td>
<td>29</td>
<td>F</td>
<td>P</td>
<td>F</td>
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<tr>
<td>Adam</td>
<td>M</td>
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<td>F</td>
<td>U</td>
<td>F</td>
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<tr>
<td>Jack</td>
<td>M</td>
<td>21</td>
<td>F</td>
<td>U</td>
<td>F</td>
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<tr>
<td>Leo</td>
<td>M</td>
<td>27</td>
<td>F</td>
<td>P</td>
<td>F</td>
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<tr>
<td>Rafi</td>
<td>M</td>
<td>27</td>
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<td>P</td>
<td>F</td>
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<tr>
<td>Max</td>
<td>M</td>
<td>31</td>
<td>F</td>
<td>P</td>
<td>F</td>
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<tr>
<td>Sam</td>
<td>M</td>
<td>34</td>
<td>L</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Ben</td>
<td>M</td>
<td>37</td>
<td>L</td>
<td>P</td>
<td>P</td>
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Note: *Full case report presented in this paper.
The participants were first asked to tell the overall story of how they came to use YouTube, then about the use they now make of YouTube, how they feel about using YouTube, and how YouTube use has affected their life. The interviewer actively probed with follow-up questions to clarify or deepen responses. Each interview was conducted in English and lasted about 30 min.

Data analysis
All interviews were transcribed by a professional transcription service. Data analysis was undertaken in two stages: classification and storytelling (sensemaking).

For classification, full interview transcripts were uploaded to NVivo. The data were analysed thematically by one member of the research team who was guided by a coding scheme developed collaboratively by the research team from the theory and literature. New codes were permitted to emerge. After initial coding, the interview transcripts, thematically coded remarks, and graphical representations of the results were reviewed by a second member of the research team. The 273 coded remarks were mapped to 27 categories within the high level themes of nature of use, purpose/motivation for use, positive consequences and negative consequences, as shown with the results in Table II. NVivo cluster analysis of coding similarity clearly distinguished between addicted (three cases), compulsive (3) and functional (3) extensive users (Figure 1). A case that provided a rich, but succinct illustration of the experiences and consequences of YouTube use was chosen to illustrate each user category.

YouTube life stories were written directly from the transcripts by one member of the research team. The draft stories were reviewed for consistency with the classification scheme. No inconsistencies were found. Instead, the coded data drew attention to a small number of additional quotes that were added to the YouTube stories to enhance their biographical richness.

Results
This section begins with a classification of experiences and consequences of YouTube use in each of the three YouTube user categories (functional, compulsive and addicted), and distinguishes between them. Three YouTube use life stories are then presented to illustrate more fully the experiences and consequences of extensive YouTube use.

<table>
<thead>
<tr>
<th>Table II. Coding summary, by user category</th>
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<tbody>
<tr>
<td><strong>User category</strong></td>
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<tr>
<td><strong>Experience of use code</strong></td>
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<tr>
<td>Extent of use (hours per day)</td>
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<td>Nature of use</td>
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<tr>
<td>Self-regulation</td>
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<td>Positive consequences</td>
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<td>Negligible treatment for use</td>
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<td>Positive consequences</td>
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<td></td>
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<tr>
<td>- Weaning time/desirability/leap</td>
</tr>
</tbody>
</table>
Classification of extensive YouTube users

The results of the qualitative coding are summarized in Table II. The rows present characteristics of YouTube use listed by the four high level themes: Nature of use, purpose/motivation for use, positive consequences and negative consequences. A column is presented for each interviewee, classified by the user category clusters that emerged from NVivo: functional use, compulsive use and addicted. The functional users (Stella, Sam and Nina) reported quite extensive YouTube use but encountered few problems and these had minimal impact on their lives. The three compulsive users (Jack, Leo and Rafi) reported symptoms of compulsive behaviour but, other than a feeling that they are addicted to YouTube, reported no other symptoms of addiction. The three users classified as addicted not only reported symptoms of compulsion, but also serious consequences for their social and family life and health as a result of their YouTube use.

Common characteristics

All of the interviewees described learning from videos in an informal way. All but one, a functional user, watched videos for entertainment. At least two of the three users in each category mentioned that using YouTube was, at least occasionally, unproductive, distracting or a waste of time. In addition, at least two of the three users in each category spoke about negative effects of their YouTube use on their social and family life, but there was a distinct difference in the severity of the effects: minimal for functional users, modest for compulsive users and serious for addicted users.

Functional use

The focus of functional users is short-term and contained in time. These users view YouTube videos in the evenings and in breaks. They reported a wide range of reasons for using YouTube for functional, formal and informal learning, and entertainment. Early research on the length of web browser sessions found that users who spent longer on the internet were experiential (e.g. exploratory and entertainment-driven) rather than being goal-driven (Sanchez-Franco and Rodriguez-Bobada Rey, 2004), but this distinction was not observed amongst the YouTube users in this study. Although Stella did not refer to any specific effort to control her YouTube use, both Nina and Sam described the need for a conscious effort directed towards internal self-regulation to maintain control over time spent using the platform.
One type of use gave an insight into how extensive YouTube use might be the norm for some users who pay little attention to the service. Both Sam and Ben explained how they keep YouTube turned on, like a radio or television in the background “for company” (Sam).

Problematic use
The problematic users differed from the functional users in several ways. All problematic users (both addicted and compulsive) described lack of regulation or control of use, and the ease of giving in to the temptation – or inability to resist – following links from one video to another. Similarly, while none of the functional users described losing track of time while using YouTube, all but one of the problematic users did.

The compulsive users were all full-time students who used YouTube when they were not in class, including during breaks, before and after class, and on weekends whenever they had an internet connection; their daily pattern of use varied depending on internet access and the number of hours that were free from fixed tasks. The addicted users put themselves into situations where they had 24 h internet access, or a near equivalent. They also reported using YouTube for more hours a day than all other users apart from Rafi (compulsive) who reported indulging in YouTube binges “all day and night” on weekends.

Symptoms of YouTube addiction
Although both addicted and compulsive users had symptoms of compulsive use and described themselves as “addicted”, the addicted users were distinguished from the compulsive users by symptoms of addiction. They were preoccupied with YouTube, speaking of it as a powerful force or important actor in their lives, over which they needed to gain control. Furthermore, unlike the other users, they described dramatic negative effects of YouTube on several aspects of their lives: all reported poor and deteriorating physical health and relationships with members of their family; two had been told that their use of YouTube is losing them friends; two had lost their girlfriends; one is putting his job at risk; another is concerned that he no longer meets his religious obligations; and the third is aware that the videos he watches makes him envious of the appearance and wealth of others, reducing his satisfaction with life. Not all effects have been negative, however: Max attributed his having quit his addiction to smoking with the help of YouTube videos and Adam was pleased that he has learnt so much from watching YouTube.

Two of the three addicted users described serious deterioration in their academic performance that could be attributed to their YouTube use. In both cases (Max and Adam), time spent on YouTube left too little time to study effectively. Unlike the other seven interviewees, neither Max nor Adam reported using YouTube to study for exams and assignments, adding weight to the sense that viewing YouTube in and for itself had become an overwhelming preoccupation for these addicted users. Two of the compulsive users more tentatively suggested that their test scores might have suffered in the past and that the time they spent on YouTube might be spent more productively studying. By contrast, none of the functional users reported any effects on their academic performance.

None of the nine interviewed students was able to describe a positive effect of YouTube use on their academic performance, even when prompted. On the other hand, a strong theme underlying all narratives of YouTube user stories was the value of informal learning from YouTube, whether for professional work, for hobbies or for general interest. Among the non-problematic and compulsive users, in particular, there was a sense of pride in being recognized by others for their extensive general knowledge or depth of knowledge in a particular field. Nonetheless, most interviewees in all categories noted that there might be more efficient ways to learn than watching YouTube videos.
Whereas addicted users reported a range of serious negative consequences of YouTube use for their well-being, functional users and compulsive users reported few negative effects, and they tended to be outweighed by positive consequences. Both Nina and Stella (functional users) described how they would occasionally prefer to watch a programme or video on YouTube than go out with family and friends. The consequences for Nina were similar to those reported by the compulsive users: the criticism of family and friends for being “stuck on” YouTube instead of spending time with them, as distinct from the breaking of relationships described by the addicted users. Stella, along with Sam (non-problematic) and Rafi (compulsive) also reported some positive consequences of YouTube on their social life: YouTube provides topics to discuss in social settings, particularly for a foreign student in a new country.

YouTube life stories

In this section, we report more fully on the experiences of three YouTube users. We report the case of Adam, an articulate young, addicted user, followed by Rafi whose case provides a succinct illustration of the experience of compulsive use. We also present the case of Sam, a functional extensive user, which provides a contrast to the two problematic user cases.

Case study 1, addicted user: Adam

Everything in this world has a good side and a bad side and so does YouTube.

Adam is a 21 year old undergraduate science student. He is a full-time international student. He has used the internet since he was about eight years old. Initially, he browsed the web. Around 2006, when he was 12 years old, he heard about YouTube from his friends. He remembers his excitement when he heard about “a video sharing website where millions of people are sharing videos every day”. He soon discovered that “there are a lot of things to learn and see on YouTube”.

Adam is sure that YouTube has had a significant effect on his life. He learned to play the guitar by watching YouTube. But, this was not just a functional experience; it was an emotional experience that helped him through the uncertainty of not knowing how to play and the loneliness of having no mentors to learn from. He was particularly aware of the attention that the teachers in the YouTube videos paid to giving detailed instructions. This formative experience gave him a very positive view of YouTube and its value.

Now, Adam watches YouTube videos on his smartphone whenever he has “some free time” during the day. Although he recognizes that it is “really harmful”, he occasionally watches videos during class as well. During the week, he starts to use YouTube more intensively when he returns home from class. On the weekends:

[... you can’t find me anywhere, I am watching YouTube from the moment I wake up in the morning till I go to bed at night, maybe I will go out for lunch or something but normally I am engrossed in] YouTube.

Adam’s worldview has been opened up by watching YouTube. He was intrigued by videos of Iceland and Icelandic songs and now hopes to follow up on a New Year’s resolution to visit Iceland.

Nonetheless, YouTube use is not an entirely positive experience for Adam. He is aware of several “negative consequences”. Because he spends a lot of time in front of the computer, he has gained weight and lost physical fitness. He attributes the fact that he now needs to wear glasses to the time he spends in front of the computer. He has almost stopped spending time with his friends and family, who are critical of the time he spends watching videos, and his academic performance has suffered.
A few months ago, his friends complained that he was treating them badly because he was spending too much time in his room on the computer. At first, he did not believe them—but, then, he recorded the amount of time he was spending on YouTube and found it was more than nine hours a day. He says:

I was glued to my screen, watching videos day and night all day long, for no reason. Sometimes I was fooling around on YouTube and that affected my social and physical life [...] I found out [...] some of the time I spent on YouTube was not that [...] useful.

Not only is some of Adam’s YouTube time unhelpful, but it has also resulted in at least one “bitter experience”. Adam tells the story of how he broke up with his girlfriend. She phoned to say that she badly needed to see him, but he said he could not come because he was “watching an important video on YouTube”. She replied (as reported by Adam):

“If YouTube is more important to you than me, then you could just go wherever you want”, and then she broke up with me.

Adam’s attachment to YouTube has been a source of conflict with his parents, his father in particular. Indeed, Adam speaks as though he has a stronger physical connection to YouTube than to his family:

I feel that it [YouTube] is too much attached to me and even my parents don’t [...] like me watching all these videos, instead of spending my time with my family.

Adam is aware that he avoids academic work by watching YouTube:

I start procrastinating on YouTube and even though I have the intention of watching videos related to my studies [...] I end up watching foolish and funny videos.

As a result, Adam’s academic performance has fallen, and his grades are poor. He was an “A student” before starting to spend so much time watching YouTube.

Adam has a good deal of self-awareness, and his sense of self-worth has suffered. His awareness that “it’s affecting me and having a lot of consequences” is accompanied by thoughts that “I should change myself and transform myself into someone better”. He confounds reducing the amount of time he spends on YouTube with changing himself:

Although YouTube has become a part of my life [...] I still have to change it, and I have thought of changing myself.

He lacks the confidence to change himself, and sees YouTube as an uncontrollable force, “like a drug to me”. Indeed, he says that if he tries to stop using YouTube, he gets “withdrawal symptoms”. Adam faces internal conflict between the benefits he believes he still gains from watching YouTube videos and the costs of spending too much time watching them: “There are some productive videos, but I do plan to change myself real soon”.

Adam sees the necessary change as quitting YouTube use rather than reducing use. His idea is to “get away from YouTube and learn something else”. He is sure there are other options, but at the same time, he recognizes that his familiarity with YouTube gained over many years makes it difficult for him to move away from it. He says that it might take the banning of YouTube in his country to force him to try something else.

Adam believes that the overall effect of YouTube on his life has been more negative than positive. He reflects that he was initially attracted to YouTube for its educational value, but “instead, I focused on music videos, funny videos and for entertainment purposes only”. Adam concludes that, by putting entertainment before education, his (mis)use of YouTube “has affected my life in a negative way”.
Case study 2, compulsive user: Rafi

I start watching a video about the construction of a bridge then the bar on the right will show me [a] bridge collapsing, […] the next one will be that some sort of accident happened on that bridge; next thing will be a cat walking across the bridge […] it will move on to Kurt Cobain […] and from there […] to grunge metal and I just keep watching.

Rafi is a 27 year old postgraduate engineering student from Pakistan. A self-confessed computer geek, he discovered YouTube soon after its official launch, while searching for other topics on the internet. Although he had a low speed internet connection, it was good enough to download music videos. Nearly ten years later, Rafi is now a heavy user of YouTube, although high volume use is not intentional:

On the weekdays it usually starts off with a link [from email or another Internet platform or page] that goes to YouTube […] and that gets to another video and so on and so forth. So an intention of five minutes goes up to two hours. So average use per day is four to five hours, and in the weekends, it can go on all day and night on Friday and Saturday.

To Rafi, positive aspects of YouTube use are that “I get educated, new ideas, entertainment, and I get up-to-date with my knowledge”. He uploads videos that he thinks will be useful to others, even though his friends and colleagues see this as a sign of his “obsession” with YouTube. Indeed, despite the positive aspects of YouTube use, Rafi struggles to justify the time he spends on the platform.

Rafi spends more time on YouTube than on any other internet service. Every day, when he first begins study, Rafi starts YouTube and keeps it running for about half an hour while he checks his e-mail. During the lunch break, he often watches videos of up-and-coming rock bands, or reports on developments in computer games or operating systems, rather than leaving his desk. This gives him something to talk about with other people, but he does not value the knowledge gained from these short videos as “usable in my life”.

Rafi has never socialized a great deal with friends and family. While this was not a problem in his home country with people he knows, he believes that his habit of staying “in front of the computer all day” disconcerts friends in Malaysia. He is aware that he has a tendency to “feel superior” to people who do not know as much as he does and as a result he can offend them. The combination of being in a new national and educational environment and seeing more of the world through YouTube videos has inspired Rafi to start spending some time with friends in Malaysia:

Recently, I have started to interact with my friends a little, and it all seems very new to me because I spend my entire life in front of a computer screen. I feel like I have missed out a lot on life because seeing the same thing on a computer screen and going out there and experiencing it for myself are totally different things.

He finds himself both inspired and “overwhelmed” by the knowledge that:

[…] so many people around the world [are] doing so many […] extraordinary things […] there is a girl who can shuffle cards and play well at the same time, then there is a guy who can play the guitar at blazing speeds, there are people who can solve Rubik’s cubes in less than nine seconds […] Sometimes [I] get scared that everyone is doing something and the world is getting far ahead […] and I am sitting here doing nothing.

YouTube use sometimes has a positive effect on Rafi’s academic work, particularly when he needs to find basic information about topics and concepts in a new field, or is seeking practical information about processes such as prototype building. He has found useful videos on the MIT Open Courseware site (http://ocw.mit.edu), but the length of the videos (about three hours each) is daunting, and he is unable to watch them “continuously”.
On the other hand, once Rafi begins to watch a video on any topic, he finds it difficult to resist clicking on a link to another video and can quickly move away from academic topics to other types of content. Overall, he feels that YouTube research for information related to his academic work is helpful about 20 per cent of the time, while the rest of the time “is wasted on other videos”. He wonders, “If there was no YouTube, then maybe I would learn the things in more detail and less time”. Rafi is conscious of “fatigue” brought on by a combination of lack of sleep because he often watches videos into the early morning and from using YouTube during rest periods. Although he has not missed any deadlines, he now finds he has to “rush to finish my work on time”. His ambiguity about the value to him of YouTube is linked to his awareness that he is unable to limit or control his use of YouTube once he begins:

I cannot help it. It’s like I do some work and I want to drink a cup of coffee, and so I just want to open a [YouTube] page and view it for five minutes but those five minutes turn into half or a full hour. I just get sucked deeper into the things.

The enormity of YouTube and the amount of the new content that is uploaded every day overwhelms Rafi, who wants to taste all that is offered: “We can choose to be selective, but it is like consoling yourself”. His fear of missing out drives him to use YouTube, even though he believes that “excess is not good” and “we have to be really strict with ourselves” to limit use.

Case study 3, functional user: Sam

The whole thing with this is, of course, self-regulatory.

Sam is a 34 year old part-time MBA student who was an early adopter of YouTube (2007). He works in the IT industry. Although initially attracted to YouTube by its content, Sam was surprised and delighted by its social or “communal” flavour as well, and leaves comments on videos once or twice a year. He does not upload videos. After nearly ten years of use, he continues to be attracted by videos about his many hobbies, which range from unusual sports to video games to citizen band radio, and he treats YouTube as “another go to tool for information”, along with Google and Wikipedia.

He connects to YouTube several times a day:

It’s not one sitting. I got a life. I got a job. I can’t sit and watch three hours of stuff in one go. And his YouTube use follows a regular routine. Early in the morning:

[I] go to the little room of the house and watch [a sporting skills video] for at least 20 minutes.

On week days, he tunes in to YouTube during breaks from work:

Perhaps during […] tea breaks […] I squeeze in at least one [10 to 15 minute] video […] At lunch time, at least another half an hour. Another pick me up 15 minute video when I am having coffee at the cafeteria or canteen.

And most nights:

[…] a little bit at night and, of course, a few more videos right before I go to bed.

He has no trouble getting to sleep at night, even if he has been watching videos just beforehand.

Although Sam estimates that he watches YouTube for about two hours a day, he is probably connected for longer than this because he uses it as background in much the same way that others might use a radio or television:

It’s not necessary to view [YouTube]. I just have it turned on and listen to the conversations and what they are talking about.

Problematic and extensive YouTube use
He finds YouTube useful to “time shift” so he can tune in to broadcast programmes at convenient times and to catch up with the day’s news, and he listens to YouTube when he is driving (it’s just like talk radio):

Usually I leave the office somewhere around 7.00 or 7.30. By the time I actually get home, there is dinner […] So the only way I catch up with my things is through YouTube or [podcasts].

Sam also finds YouTube useful for his studies, but this use is prompted by specific tasks rather than the general, ongoing interest that prompts his everyday use:

For instance, like yesterday’s assignment where [the professor] gave my group a topic called ethical relativism. Of course, our research is a mix of everything and not from physical books but digital version, whatever is available in our library database, websites, YouTube and Wikipedia.

Sam is conscious of the need to self-regulate YouTube use, in common with other aspects of his life:

That’s the thing with me; everything is very regimental. The whole thing with this is, of course, self-regulatory […] I will be cutting short [when] I don’t feel I really have to see this […] I pretty much practice limiting myself […] I know when to watch it and when not to.

For Sam, self-regulation includes selection of relatively short videos. Although he occasionally watches programmes that are longer, his general rule is:

I can’t afford to get hooked on to stuff that [is] too long. If the shows are too long then I don’t bother. My shows are maximum twenty minutes.

Sam also makes a clear distinction between his private self, who watches YouTube, and his social self, who participates in face-to-face work and family life: “I am actually a very social person”. Although he has unlimited mobile data and makes use of it to keep YouTube running on his mobile phone when he is on his own, Sam does not use YouTube at the table, when his family come to visit, or “around people”. He is comfortable pausing a video to return to it later if he is invited to go out, and is not tempted to use YouTube when at work or during lessons or group discussions: “I don’t have that itch”.

External social pressure also acts as a strong motivator to limit his YouTube use. In addition to sharing a work space with his boss, there are family pressures:

Well my daughter’s only six months old. The thing with my wife is she is the serious type, so after twelve I have to turn off everything. She can’t tolerate sounds, if the room is too noisy she has problems sleeping.

Sam has not noticed any major changes in his life, positive or negative, that he would attribute to YouTube, but does acknowledge:

I have become an information counter and people come to me asking questions.

Discussion and conclusion
This research was able to gather in-depth information about the experience and consequences of extensive YouTube use from a group of university students. Users had many positive experiences, including learning an instrument, locating information to support academic tasks and increasing off-platform social engagement. On the other hand, some users experienced negative effects, the most serious being deterioration of physical and mental health, decline in academic performance and rupturing of relationships. Consistent with research on other internet platforms (e.g. Andreassen et al., 2012; Chou and Hsiao, 2000; Jia and Jia, 2009), it was possible to distinguish between functional and problematic (compulsive or addicted) YouTube.
Although the generic literature on university student social media use suggested that greater levels of use would be associated with greater dysfunction (Al-Harrasi and Al-Badi, 2014; Leung and Lee, 2012), our findings do not support such a conclusion. First, for the users in this study, dysfunction is associated with the way the user interacts with YouTube rather than extent of use \textit{per se}. Extensive use does not necessarily result in harm or significant disruption. Second, functional use is not necessarily without challenge and dysfunctional use can have positive, as well as negative, outcomes. Thus, in terms of well-being, Sam (a functional user) needs to be vigilant to prevent negative consequences in his family life, while Rafi (a compulsive user) was able to describe some positive social consequences. Academic consequences appear to depend on many factors other than just functional or dysfunctional YouTube use: the compulsive users in this study are partly driven by their search for knowledge, even though Rafi wonders if YouTube might be an inefficient way to learn. We also did not gather clear evidence that the effects of YouTube use on health were associated with time spent on the platform: only Rafi made reference to his physical health, which he attributed to the increase in time spent on YouTube.

A distinctive difference between the functional and problematic users in this study is ability (or inability) to regulate YouTube use. Although lack of self-regulation is a common element of compulsive use of internet platforms (Ryan \textit{et al.}, 2014; Wohn and LaRose, 2014), collection of YouTube use life stories has provided a deeper understanding of how users exercise, or fail to exercise, control of the time and context of their use. Functional users use specific techniques to limit use: Sam deliberately selects short videos and has defined times when he accepts that use is not desirable. The compulsive and addicted users are hoping for an external event or force (in Adam’s case, a complete ban on YouTube use in his country) so that control over use could be attained. Rafi (compulsive) and Adam (addicted) are both aware that they spend “too much” time on YouTube, but are unable to resist the temptation to click on a link to another video that might bring new knowledge or entertainment. For Rafi, this temptation is linked to his desire to know as much as possible and, perhaps, to reinforce his sense of self-worth as a person who knows more than others.

Despite similar lack of self-regulation, compulsive YouTube use is substantially different from YouTube addiction. Although Rafi continues to use YouTube compulsively, he has been able to limit harm from usage, unlike Adam and the other users classified as addicted. Although Rafi is aware of the negative effect of late night YouTube use and his physical activity, he does not miss classes. He has even increased his participation in face-to-face social activity in response to requests from his friends and armed with knowledge from the internet. By contrast, YouTube appears to be the most important activity in Adam’s life. He found himself almost forgetting the world when he was on YouTube, until it badly affected his relationship with his girlfriend. Despite this incident, Adam still spends long hours on YouTube, lack of physical inactivity has affected his body weight and eyesight, and he has an irregular sleeping pattern. In addition to compulsive use, Adam, like the other addicted users, displays several of the characteristics of addiction: YouTube dominates his thinking (he is preoccupied with it), he gets a “high” from accessing the platform, he has low self-esteem, and his use of YouTube has resulted in serious life consequences for him, including declining health and loss of a relationship. These observations illustrate the similarities between addicted YouTube use and similarly labelled problems in use of other internet platforms (Balakrishnan and Shamim, 2013; Li \textit{et al.}, 2016).

U&G allows a deeper analysis of the different forms of YouTube usage examined here. Although their YouTube use histories tell us that all the users were attracted to YouTube by what they perceived to be unique content, the users differ in terms of their sense of agency. The functional users are aware that YouTube is one of several media they can choose for information and entertainment, and they exercise choice about both the YouTube content they engage with and the times they access it. On the other hand, the problematic users
appear to have been dazzled by YouTube’s content offering to the extent they do not see YouTube as one of several media which might satisfy their needs. Their hope that an external force will intervene to limit their YouTube use is a powerful expression of lack of agency. Consideration of use context offers further insight. Context appears to play two roles: for functional users, context defines appropriate use (such as on in the background while at work, or in breaks while on campus), but problematic use seems to be defined in part by inability to adapt to context (e.g. use during class or in preference to participation in activities with family and friends). Nonetheless, compulsive use of YouTube appears to differ substantively from compulsive use of other SNS, which is often believed to be motivated by a desire to address problems such as loneliness (Ellison et al., 2010; Sheldon et al., 2011). YouTube users can increase their level of connectedness to others by sharing their identities and videos, but this type of connectedness on YouTube is driven by shared interests (Lange, 2008) rather than a need to alleviate loneliness or address other problems. Similarly, as our results show, YouTube compulsion is driven by content, or more specifically, by perceived content opportunity. The social network contribution to compulsive use of YouTube can be passive, even distant and opaque from the user: the links that appear to the right of the video currently showing, and the video that begins automatically a few seconds after one video ends, reflect shared interests across the network of YouTube videos in the current, recently viewed and linked videos. Information about the name of the user who uploaded a linked need not contribute to the motivation to click to view a new video; from the user’s point of view, the connected content appears to count more than a sense of connectedness to other people.

Limitations
In common with other qualitative studies, several decisions made about the methods used in this study, although suited to the purpose of this paper, impose limitations on the extent to which the results can be generalized. Because we sought life stories from students whose use of YouTube was potentially in conflict with their role as learners and, in the case of addicted users in particular, might otherwise have been difficult to identify or who were unlikely to respond to a questionnaire survey, we used a purposive sampling technique (Merriam and Tisdell, 2015). While this technique allowed us to meet the purpose of our research, the sample size of nine is small and caution should be used in generalizing from our results: the proportion of compulsive and YouTube users in the population is likely to be much lower than in our study (Balakrishnan and Griffiths, 2017); the data also contain no information to support inferences about similarities by gender, nationality, degree or work status; each YouTube user is likely to have their own story to tell about their experience of YouTube use, so the specific aspects of use illustrated here are specific to the person whose YouTube life story has been told.

In addition, we chose to use qualitative coding to classify users by use category (functional, compulsive, addicted). Although a number of scales exist to measure problematic, compulsive and addicted use, we decided not to use a metric scale for this study, both because it was necessary to quickly establish a relationship with participants that encouraged open conversation about highly personal matters (Punch, 2014), and because we preferred to permit a classification of use to emerge from the specific focus on extensive users taken in this study (Miles et al., 2013). The symptoms of compulsive YouTube use and YouTube addiction described by our interviewees were consistent with definitions of compulsive and addictive behaviours, so we are confident that we identified suitable informants for our study; nonetheless, it would be useful to test that the case-based classification that emerged from this study could be confirmed with a metric scale such as the Social Media Disorder scale (van den Eijnden et al., 2016). Future interview-based studies could do this by administering a metric scale after the interview.
Implications for practice
Although YouTube is a social media platform that furnishes many advantages, individual users need to manage usage so that it does not affect them negatively. Awareness of the pitfalls of extensive YouTube use, along with development of techniques for self-management, should provide sufficient insight for many extensive users to avoid negative consequences. Compulsive users are likely to need more assistance, as they learn to identify the stimuli and the symptoms of their compulsion as well as techniques to bring it under control. Information on the need for, nature of and methods for self-management of YouTube use would be a welcome addition to internet user education courses and materials. Although likely to be rare, addictive use of YouTube appears to be a real phenomenon associated with negative thoughts about oneself as well as substantial, negative life consequences; clinical identification and treatment of this condition is warranted.

For compulsive and addicted users, time spent using YouTube is associated with compulsion to click on a link to another video, and another, and so on. A cascade of compulsive YouTube use might begin with a video required for work or study, but it can quickly become experiential and undirected as linked content becomes less relevant to the original video. Any intervention to regulate this kind of problematic YouTube use would need to break the link between the stimulus – the link to another video – and the behaviour of clicking on the link, rather than simply address the amount of time spent on the internet or YouTube.

Implications for research
This study has added value to the research on YouTube use by adopting U&G theory more faithfully than previous studies (Littlejohn et al., 2016). Studying use in its historical context has enabled a deeper understanding of the basis of current motivations (gratifications) for use. Attention to the wider use context identified the role of user (in)attention to context and provided some support for the environmental approach to internet use studies of Chiang and Hsiao (2015). Increased focus on agency in this context has also provided a deeper understanding of regulatory mechanisms associated with both compulsion and addiction.

Methodologically, using life histories permitted exploration of historical use motivations, the role of use context, and exercise of agency in ways that are not possible in quantitative studies. This method also provided users with a safe environment in which to tell profoundly personal stories. Future studies of extensive YouTube use, and use of other platforms should consider adopting this approach.

Empirically, this study has highlighted that agency is of particular importance for distinguishing functional from problematic YouTube use. Extensive use is not necessarily dysfunctional or problematic. Users who understand and can use their agency to make reasoned choices about YouTube use are also able to exercise control, while others relinquish their agency and control to the medium, resulting in compulsive, and in extreme cases, addicted use.

Because little is known about YouTube use relative to more studied SNS such as Facebook, there are many opportunities for further research. Larger studies in different populations (not just students) and different countries will shed further light on the issues raised here. It would be helpful to know more about the nature of compulsive YouTube use. What actions are automatic? How do compulsive users “select” the next video to watch? What approaches to self-regulation of compulsive YouTube use can be developed? Is use of other content-driven internet services challenged by similar compulsions and symptoms of addiction?
References


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The asymmetric effect of review valence on numerical rating
A viewpoint from a sentiment analysis of users of TripAdvisor

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Abstract

Purpose – The basic assumption is that there is a symmetric relationship between review valence and rating, but what if review valence and rating were linked asymmetrically? There are few studies which have investigated the situations in which positive and negative online reviews exert different influences on ratings. This study considers brand strength as having an important moderating role because the average rating of existing reviews for a particular product is a heuristic cue for decision makers. Thus, the purpose of this paper is to argue that an asymmetric relationship between review content valence and numerical rating will depend on brand strength.

Design/methodology/approach – The authors have conducted a sentiment analysis via text mining, using self-developed computer programs to retrieve a data set from the TripAdvisor website.

Findings – This study finds there is an asymmetric relationship between review valence (verbal) and numerical rating. The authors further find brand strength to have an important moderating role. For a stronger brand, negative review content will have a greater impact on numerical ratings than positive review content, while for a weaker brand, positive review content will have a greater impact on numerical ratings than negative review content.

Practical implications – Marketers could adopt sentiment analysis via text mining of online reviews as a valid measure or predictor of consumer satisfaction or numerical ratings. Strong brands should direct more attention to negative reviews, because in such reviews the negative impact transends the positive. In contrast, weak brands should aim to exploit as many positive reviews as possible to minimize the impact of any negative reviews.

Originality/value – This study finds there is an asymmetric relationship between review valence (verbal) and numerical rating and considers brand strength to play an important moderating role. The authors have used real data from the TripAdvisor website, which allow people to express themselves in an unsolicited manner, and linked these with the results from the sentiment analysis.

Keywords Sentiment analysis, Online review, Text mining, Asymmetric effect, Brand strength

Paper type Research paper

1. Introduction

We are now well into the era of big data, which comprises everything from ubiquitous social networking sites, such as Facebook and Twitter, to a myriad of smaller online information communities, such as that included in this study, namely TripAdvisor. Online information communities, such as TripAdvisor, are important examples of data hubs which may help consumers to make decisions about the quality of products or services. At the same time, the benefit to consumers of reading online reviews is that they provide real-world accounts of how fellow consumers rate products or services in which they are interested (Cheung et al., 2008). Thus, the online review is a market phenomenon that plays a large and increasingly important role in purchase decisions (Chen and Xie, 2008; Chiou et al., 2014; Lee et al., 2013; Li et al., 2013; Yan et al., 2015), in a process by which consumers inform
each other of their opinions about the quality of a product or service. Simultaneously, through learning about consumer opinions, marketers may choose to apply such lessons to furthering the appeal of their products to the consumer. Li and Hitt (2008) suggested that enterprises armed with information of this kind can modify their marketing strategies, including such factors as pricing, advertising or product design. Thus, marketers in e-commerce can encourage their targeted consumers to spread positive reports and, by word-of-mouth, create an early positive buzz for a product or service (Hung, 2017).

Several studies published in recent years have examined the impact of online reviews on different outcome variables, such as sales (Chevalier and Mayzlin, 2006; Floyd et al., 2014) and the helpfulness of online reviews (e.g. Chen, 2016; Li et al., 2013; Mudambi and Schuff, 2010; Schlosser, 2011; Yin et al., 2014; Goudas et al., 2015; Lin et al., 2017). However, the relationship between online review valence (i.e. positive vs negative) and numerical rating is a topic that has attracted negligible attention to date. This issue is particularly important, because to determine if a reviewer is able to convey the truth, consumers will likely compare review comments and the rating. In this case, disconfirming expectations should reduce (not enhance) credibility. In the absence of thorough empirical testing of the proposition, online reviewing cannot yet be accepted as a fully reliable indicator of product quality ratings (Koh et al., 2010). The basic assumption is that there is a symmetric relationship between review valence and rating, but what if review valence and rating were linked asymmetrically? There are few studies which have investigated the situations in which positive and negative online reviews exert different influences on ratings. This study considers brand strength to play an important moderating role, because the average rating of existing reviews for a particular product is a heuristic cue for decision makers. Furthermore, stronger brands provide more credible signals than weaker brands, because they are more susceptible to the loss of established brand equity (Erdem and Swait, 1998) and future sales and profit (Wemerfelt, 1988). Thus, this study argues that an asymmetric relationship between review valence and numerical rating will depend on brand strength. To fill this research gap, the main purpose of this study is to gain a better understanding of an asymmetric relationship between positive/negative reviews and numerical rating. Moreover, we have considered an important moderating role: brand strength. In addressing this issue, we have performed a sentiment analysis (or opinion mining) to understand the surrounding positive or negative connotations.

Compared with previous studies, this research provides additional contributions in three ways. First, it contributes to the literature on the basic assumption that there is a symmetric relationship between review valence and rating, because it assumes there is an asymmetric relationship between review valence (verbal) and numerical rating. We further consider brand strength to play an important moderating role. Second, this study performs sentiment analyses to gain more insight into the composition of reviews. Sentiment analysis is a useful technique with which to assist marketers in determining how a brand or product is perceived in relation to value and quality. For example, subtasks of sentiment analysis include determining subjectivity, the degree and valence of opinion (positive or negative), and classifying the subject matter and author. Sentiment analysis, through the monitoring of social media or online discussion forums, can change the way firms measure consumer opinions. Pang and Lee (2008) presented a detailed and comprehensive review of affective computing and computer technology for the recognition of emotion and expression. Thus, sentiment analysis is a useful research method in either text or review mining. The results derived from a sentiment analysis represent a first step toward a better understanding of the nature of reviews. Third, this study uses real data from the TripAdvisor website, which provide a complete spectrum of hotel consumer reviews, including the text of consumers’ comments, numerical ratings and the average rating of existing reviews for a particular brand (i.e. hotel quality or ranking), by using measures which allow people to express themselves in an unsolicited
manner – i.e. numerical ratings and brand strength – and linking these with the results from the sentiment analysis (Akhtar et al., 2017; Geetha et al., 2017).

The remainder of this paper is organized as follows. Section 2 presents a research model and hypotheses based on evaluation-cognitive consistency theory, expectancy disconfirmation theory (EDT) and related works with regard to positive/negative review content. The research methods are presented in Section 3, detailing how we designed a research process that includes data retrieved from the TripAdvisor website through its Application Program Interface (API) and stored in an SQL Server Database. Allied to that, we conducted a sentiment analysis via a self-developed computer program in R Language, and with SAS programming we examined the relationship between positive/negative review content, brand strength and ratings by regression analysis. Section 4 provides the results of the analyses, and the closing section summarizes the findings and presents the implications of the study.

2. Research framework and hypotheses development

2.1 Review valence

The valence of review content (i.e. positive vs negative) has been found to influence consumers’ judgments of products (e.g. Chen, 2016; Chen and Ng, 2017; Lombardi and Vernero, 2017; Yang and Chao, 2015). Researchers in a variety of disciplines have found the negativity effect, which is a phenomenon whereby negative information has a stronger impact on evaluations than positive information (Godes and Mayzlin, 2004). Others have argued that mildly negative information can result in a more positive overall assessment of a product by a consumer (Ein-Gar et al., 2012). More specifically, in the context of consumer reviews, Chevalier and Mayzlin (2006) found that negative reviews had a greater impact on book sales than positive reviews. Previous research has also argued that negative information is typically more diagnostic than positive information in categorizing the target into a certain category (Skowronski and Carlston, 1989). For example, in the context of consumer reviews, negative reviews about a product help consumers categorize it as a low-quality product more so than positive reviews help them categorize the same as a high-quality product (Bone, 1995; Herr et al., 1991).

2.2 A theory of evaluation-cognitive consistency

A theory of evaluation-cognitive consistency was proposed by Rosenberg (1956), in which the core concept is “the consistency between one’s abstract evaluation of an attitude object and the evaluative content of one’s beliefs about the object” (Eagly and Chaiken, 1993, p. 114), and which exists when “objects are liked to the extent that they are seen as possessing desirable attributes” (Scott, 1969, p. 263). For instance, holding only favorable beliefs about a product should make it appear entirely good and thus lead to extremely favorable evaluations. In contrast, holding both favorable and unfavorable beliefs should make it appear neither entirely good nor bad, which should lead to moderate evaluations. Indeed, when individuals derive their attitudes from their beliefs, considering both the pros and cons produces moderate judgments, whereas considering only the pros (vs cons) leads to extreme judgments (Brauer et al., 2004; Linville, 1982; Tetlock, 1983). Consequently, this study considers review valence and the sentiment of opinions to be consistent with rating judgments. The hypothesis is as follows:

H1. There is a consistent relationship between review content valence, the sentiment of opinions and numerical rating.

2.3 A theory of expectation–disconfirmation

According to brand signaling literature, uncertainty about product quality and performance creates risk (Erdem et al., 2006; Tsao et al., 2006). To cope with any such risk when making a purchase, customers rely on signals to indicate product quality and performance
Shimp and Bearden, 1982). Previous research has indicated many elements which serve as credible signals, such as price (Stiglitz, 1989; Tellis and Wernerfelt, 1987) and warranty (Boulding and Kirmani, 1993). Scholars have also found brands to be especially strong and effective signals of product quality (Erdem and Swait, 1998; Rao et al., 1999). Thus, this study considers brands to be a signal of quality and as determinants in forming opinions about product satisfaction. By applying the expectation–disconfirmation paradigm, we define expectation as customers' pre-trial beliefs about a particular hotel, perceived performance as the customers' perception of how a product performs in terms of meeting their needs and desires, and disconfirmation as the customers' subjective comparison of their expectations and the perceived performance (McKinney et al., 2002). Stronger brands provide more credible signals and higher expectations than weaker brands because they are more susceptible to the loss of established brand equity (Erdem and Swait, 1998). Thus, negative review comments should have a larger effect on numerical rating than positive reviews for strong brands, which cause higher levels of disconfirmation. In contrast, positive reviews should have a larger effect on numerical rating than negative reviews for weak brands, which lack a credible quality signal (i.e. lower quality expectations). The hypotheses are as follows:

H2. An asymmetric relationship between review valence and rating will depend on brand strength.

H2a. For stronger brands, negative review content will have a greater impact on numerical ratings than positive review content.

H2b. For weaker brands, positive review content will have a greater impact on numerical ratings than negative review content.

Figure 1 illustrates the research framework in Study 1, based on the theoretical background discussed above.

3. Research method

3.1 Sentiment analysis

Sentiment analysis is also known as opinion mining and/or subjectivity analysis. It is used to extract opinions, sentiments and subjectivity in unstructured text, to identify whether they indicate positive (favorable) or negative (unfavorable) opinions toward the subject (Pang and Lee, 2008; Chan and Chong, 2017; Faliang et al., 2017; Fan et al., 2017;
Sentiment analysis normally deals with detecting polarity, i.e., only positive or negative sentiment, rather than distinct emotions (e.g., happiness and sadness). The process of the sentiment analysis for the TripAdvisor online review mining is shown in Figure 2, with the details described below.

Our sentiment analysis includes both a training and a testing stage. The left side of Figure 2 indicates the position in the training stage, and the basic process is described below.

3.1.1 Selection of the content for analysis (please refer to Sentence Valence in Figure 2). Pang and Lee (2004) took film review data as their base (for details, please refer to http://www.cs.cornell.edu/people/pabo/movie-review-data/) and built a sentence valence data set v2.0, containing 1,000 positive and 1,000 negative processed review sentences, from reviews that had been classified as either positive or negative. We adopted their selection as our own base content for training/learning data for a self-developed program in R Language for classification purposes and for calculating the sentiment score of the sentences in the Test Stage.

3.1.2 The content was analyzed by using the data set of positive and negative elements (please refer to the Word List in Figure 2). We adopted AFINN, the well-known and established list of English words that were manually labeled by Finn Arup Nielsen in 2009–2011. The words were rated for valence with an integer between minus five (negative) and plus five (positive) (Hansen et al., 2011), using a numerical system placing word strength values between 1 and 5 for either positive or negative sentiment strength (Collins et al., 2013) (for details, please refer to http://www2.imm.dtu.dk/pubdb/views/publication_details.php?id=6010).

We took the following two examples (samples extracted from the positive and negative sentence valence data set v2.0, respectively, Pang and Lee, 2004), to demonstrate the process of the sentiment analysis in this study.

First, an example of a positive sentence from the data set, judged manually, is as follows:

[...] this insightful, Oscar-nominated documentary, in which children on both sides of the ever-escalating conflict have their say away from watchful parental eyes, gives peace yet another chance.

Based on the AFINN sentiment word list, while the word “conflict” is rated at −2, both the words peace and chance are rated at +2.

Asymmetric effect of review valence

Figure 2.
The process of the sentiment analysis for the TripAdvisor online review mining.
Second, an example of a negative sentence from the data set, judged manually, is as follows:

[…] while the ensemble player who gained notice in Guy Ritchie’s *Lock, Stock and Two Smoking Barrels* and *Snatch* has the bod[sic], he’s unlikely to become a household name on the basis of his first starring vehicle.

Based on the AFINN sentiment word list, while the word “gained” is rated at +2, the word unlikely is rated at −1.

If we solely use the summation of all the sentiment words in the sentences, the first example is −2 (conflict) +2 (peace) +2 (chance) = +2, while the second example is +2 (gained) −1 (unlikely) = +1. Thus, both sentences are positive. However, even though the summation of sentiment score for the second sentence is +1, the valence of sentiment, judged manually, is negative. Please refer to Table I. In other words, using only the summation of all sentiment words does not reflect precisely the true sentiment based on human judgment (Pang and Lee, 2004).

3.1.3 Training stage: a classification algorithm based on the data. Many researchers have argued that simply taking the sum of the negative terms and subtracting them from the sum of the positive terms – i.e., the additive method – reduces an opinion to a number, which is bound to result in a certain level of semantic mismatch (Cambria et al., 2017). It should be noted that positive words are commonly used in phrases expressing negative sentiments, and vice versa. Compared to polarity-counting or the additive method, some classification algorithms of machine learning approaches, such as Support Vector Machine (SVM) or Naive Bayes (NB) classifiers, usually achieve much better results (Pang et al., 2002), and have been properly adopted in domain adaptation for sentiment classification (Blitzer et al., 2007).

Consequently, a number of researchers have attempted to employ some machine learning approaches to classify sentiment, rather than simply using the polarity-counting method. Notably, the binary system of classifying the sentiment as either positive or negative works better than full word counts for sentiment classification (Pang et al., 2002).

Most algorithms for sentiment analysis are used for classifying collections of annotated text data. Before entering into the training stage, the data are pre-processed to extract the main features. Of the classification methods available, e.g., NB and SVM, we adopted the NB algorithm because it is a simple and intuitive method which performs similarly to other approaches. It combines efficiency (optimal time performance) with reasonable accuracy (Manning et al., 2008). More specifically, the NB classifier focuses on how the number of words in each of the categories relates to whether the whole sentence is either positive or negative. It then tries to predict whether a sentence is positive or negative by examining how many words it has in each category and relating this to the probabilities of those numbers appearing in positive and negative sentences.

<table>
<thead>
<tr>
<th>No. of very negative words (−5~−4)</th>
<th>No. of negative words (−3~−1)</th>
<th>No. of positive words (+1~+3)</th>
<th>No. of very positive words (+4~+5)</th>
<th>Sentiment (Polarity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First example: −2 (conflict) +2 (peace) +2 (chance) = +2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Second example +2 (gained) −1 (unlikely) = +1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table I. Example of list of count of negative, positive words and sentiment
3.1.4 Classifier. We used the AFFIN word list to count the number of very negative words, the number of negative words and the number of positive words, the number of very positive words and sentiment (positive or negative), as shown in Table I. Then, we have assumed: very negative (rating $-5$ or $-4$), negative (rating $-3$, $-2$ or $-1$), positive (rating $+1$, $+2$ or $+3$), very positive (rating $+4$ or $+5$) and reduced the items to reach a polarity score for each sentence.

Based on the example of the two sentences cited above, selected from a sentence valence data set v2.0 (Pang and Lee, 2004), the example training data and the pattern of polarity are shown in Table I.

By feeding the two example sentences, we were able to identify a variety of patterns/features in the data, as illustrated in the first two rows of Table II, which could be of use in the future for making predictions at the testing stage.

Please take note of the details in italics in the third and fourth rows. We have assumed the two positive sentences were selected from sentences judged manually in the valence data set (Pang and Lee, 2004). Thus, we produced three identical patterns of input $(0,1,1,0)$ in the training stage, i.e., zero number of very negative, one negative, one positive and zero very positive, but two different types of output, where one is negative (second row in Table II) and the other is positive (two occasions, third and fourth row in Table II). It is interesting how the NB classifier made decisions about the polarity of the sentiment in the testing stage for prediction. The standard NB classifier assumes independence of the predictor variables, and a Gaussian distribution (given the target class) of metric predictors.

3.1.5 Testing stage. The right side of Figure 2 indicates the position in the testing stage, and the basic process is described below.

3.1.5.1 Data collection. The data set was retrieved from the TripAdvisor website through its API (Application Program API) and stored in an SQL Server Database. To begin developing our system, we were required to register to gain API access. In line with our specific research requirements, API calls made with a TripAdvisor ID would be granted. Next, we created a database (and its tables) in the SQL Server 2012 by using SQL Server Management Studio or Transact-SQL. A table is a structure used to hold the actual data retrieved from TripAdvisor website. When we used our function of data retrieval, the data would be retrieved. The process is shown in Figure 3 and the sample content retrieval from the TripAdvisor website is shown in Table III.

3.1.5.2 The prediction of sentence valence. The test data stored in the database was entered into the self-developed program which counted the number of very negative words, the number of negative words, the number of positive words and the number of very positive words. Next, the classifier derived by the NB algorithm at the training stage was applied to predict/classify the sentence valence. Finally, an example of the classified data is listed in Table IV.

3.1.5.3 Calculating the sentiment score (please refer to the Word List in Figure 2). We counted the number of authors who had posted one or even several online reviews on
the TripAdvisor website. The following examples, shown in Table IV, are what two particular consumers had posted – i.e., several sentences each – about the same hotel.

There are several ways to calculate the sentiment score, however, the best could simply be adding together the positive and the negative scores. If the total score is higher than zero, then the valence of the sentiment score is positive. Take the example given in Table IV for author 001, with three positive words and one negative, yielding a score thus: \((1+1+1-1) = 2\).

3.1.5.4 Prediction of data for statistics. The NB prediction method served to calculate the sentiment scores for each online review as posted by each individual author. We then combined the rated data, being the overall rating for each hotel by author, for further statistical analysis via SAS programming.

3.2 Variables

3.2.1 Review content valence. The sentiment score, a measure of customer sentiment about a given hotel using text mining from the online reviews, was derived by using the NB algorithm to classify the sentiment as either positive or negative and then calculating the score by the method described in Section 3.1. The polarity is the sentiment score calculated by the number of positive/negative words in a sentence with values from \(-5\) to \(+5\), and also averaged over a number of sentences. In addition, we counted the number of very negative words, the number of negative words, the number of positive words and the number of very positive words for each sentence to further examine the relationship between the pattern of the number of very negative words, the number of negative words, the number of positive words and the number of very positive words for each sentence, and the sentiment score derived by the NB classifier. Furthermore, we were able to examine the relationship between the sentiment of opinions and the ratings, and that between the pattern of the number of very negative words, the number of negative words, the number of positive words and the number of very positive words and the ratings, respectively.

3.2.2 Numerical rating. The individual customer rating of a given hotel is labeled as the numerical rating. That is, the numerical rating is individual-level data that reflect the results of an individual’s satisfaction toward the hotel in which they have stayed.
3.2.3 Brand strength. The brand strength of a given hotel, labeled as the overall rating, was taken as the average hotel rating from travelers on the TripAdvisor website. The range of average hotel ratings is between 1 and 5 (indicated by circles rather than the usual stars), calculated by averaging the individual customer ratings received by the hotel on the first
item of their online review form. This asks reviewers to give their “overall rating of this property” by selecting 1 circle for “terrible,” 2 circles for “poor,” 3 for “average,” 4 for “very good” and 5 for “excellent.” That is, brand strength is aggregation level data for a specific hotel, scored as 5, 4, 3 and so on, according to the results of all users’ ratings.

4. Results and analysis

We conducted the sentiment analysis with the data set retrieved from online reviews posted on the TripAdvisor website, which included 1,043,573 sentences covering 1,759 hotels. This study classified brand strength based on overall rating, which ranged from 1 to 5, into two groups. If the overall rating was higher than 3, the hotel was categorized as a “stronger brand” (n = 368; 94.36 percent). Conversely, if the overall rating was lower than 3, the hotel was assigned to the “weaker brand” group (n = 22; 5.64 percent). Any hotels which were just on the median (i.e. 3) were omitted (n = 1,369), because they did not present a clear tendency toward brand strength. Moreover, 40,468 reviews (97.05 percent) were contributed to the stronger brands, whereas 1,232 reviews (2.95 percent) were contributed to the weaker brands. Any reviews which were just on the median (i.e. 3) were omitted (n = 2,129).

4.1 An examination of the validation of sentiment analysis

Before an examination of the hypotheses, we first conducted a regression analysis and correlation analysis through SAS software to examine the relationship between the sentiment score and the number of negative, the number of very negative, the number of positive and the number of very positive sentences, to examine the validation of the NB algorithm. This is because the predictors of ratings in all hypotheses are the number of negative, the number of very negative, the number of positive and the number of very positive sentences, rather than the sentiment score, so we had to test empirically their validation. The results of correlation coefficient indicate that the number of negative ($r = -0.52, p < 0.01$), the number of very negative ($r = -0.06, p < 0.01$), the number of positive ($r = 0.55, p < 0.01$) and the number of very positive ($r = 0.26, p < 0.01$) sentences are significantly correlated with the sentiment score. Similarly, the results of the regression analysis also indicate that the number of negative ($\beta = -0.56, p < 0.01$), the number of very negative ($\beta = -0.02, p < 0.01$), the number of positive ($\beta = 0.58, p < 0.01$), and the number of very positive ($\beta = 0.12, p < 0.01$) sentences are significant predictors of the sentiment score (see Table V). The results suggested the process/algorithm which was employed in this study to obtain the review valence is appropriate, and confirmed the validation of the sentiment analysis and the following regression analysis in testing the hypotheses.

4.2 Hypotheses testing

Our regression model includes the rating of the review valence (i.e. very positive, positive, negative and very negative), the sentiment of opinions, a dummy variable for brand

<table>
<thead>
<tr>
<th>Author ID</th>
<th>Hotel ID</th>
<th>No. of very negative words</th>
<th>No. of negative words</th>
<th>No. of positive words</th>
<th>No. of very positive words</th>
<th>Sentiment (Valence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>0001</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>Positive</td>
</tr>
<tr>
<td>0001</td>
<td>0001</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>Positive</td>
</tr>
<tr>
<td>0001</td>
<td>0001</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Negative</td>
</tr>
<tr>
<td>0001</td>
<td>0001</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>Positive</td>
</tr>
<tr>
<td>0002</td>
<td>0001</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>Negative</td>
</tr>
<tr>
<td>0002</td>
<td>0001</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>Negative</td>
</tr>
<tr>
<td>0002</td>
<td>0001</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Table IV. An example of a list of polarity and sentiment scores for each author.
strength (“weaker brand” = 1, “stronger brand” = 0), and the interaction of the two (i.e. the rating of the review valence and the brand strength). Following Baron and Kenny’s (1986) suggestions, the results are shown in Table VI. The variance inflation factors for all coefficient estimates in our regression model are below the cut-off of 10 (Mason and Perreault, 1991), indicating that multi-collinearity does not contaminate the results. Consistent with H1, the main effect of review valence (i.e. very positive, positive, very negative and negative) on the sentiment of opinions is significant (see Table V). Furthermore, the main effect of review valence (i.e. very positive, positive, very negative and negative) and the sentiment of opinions on ratings is also significant, but the absolute magnitude of the positive and negative \( \beta \) coefficient estimates is attenuated (see Table VI).

In summary, our findings suggest that there is a consistent relationship between review content valence, the sentiment of opinions and numerical rating. Furthermore, the review valence on ratings was partially mediated by the sentiment of opinions.

Moreover, after controlling the sentiment of opinions, the two-way interaction of brand strength and the number of positive opinions is significant (\( \beta = 0.06, t = 8.33, p < 0.00 \); see Table VI). In addition, the two-way interaction of brand strength and the number of negative opinions is significant (\( \beta = 0.06, t = 8.65, p < 0.00 \); see Table VI). However, the number of very negative opinions and the number of very positive opinions did not interact with brand strength.

To analyze how the asymmetric effect of positive and negative opinions on ratings of online reviews depends on brand strength, we had to compute separate estimate coefficients for the number of negative and the number of positive opinions, and then compared the absolute magnitude of the positive and negative \( \beta \) coefficient estimates. The absolute magnitude of the positive and negative \( \beta \) coefficient estimates is attenuated (see Table VI).

### Table V.

Results from the regression analysis for the sentiment of opinions with review valence (the number of negative/very negative opinions and the number of positive/very positive opinions)

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>( \beta )</th>
<th>( t )-value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of positive opinions (Pos)</td>
<td>0.58</td>
<td>195.00***</td>
<td>1.04</td>
</tr>
<tr>
<td>No. of very positive opinions (vPos)</td>
<td>0.12</td>
<td>42.01***</td>
<td>1.04</td>
</tr>
<tr>
<td>No. of negative opinions (Neg)</td>
<td>-0.56</td>
<td>-191.51***</td>
<td>1.02</td>
</tr>
<tr>
<td>No. of very negative opinions (vNeg)</td>
<td>-0.02</td>
<td>-7.62***</td>
<td>1.00</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( F )-value</td>
<td></td>
<td></td>
<td>19,120.2***</td>
</tr>
<tr>
<td><strong>Note:</strong> ( ***p \leq 0.01 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table VI.

Results from the regression analysis for rating of online review with the number of negative opinions and the number of positive opinions and brand strength

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>( \beta )</th>
<th>( t )-value</th>
<th>( \beta )</th>
<th>( t )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of positive opinions (Pos)</td>
<td>0.23</td>
<td>51.23***</td>
<td>0.02</td>
<td>3.13***</td>
</tr>
<tr>
<td>No. of very positive opinions (vPos)</td>
<td>0.13</td>
<td>29.59***</td>
<td>0.08</td>
<td>19.49***</td>
</tr>
<tr>
<td>No. of negative opinions (Neg)</td>
<td>-0.34</td>
<td>-76.56***</td>
<td>-0.14</td>
<td>-23.90***</td>
</tr>
<tr>
<td>No. of very negative opinions (vNeg)</td>
<td>-0.03</td>
<td>-6.75***</td>
<td>-0.14</td>
<td>-5.26***</td>
</tr>
<tr>
<td>Brand strength (BS)</td>
<td>-0.03</td>
<td>-32.88***</td>
<td>-0.22</td>
<td>-28.15***</td>
</tr>
<tr>
<td>Pos × BS</td>
<td>0.06</td>
<td>8.33***</td>
<td>0.03</td>
<td>5.18***</td>
</tr>
<tr>
<td>vPos × BS</td>
<td>0.00</td>
<td>0.73</td>
<td>0.01</td>
<td>1.52</td>
</tr>
<tr>
<td>Neg × BS</td>
<td>0.06</td>
<td>8.65***</td>
<td>0.04</td>
<td>6.68***</td>
</tr>
<tr>
<td>vNeg × BS</td>
<td>0.00</td>
<td>-0.29</td>
<td>-0.00</td>
<td>-0.11</td>
</tr>
<tr>
<td>The sentiment of opinions</td>
<td>-0.27</td>
<td>-32.88***</td>
<td>-0.22</td>
<td>-28.15***</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.25</td>
<td>51.23***</td>
<td>0.29</td>
<td>52.09***</td>
</tr>
<tr>
<td>( F )-value</td>
<td>1,537.07***</td>
<td>1,477.76***</td>
<td>1,477.76***</td>
<td>1,477.76***</td>
</tr>
<tr>
<td><strong>Note:</strong> ( ***p \leq 0.01 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
magnitude was compared because the number of negative opinions should be related negatively to the ratings of online reviews, and the number of positive opinions should be related positively to the ratings of online reviews. Thus, to obtain a valid comparison, the “sign” of the estimates must be ignored.

This study further conducted a regression model by subgroup analysis. The results of the analysis are shown in Table VII. In line with $H2a$, for stronger brands, the coefficients for the number of positive opinions and the number of negative opinions are $0.02$ and $-0.14$, respectively. Both are in the expected direction and are significant at $p < 0.0001$. Moreover, their absolute magnitude is as hypothesized, where the absolute value of the coefficient for the number of negative opinions is greater than the absolute value of the coefficient for the number of positive opinions. In contrast, for weaker brands, the coefficients for the number of positive opinions and the number of negative opinions are $0.12$ and $-0.02$, respectively. Both are in the expected direction but only the number of positive opinions is significant at $p < 0.0001$. Moreover, their absolute magnitude is as hypothesized, where the absolute value of the coefficient for the number of positive opinions is greater than the absolute value of the coefficient for the number of negative opinions, which supports $H2b$.

5. Conclusion and general discussion

5.1 Theoretical implications

The results in this study are based on 1,043,573 sentences extracted from 41,700 online reviews. They are important in three respects. First, the results indicate that the effects of extremely positive or extremely negative review content did not interact with brand strength. Nevertheless, there is an asymmetric impact of positive and negative reviews on the numerical rating (see Figure 4). The broken line in Figure 4 represents strong brands, for which the slope of the negative reviews is steeper than that of the positive reviews, while the solid line represents weak brands, for which the slope of the positive reviews is steeper than that of the negative reviews. In other words, for weak brands, the higher the impact of positive review comments on the numerical ratings, whereas for strong brands the higher the impact of negative comments on the numerical ratings.

Prior research has also shown the asymmetric impact of negative and positive attribute level performance on overall levels of satisfaction (Mittal et al., 1998). However, few studies have considered the moderating role of brand strength on the asymmetric relationship between positive/negative review comments and the consequent numerical ratings. Although the relative impact of negative comments on credibility was clearly greater than that of positive comments, in accordance with prospect theory (Kahneman and Tversky, 1979), this does not mean that we should ignore the impact of positive review comments on numerical ratings. There was still a significant positive impact, albeit less pronounced.

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Strong brand</th>
<th>Weak brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of positive opinions (Pos)</td>
<td>0.02</td>
<td>0.12</td>
</tr>
<tr>
<td>T-value</td>
<td>3.17***</td>
<td>2.81***</td>
</tr>
<tr>
<td>No. of negative opinions (Neg)</td>
<td>-0.14</td>
<td>-0.02</td>
</tr>
<tr>
<td>T-value</td>
<td>-23.97***</td>
<td>-0.62</td>
</tr>
<tr>
<td>No. of very positive opinions (vPos)</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>T-value</td>
<td>19.63***</td>
<td>2.64***</td>
</tr>
<tr>
<td>No. of very negative opinions (vNeg)</td>
<td>-0.02</td>
<td>-0.04</td>
</tr>
<tr>
<td>T-value</td>
<td>-5.30***</td>
<td>-1.61</td>
</tr>
<tr>
<td>The sentiment of opinions</td>
<td>0.37</td>
<td>0.37</td>
</tr>
<tr>
<td>T-value</td>
<td>51.76***</td>
<td>7.01***</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>F-value</td>
<td>2,627.22***</td>
<td>78.74***</td>
</tr>
</tbody>
</table>

**Note:** $***p \leq 0.01$
Second, the fundamental theory here is EDT, the effect of which can be either positive or negative. Under this theory, if the performance/quality associated with a purchase entity exceeds a customer’s expectation or desire, then the result is known as positive disconfirmation. Conversely, if the performance/quality falls short of expectation/desire, then the result is negative disconfirmation. The theory explains why, in the case of hotels considered to have a weak brand, the impact of a positive consumer review is greater than that of a negative review. Since quality expectations are lower, although negative reviews yield a negative impact on the ratings, the positive impact on ratings provided by positive reviews exerts an asymmetrically greater effect, thereby tending to override the negative impact of negative reviews. The situation for strong brands is interesting, where the quality expectations are higher, so the negative impact on ratings provided by negative reviews seems to exert an asymmetric effect on ratings. The results obtained in this study do not contradict EDT theory in terms of the impact of negative opinion and its influence on consumers. Rather, it confirms the view that when negative opinions have more of an impact on the ratings, it is crucial to pay more attention to positive opinions. In other words, when assessing how an entity is viewed, consumer expectations or perceptions of brand strength play a moderating role in the relationship between positive/negative opinions (i.e. review valence) and numerical rating (of overall satisfaction evaluation).

Third, the methodology utilized in this study is a useful technique with which to examine the asymmetric effect of review content valence on numerical rating by brand strength. There has been increasing attention paid to how sentiment analysis via text mining is used for prediction purposes, in areas such as stock markets, political elections and public opinion on various issues. Little of that research, however, has been devoted to exploring the validation of online review comments through sentiment analysis. The rating decided by consumers is a quantitative representation of qualitative inputs. Essentially, open-ended text posted online will often be more information dense than a simple star rating. However, current sentiment analysis is not a strong alternative to explicit consumer ratings (Lak and Turetken, 2014).

Many researchers argue that the use of a single positive or negative global judgment is often done when traditional document-based or sentence-based sentiment analytical approaches are adopted. Simply citing the number of positive and negative mentions is
insufficient to capture the complexity of written thought, and relying on a single positive or negative global judgment of open-ended text online is not recommended (Gunter et al., 2014).

Consequently, this study proposes two steps to explore the relationship between the ratings and sentiment scores. First, we suggest to return the single sentiment scores, derived via the NB algorithm, to the numbers of very negative, negative and positive, and very positive words. Second, while the numbers of very negative, negative and positive, and very positive words are strongly related to the sentiment scores, the sentiment score itself becomes a good predictor of rating when the brand strength acts as a moderator.

The methodology employed in this study provides a means of validating the process of mining the text of online reviews, and the results yielded suggest that the process we used was indeed a valid one. That process employed sentiment analysis, and that analysis in turn involved two crucial steps, namely classification and prediction via the NB algorithm and then computation of the sentiment score. The sentiment scores, obtained from text mining, form a valid predictor of numerical rating. Thus, sentiment analysis of online reviews is a legitimate alternative and an efficient process.

5.2 Managerial implications
The results in this study could also have implications for practitioner audiences. We suggest that firms could adopt the scores of sentiment analysis via text mining from customer reviews as a valid measure or predictor of numerical ratings. This is consistent with previous studies (Akhtar et al., 2017; Geetha et al., 2017; Hribar et al., 2017). Furthermore, strong brands need to pay attention to dealing with, or decreasing, the effect of reviews of a negative cast, because in such reviews the negative impact outweighs the positive. In contrast, weak brands need to exploit as many positive reviews as possible and make their impact transcend that of any negative reviews.

5.3 Limitations and directions of future research
As with any study, there are some limitations that present opportunities for future research. First, although the results of this study confirmed the effectiveness of text mining of online reviews, and also validated the process of sentiment analysis, the results were confined to a hotels data set. Future research could perhaps explore other product categories, such as those featured in the restaurant industry. Second, we also recognize that employing different learning/classification algorithms and/or computational methods could yield changes in sentiment scores. Thus, it could be a task for future researchers to examine these two alternatives and perhaps arrive at different scores. Hotel managers are most eager to learn from their guests whether their stay was satisfactory, and what aspects of the stay were most pleasing or displeasing. Thus, text mining and sentiment analysis make excellent tools with which to gain access to guest responses on such matters, both in terms of quantity and quality.

References


Chen, G.M. and Ng, Y.M.M. (2017), “Nasty online comments anger you more than me, but nice ones make me as happy as you”, *Computers in Human Behavior*, Vol. 71, pp. 181-188.


Further reading


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Abstract

Purpose – The purpose of this paper is to review and illustrate historical milestones and evolutionary stages of public sector reforms in such a typical transitional society as Kazakhstan through the prism of existing e-government development strategies, implementation models and institutional regulations.

Design/methodology/approach – The research is mostly based on a retrospective analysis of technology-driven public sector reforms and content analysis of various e-government strategies and platforms implemented by national and local executive authorities in Kazakhstan for the last two decades.

Findings – The results of the analysis has confirmed previously made assumptions that typical developing states tend to adopt different non-linear and multidimensional implementation strategies in advancing e-government reforms in comparison with developed countries. As it turns out, the continuity of actual stages or levels of such development not always corresponds in a consecutive manner to the formal phases of the most popular e-government maturity models proposed previously in academic literature.

Research limitations/implications – One of the fundamental limitations of the case study is that its findings and recommendations could relate only to a limited number of countries that have similar political, socioeconomic and administrative contexts. Taking into account the fact that Kazakhstan is not only a typical developing economy but also a transitional post-communist and post-totalitarian society that has its own unique political and socioeconomic features of governance, the results of case study could not be generalized and extrapolated to all developing countries, presumably narrowing them only to a very limited number of similar states, mostly, in Eastern Europe, Caucasus and Central Asia.

Practical implications – The main practical contribution of the article is that it provides a close review of e-government politics in Kazakhstan that could be helpful for policy makers and practitioners in evaluating, learning and improving the work of various technology-driven public sector projects in the area, especially from a regulatory point of view.

Originality/value – This inherently ethnographic narrative, which is based on the analysis of e-government legislation and implementation strategies derived from diverse administrative practices, could be interesting for those who seek to understand an ever-changing truly evolutionary nature of technology-driven public sector reforms in a typical transitional society.

Keywords Kazakhstan, Regulation, Public sector reforms, Digital state, E-government models, Evolution of e-government

Paper type Research paper

1. Introduction

Since the moment it became independent in 1991, Kazakhstan, a transitional country in Central Asia, has been experimenting with various public sector reforms in order to transform its post-communist administrative system and join the list of the most developed capitalist economies in the world. Often such ambitious reforms have been carried out in an intrinsically technological manner, especially in regard to the privatization of various sectors of national economy, streamlining of administrative procedures and operational costs in government institutions and, more importantly, promoting of various technology-driven public sector innovations and related digital solutions in a wide range of ministries and agencies. The recent advance of various digital initiatives such as e-government, e-participation, e-procurement and open data-driven platforms among others in this country is a demonstrative example of modernization trends in related public sector reforms.

In this regard, it seems interesting to review key historical milestones and evolutionary stages of technology-driven public sector reforms in this emerging digital society, especially
in locating regulatory measures and implementation tactics adopted by policy makers and other stakeholders in the area. Kazakhstan could be regarded, to a certain degree, as a poster child of dramatic changes that transitional societies are experiencing today in promoting public sector reforms. Almost every implementation aspect of such reforms are affected by technological innovations and new executive practices that either have been adopted from administrative contexts in other countries, mostly western ones, or invented in unique socioeconomic and political environments of post-socialist economy. Learning and improvisation have been two key elements of technological modernization in public sector that shaped the whole reformation process.

Today, the active promotion of digital agenda in Kazakhstan is not only limited to public sector (Bhuiyan, 2010; Kassen, 2015), such areas as business, civic and even political ones are also now being affected by the phenomenon. It is especially true when it comes to the implementation of various e-procurement, e-education, e-commerce and e-culture platforms or the recent emergence of such new instruments in advancing collaborative trends in these administrative reforms as open software, social media and open data-driven platforms. The key idea of these technology-driven reforms was to apply civic engagement practices not only at national levels of government, e.g. institutionally at different ministerial and department levels, but also at provincial and local levels. In this regard, the overall development of various digital government platforms in Kazakhstan for the last two decades has been reflected in the demonstrative progress of its ranking in global e-government rating lists.

2. Research methodology
This case study research is mostly based on a retrospective analysis of technology-driven public sector reforms and content analysis of various e-government strategies, related regulatory mechanisms and digital platforms implemented by national and local executive authorities in Kazakhstan since late 1990s when, in fact, first national programs of government reformation were adopted. In this regard, it is necessary to note that retrospective analysis is rarely used in e-government research and mostly resorted to when scientists aim to review and locate certain periods in the development of the phenomenon and understand historical records of related research in academic literature (Belanger and Carter, 2012) or, more often, in analyzing a set of related empirical data such as results of interviews with stakeholders, short quizzes and longitude analysis (Hardy and Williams, 2011; Janssen et al., 2012). Such retrospective approach could demonstrate better the technological progress and evolution of e-government (Pina et al., 2009; Hu et al., 2012), open government, e-voting (Schryen and Rich, 2009), e-procurement (Hardy and Williams, 2008) and other related institutions in a strictly consecutive manner. Therefore, the research presented in this paper is mainly dedicated to the review of continuous progress in the development of the Kazakh e-government project. This is especially important to do in the context of a transitional country that is not so often mentioned in related professional literature. In this respect, the retrospective analysis seems to be the most suitable methodological technique in this study.

On the other hand, the second method of investigation, namely, the content analysis is a much popular research approach in e-government studies, especially in understanding or evaluating the implementation stages of related digital services and regulatory measures in various public agencies (Kaaya, 2004; Zhou, 2004; West, 2004; Bonsón et al., 2012; Liang and Lu, 2013; Bonsón et al., 2015; Gao and Lee, 2017). In this regard, the analysis of various e-government regulation instruments adopted by Kazakh authorities for the last two decades in the area was a key source of empirical data for the whole case study research. The overall development of such public sector reforms was highlighted in a chronological way in its periodization, which was elaborated and suggested by the author based on the
analysis of its key historical milestones and reflected in a consistent advance of the national digital government project. The investigation also relies on the study of secondary sources of data such as academic and professional literature on the topic, policy analysis of key administrative decisions adopted during those periods, content analysis of related political texts, programs and official speeches by top politicians and policy makers.

3. Identifying key sources of data for case study

This section is dedicated to the location and selection of key sources of data on the development of the e-government movement in Kazakhstan which was necessary to collect and analyze in order to support key arguments and findings of the research. In this regard, the analysis of e-government laws was a key source of relevant official information on the topic, especially in understanding how related implementation policies were adopted by public agencies. Taking into account unambiguous overwhelming influence of central authorities in this unitary state in advancing e-government, the analysis of related executive directives could be extremely helpful also in understanding the role of public sector in promoting such reforms and overall development of the concept in this country. The availability of official repositories that store all legal acts in the field in a chronological order significantly simplified such retrospective analysis. In this regard, the regulation acts were analyzed in accordance with their force, type and direct or indirect relevance to the topic such as national and local laws, state programs, national strategies, e-government directives, charters, etc.

3.1 Key e-government laws


3.2 Related documents


4. Literature review of e-government development models

The conceptual evolution of e-government development models has been truly reflective of major stages and transformations that happened in the area for the last two decades, whether they are technological, organizational, socioeconomic or political ones. In this regard, it is interesting to review the progression of related development models or, as they are often referred to in academic and professional literature, stages of growth in advancing e-government as a public institution.
4.1 Understanding e-government classics: the Layne and Lee model

The foremost first popular model to describe and theorize key stages of e-government development was offered by Layne and Lee (2001) in their universally famous journal article entitled “Developing fully functional e-government: a four stage model.” The paper analyzes structural transformation of e-government through a number of implementation steps, which are consecutively needed to be applied by public agencies in order to succeed in advancing related digital platforms in public administration and promoting related technology-driven public sector reforms. According to authors of this piece, which was written at the dawn of the digital era, the advent of new development models, which are beginning to be amalgamated with traditional public institutions, became possible thanks to internet-based solutions in public administration. As a result, new trends in management transform the very core of governance and, therefore, it is important to understand, navigate and control such fundamental changes in the structuration of e-government development, especially in building infrastructure basis, addressing policy issues or managing interoperability nuances in order to harness fully the key results of the movement. By resorting to the historical analysis of the US e-government development as a demonstrative case, they argue that “e-government is an evolutionary phenomenon” (Layne and Lee, 2001) and identify four typical stages of related growth for its maturity, namely, cataloguing (i.e. presenting online government information, downloadable document forms, public executive reports, etc.), transaction (i.e. providing digital services and interactive online forms, promoting various government databases, interactive platforms, etc.), vertical integration (i.e. creating and integrating e-government ecosystems at local levels or specific areas of activity) and horizontal integration (i.e. creating a single ecosystem for all e-government services or one-stop-shop for all digital interactions of citizens with public agencies, regardless whether they are accessed at local, national or specific levels). As it was claimed by authors, this four-stage model could theoretically be extrapolated to e-government cases in other countries also, which, nevertheless, would require further investigation and analysis. In this regard, the Layne and Lee model provided certain inspiration and conceptual foundation to continue research in this direction by resorting to the case of the Kazakh e-government project.

4.2 Understanding the Andersen and Henriksen model: extended e-government development phases

Another approach for e-government development as an evolutionary phenomenon that could be regarded as a certain conceptual continuation of the Layne and Lee four-stage theory was proposed by two Danish scientists, Andersen and Henriksen (2006), in their journal article entitled “E-government maturity models: extension of the Layne and Lee model.” In their paper, the authors propose an upgraded maturity model entitled public sector process rebuilding to inform further progress of e-government phenomena. They pay special attention not only to the technological aspects of development but also to such important benchmarks as key public values of related implementation reforms, civic engagement and customer-oriented approaches in advancing all e-government platforms. The updated development model complements the existing Layne and Lee’s theoretical approach, adding four further stages of e-government maturity such as cultivation (i.e. promoting vertical and horizontal integration of e-government platforms, one-stop-shops and, more importantly, internal peer-to-peer public administration digital projects within government institutions themselves), extension (i.e. using further intranet e-government platforms and development of personalized digital services for citizens), maturity (i.e. focusing on mechanisms that help to increase the transparency of government institutions rather than efficiency and advancing furthermore personalized digital services for citizens) and, finally, revolution (i.e. facilitating interoperability of government data sets across various platforms, higher centralization of digital platforms and focus on efficient
data management and transfer of data ownership to customers) (see Figure 1). This academic masterpiece truly foresaw the advent of open government and, more importantly, open data-driven e-government technologies whose diffusion could be observed today all over the world, providing a robust conceptual foundation to continue research also in this area. In this regard, the proposed model of e-government maturity has also been analyzed further through the evolutionary prism of the Kazakh e-government project.

4.3 Understanding the e-government evolution models for developing countries
Taking into account modest infrastructural and socioeconomic capabilities existing in many developing nations, which are not taken account in many studies about typical stages of development, Zarei et al. (2008) proposed a new model for e-government evolution in the emerging world in the paper entitled “Toward national e-government development models for developing countries: a nine-stage model.” By resorting to the review of existing development stages in the area and, particularly, to Iranian case, they argue that localization and customization always needed to be applied in regard to all models proposed in academic and professional literature, especially in regard to transitional states. Local contexts always play a crucial role in driving the adoption of such technologies in public sector reforms, whether they are political, administrative, economic, organizational, infrastructural or even cultural ones. For example, in the context of such typical developing nation as Iran, the evolution of e-government turns out to be certainly a much more complex phenomenon than in a typical developed state and, in general, includes nine stages of maturity, namely, strategy developing,
infrastructure creating, portal making, initial citizens interacting and stimulating, prototyping, enriching, integrating and ICT industry developing. As they argued, the model of e-government maturity proposed in the paper could be extrapolated to the contexts of other emerging societies. In this regard, the Kazakh case provides almost an ideal playground to further research in this direction, taking into account that public administration institutions have had to be created in this post-Soviet nation basically from the scratch and all the more so in the environment of limited economic and technological resources.

Among other scholars who tested, revised or proposed their own models for e-government development, it is also necessary to mention Hiller and Bélanger (2001), Reddick (2004), Kunstelj and Vintar (2004), Ndou (2004), West (2004), Davison et al. (2005), Siau and Long (2005), Verdegem and Verleye (2009), Valdès et al. (2011), Path-Allah et al. (2014) and Rooks et al. (2017). Moreover, not only individual scholars but also various global consulting agencies and international organizations such as the Gartner Group, Deloitte, United Nations, Asian Development Bank (Wescott, 2001) and others have proposed their development models for policy makers and practitioners in the area (United Nations, 2001; Ronaghan, 2001) (see Table I). For example, the Gartner model (Baum and Di Maio, 2000) includes four stages of e-government development, namely, web presence (i.e. providing generic information for citizens), interaction (i.e. promoting interactive services), transaction (i.e. promoting traceable transactional services in government in everyday communication with all stakeholders) and, finally, transformation (i.e. total makeover of multidimensional governance in a digital manner).

5. The history of public sector reforms in Kazakhstan: the evolution from e-government to open government models of development

5.1 The first period (1997–2001): focus on building initial technological infrastructure basis for future e-government reforms

The first period could be characterized as a stage when national authorities in Kazakhstan began to plan strategically all technology-driven reforms. It was an age that heralded the

<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Key stages of e-government development</th>
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<tbody>
<tr>
<td>1.</td>
<td>Gartner Group (Baum and Di Maio, 2000)</td>
<td>(1) Web presence, (2) interaction, (3) transaction and (4) transformation</td>
</tr>
<tr>
<td>2.</td>
<td>Hiller and Bélanger (2001)</td>
<td>(1) Information dissemination, (2) two-way communication, (3) transaction, (4) integration and (5) political participation</td>
</tr>
<tr>
<td>4.</td>
<td>Wescott (2001)</td>
<td>(1) Setting up an e-mail system and internal network, (2) enabling inter-organizational and public access to information, (3) allowing two-way communication, (4) allowing exchange of value, (5) digital democracy and (6) joined-up government</td>
</tr>
<tr>
<td>5.</td>
<td>Layne and Lee (2001)</td>
<td>(1) Cataloguing, (2) transaction, (3) vertical integration and (4) horizontal integration</td>
</tr>
<tr>
<td>7.</td>
<td>Siau and Long (2005)</td>
<td>(1) Web presence, (2) interaction, (3) transaction, (4) transformation and (5) e-democracy</td>
</tr>
<tr>
<td>8.</td>
<td>Andersen and Henriksen (2006)</td>
<td>(1) Cultivation, (2) extension, (3) maturity and (4) revolution</td>
</tr>
<tr>
<td>9.</td>
<td>Zarei et al. (2008)</td>
<td>(1) Strategy developing, (2) infrastructure creating, (3) trust building, (4) portal making, (5) initial citizens interacting and stimulating, (6) prototyping, (7) enriching, (8) integrating and (9) ICT industry developing</td>
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</table>

Table I.
The most popular e-government development models in academic literature

Source: Own elaboration
The advent of computer and internet-based solutions almost in every sector of economy. Due to globalization, promotion of policies aimed at popularizing open economy and active cooperation with western nations in many spheres, these technological changes also affected Kazakhstan. As a result, the active computerization of public sector subsequently led to significant changes in government operations. Furthermore, the informatization has always been associated by policy makers and practitioners in Kazakhstan with the ongoing progress in building national economic competitiveness, especially in telecommunications, later providing additional incentives to join the global e-government rally. Therefore, government agencies decided to reform public administration only after they could create a robust economic and technological basis for such transformations. In order to achieve this strategic goal, a number of important laws were adopted at that time such as the presidential decree on the formation of the single information space (The Presidential Decree No. 3787, 1997) and the government resolution on the concept of single information space and measures for its implementation (The Government Resolution No. 715, 1998). In this respect, the presidential administration and central government agencies were key policymakers which initiated such reforms, mostly focusing on building technological infrastructure basis for future e-government reforms. The key areas of activity included the initial creating of telecommunication networks, purchasing of basic computer equipment for public bodies both at central and local levels of government, establishing of first internet and intranet connections in many public institutions, introducing of internal government corporate e-mail systems, procuring of servers, software and terminals, opening of first web-sites, etc.

Such development strategy clearly demonstrated that the first stage of the Layne and Lee’s model does not fit well in the context of this transitional country and, as it was earlier shown, also in many other developing nations. Governments in emerging states tend to focus on addressing first more urgent needs in economy such as building infrastructure or closing digital divide (Ndou, 2004; Zarei et al., 2008). In the case of Kazakhstan, the infrastructure was basically created from the scratch and everything that was related to these technological processes was regarded as the number one priority and as a necessary prerequisite for the further economic progress of the country in a global sense. In this regard, it is important to highlight the crucial role of central government in developing such economic and technological basis for future administrative reforms. Taking into account that this unitary country was built on principles of strict top-down regulation, centralized public funding and strong executive control in almost every sphere of economy, it was much easier politically and, more importantly, organizationally to carry out such reforms than in many federal countries.

5.2 The second period (2001–2004): focus on informatization and training

The second period could be characterized as a stage when informatization of public institutions became a cornerstone of all administrative reforms. The Presidential Decree No. 573 (2001) on the development of national information infrastructure was the first document specifically aimed at fostering informatization processes in all public institutions. The implementation of the decree has later paved a direct road for the introduction of various innovative digital solutions in public sector. For example, in accordance with the document, national authorities had to develop a wide range of nationwide databases such as individual and legal entities registries, land cadastres, estate and taxpayers databases, etc., which provided a certain practical basis to build first information hubs at the national level, significantly increasing chances to introduce a single ecosystem of digital government (see Figure 2).

The next legal document, which also has later played an important role in advancing various technology-driven public sector innovations in Kazakhstan, was the so-called informatization law. The document, which was adopted in 2003, was aimed at regulating such areas as the protection of government information resources and development of information systems as well as establishing a set of rights and obligations of natural and legal persons in
regard to the promotion of related transactions in public sector (Law No. 412, 2003). It is also necessary to note that this legal act, in fact, was aimed at prioritizing centralized information systems and networks over federated (decentralized) ones, especially in ensuring their interoperability within a single nationwide digital government ecosystem. Moreover, in accordance with the normative document, all information resources and information systems were now required to be accompanied by a certain set of technical anti-hacker defense mechanisms to ensure information security of personal data and sensitive government files and prevent the leakage of information resources or their misuse in public and private sectors of economy. However, this law did not specify how exactly such large-scale provision of electronic services should be rendered to citizens and businesses. Another issue was associated with the lack of specialists in the ICT industry, especially among those who could ensure the flawless operation of information security systems. Therefore, in 2003, the central government established a new education institution – The Center for Advanced Training in the Field of Information Security under the auspices of the Office of the Prime Minister (The Government Resolution No. 43, 2003).

The adoption of another regulatory document, namely, the law on electronic document and digital signature in 2003, could be regarded as one of the most important steps in the history of technology-driven public sector reforms since it led to fundamental changes in the operation of government both at national and local levels. In particular, this law endorsed the introduction of the single electronic document ecosystem in all public agencies (The Law No. 370, 2003). However, due to challenges associated with normative collisions in ensuring equal legal force of electronic and paper documents, this document did not specify in detail itself the transition period. Therefore, in order to address the issue, national authorities adopted an additional resolution – on the approval of the rules of electronic document management in government agencies (The Government Resolution No. 430, 2004). The document defined better management of electronic records in government agencies, introducing a wide range of verification techniques such as electronic signatures and use of intra-agency digital certificates. Today, the single ecosystem of Kazakh e-government automatically attaches a unique digital code to any registered document to ensure its further subsequent institutional control. In this regard, all transactions are carried out through a special centralized platform.

5.3 The third period (2004–2006): focus on creating a single ecosystem of digital government

The third period could be associated with actual organizational preparations to introduce a single e-government ecosystem. It was formally finalized with the inauguration of a special
web portal in 2006. But, the preparations themselves have commenced as early as 2004 with the adoption of the first e-government strategy (The Presidential Directive No. 1471, 2004). The document was promoted by central government as a main political instrument for all technology-driven public sector reforms. One of its primary goals was to offer a roadmap on how to better implement the e-government project and an initial set of electronic services (e-services). The web platform itself (www.egov.kz) was introduced to the public only on April 12, 2006, i.e. after two years of technological and organizational preparations. In this regard, it provided free access to a number of information services in sections as diverse as culture and leisure, environment protection, land cadastre management, transport and travel, among others.

As it was rightly denominated by Layne and Lee (2001), cataloguing (i.e. the provision of merely information services) had to be the initial stage of actual e-government development in any country. In the case of Kazakhstan, it was actually the second one after the stage of infrastructure building, taking into account its transitional settings since almost everything in the area had to be created from the scratch. In this regard, in order to ensure implementation of these reforms, national authorities pledged KZT52bn in 2005–2007, which was equivalent to US$400m, an astronomical amount of money for Kazakhstan at that time. Money was later spent on various infrastructural and organizational preparations in order to ensure on-time launch of official e-government projects. Therefore, the adoption of the single e-government strategy in 2004 provided a very effective legal instrument to regulate all public activities in this area for years ahead. For example, in addition to the provision of various information, interactive and transactional services (i.e. stepping on the second stage in the Layne and Lee model), administrators of the project also initiated a number of training courses aimed at closing the digital divide among citizens and businesses, naturally, at the expense of public funds.

In this regard, a low level of the internet penetration was a key barrier in promoting these reforms due to high prices for these services. At that time, the telecommunication market was virtually monopolized by Kazakhtelecom (McGlinchey and Johnson, 2007), a national telecommunication carrier, which controlled all networks and provided access to the internet not only to the vast majority of subscribers among citizens and business entities but also to other internet service providers. Taking into account the fact that the promotion of e-government reforms logically demands affordable internet access to citizens, especially in countryside, the government decided to open specialized access points to the web in all public schools and public institutions (Resolution No. 479, 2005), resorting to extensive networks of the national telecommunication carrier (see Figure 3). Another goal was to cut the prices for the access to the internet for all citizens of the country in order to form an army of potential users and ensure the normal operation of future e-government projects. This stage of e-government development in Kazakhstan could be associated with one of the phases proposed by Zarei et al. (2008) as initial citizens interacting and stimulating.

In this regard, it is necessary to note that the central government was a key stakeholder in promoting all technology-driven public sector reforms, which support and readiness to fund-related activities allowed to prepare an organizational and legal fundament to introduce a single e-government strategy. The document itself was developed by the Agency of Informatization and Communication, which also provided all administrative supervision associated with the creation of the project. Therefore, the agency de facto could be regarded as an official administrator of the whole e-government ecosystem in Kazakhstan, representing and acting on behalf of national authorities, since it followed direct executive instructions coming from the Presidential Administration, Office of the Prime Minister and many other central agencies. Such public agencies as the Ministry of Economy, The Committee of National Security and Ministry of Justice also played a certain role in advancing the project, providing some administrative support or information assistance.
However, the lion’s share of technical assistance and maintenance for the whole e-government project was provided by various state-owned telecommunication companies, especially National Information Technologies. The technological development of related e-government platforms and databases was provided by specialists from this company under political and administrative control of central government agencies. In this regard, the case of Kazakhstan provides a classical example of centralized implementation strategy adopted in a typical unitary state where the role of national agencies in developing related projects, including building various e-government platforms, is crucial, since the participation of regional authorities is minimal due to the fact that they are all subjects of direct executive control from central government with little or no room for discretion in making any significant political or even administrative decisions. The implementation of the project was carried out at the central level, both politically and technologically. The first and foremost important result of such centralization policy was the creation of a single e-government ecosystem with nationwide institutional access to databases and services for the whole country without subdivision for regional and local projects.

Thus, the first initial stages of e-government development, which were tentatively dubbed by Zarei et al. (2008) as strategy development, portal making, initial citizens interacting and stimulating, and the ongoing first and second stages in the Layne and Lee’s model, i.e. cataloguing and transaction, which are contextually more suitable for developed rather than developing nations, complemented each other well in this transitional society. In this respect, national authorities resorted to traditional bureaucratic top-down mechanisms of regulation.
such as resolutions and directives in order to eliminate any chances of institutional resistance and corporate lobbying activity, which nevertheless, as it later turned out, have proved to be very efficient in the context of a highly monopolized telecommunication market.

5.4 The fourth period (2007–2009): focus on integrating cross-institutional digital government platforms

The fourth period could be characterized as a stage when absolutely all digital government projects in Kazakhstan were finally integrated into the single ecosystem both in organizational and technological senses, thus finalizing, in accordance with the Layne and Lee model, the third and fourth stages of e-government development, i.e. vertical and horizontal integration (Layne and Lee, 2001). This period is also associated with the first concrete results in implementing the nationwide e-government strategy and the benefits that its implementation in practice brought into the public domain such as dramatic increase in the assortment of e-services, especially personalized ones, and emergence of new projects that helped to identify best ways on how to battle such notorious aspects of public administration as red tape and corruption, thus stepping on the first and second phases of the e-government development model hypothesized by Andersen and Henriksen (2006) as cultivation and extension.

In this regard, the second e-government strategy, which was adopted in 2007, provided a new framework for all technology-driven public sector reforms in Kazakhstan for the period between 2008 and 2010 (The Government Resolution No. 1155-1, 2007), paying special attention to the development of more collaborative and participatory aspects in building centralized e-government ecosystem, for example, in promoting various e-personnel, e-management and e-legislation projects. The overall funding for anticipated reforms, especially in integrating various e-government platforms, was expected to be about KZT23bn (approximately US$190m). It is interesting to note that the amount of related public assignations was significantly less than during the implementation of the first e-government strategy in 2004–2007, since it was primarily aimed at building telecommunication basis for the single digital government ecosystem. As it was noted by Andersen and Henriksen (2006), cultivation or as a transitory stage of development implies further integration of existing e-government services, incremental improvement of their operation and simultaneous work on their operability with each other.

For example, in order to ensure cost-effective development of the national public procurement project, the government adopted a special e-procurement law (2007), which allowed to integrate all related platforms into a single e-government ecosystem. The law, which was adopted on July 21, 2007 after long debates in society, paid special attention to the regulation of various electronic methods of public procurement and related activity of public agencies (OECD, 2007). Furthermore, amendments that come into force in 2009 reinforced the document with new regulatory mechanisms of control. The key goal of legal document was to pave the way for policy makers of the project to implement a single strategy at all levels of government. One of the goals of the project was to create an effective system of budget planning and control over financial operations in all agencies. In building the platform, policy makers have resorted to the same approach as with the implementation of the e-government project, focusing on providing a single entry venue for all activities such as a nationwide ecosystem and centralized database hubs and choosing a single operator. Therefore, one of the most important steps was the creation of an interactive registry that would allow to connect all government agencies and potential public contractors with each other (see Figure 4).

Along with the Agency of Informatization and Communication as a traditional administrator of the e-government project, such new stakeholders representing the public sector in Kazakhstan as, for example, the Committee of the Financial Control and Public Procurement in the Ministry of Finance, began to play an important role in integrating and advancing electronic procurement platforms in all government agencies. The importance of
the e-procurement project that was partly aimed at reducing public spending and battling corruption significantly raised the role of the ministry (see Figure 5). In addition, now the agency was obliged to report twice a year before the central government (The Government Resolution No. 1155-1, 2007) about the implementation of the project and track any progress in developing all public digital platforms.

Moreover, the growing pool of technology-driven public sector projects in Kazakhstan predetermined the creation of the special national infocommunication holding named Zerde, which was accountable before the national government for all informatization projects. The new holding began to administer such projects as the creation of the International Information Technology University in Almaty in cooperation with the University of Carnegie-Mellon and KazSatNet Corporation in order to prepare specialists in satellite telecommunication technologies. In addition, the implementation of the e-procurement project demanded the creation of a special operator such as the Electronic Commerce Center (ECC, 2015), which now began to provide all procedural and technological assistance to the Ministry of Finance in the area.

5.5 The fifth period (2010–2012): focus on introducing participatory digital platforms
The fifth stage in the development of technology-driven public sector reforms in Kazakhstan could be characterized truly as a milestone in the conceptual realization of the whole e-government paradigm and total transformation of related implementation
strategies by national authorities. Such reforms were now aimed at promoting more transactional services rather than just informational or interactive ones as it had been practiced before and, more importantly, at facilitating the development of various e-participation tools and civic engagement platforms in an attempt to improve operational efficiency of such projects. This period was also characterized by dramatic improvements in designing the overall technological layout of the whole ecosystem of digital government. In general, this stage of development in Kazakh e-government project could be described as a maturity phase in accordance with the model proposed by Andersen and Henriksen (2006).

Since the implementation of technology-driven public sector reforms was now beginning to be considered as an intrinsic part of economic modernization, the traditional practice with providing a regulatory basis for the promotion of all related projects through e-government programs was replaced with a single strategic document that would focus on various aspects of the technological development of the whole country, especially in terms of general planning, administration and control. The new document adopted in 2010 was entitled – The Forced Industrial and Innovation Development of Kazakhstan in 2010–2014 (The Presidential Directive No. 958, 2010) and included such new aspects of public sector reforms as the promotion of public-private partnerships, mapping of industrialization zones and widespread use of information and communication technologies in preserving cultural legacy of the nation, e.g. in museums, libraries, research centers, etc.

Another document that regulated the development of technology-driven public sector reforms in Kazakhstan at that time was the legal act titled – The Program of the Information and Communication Technology Development in Kazakhstan for 2010–2014 (The Government Resolution No. 983, 2010). The main purpose of the document was to plan the progress of the ICT sphere in terms of regulation, especially in regard to the adoption of the best international practices in e-commerce, e-banking and e-procurement areas. In relationship to the implementation of digital government projects, this legal instrument provided new opportunities to streamline existing e-services and outline the perspectives to develop such collaborative initiatives as, for example, independently developed social media-driven projects and blog platforms in a number of ministries that significantly improved the overall progress of the e-government project.

![Diagram](image.png)

**Source:** Own illustration

**Figure 5.** The growing importance of the Ministry of Finance in promoting technology-driven public projects.
The growing importance of public sector reforms and the necessity to focus on more collaborative aspects of development required the fundamental transformation of e-government operators. It was related not only to the Agency of Informatization and Communication, i.e. a key stakeholder of almost all e-government platforms, but also to all ministries and local governments and sometimes even national corporations which participation in some of the projects played an important role. The general rule was simple: the more popular e-services were in a particular area of e-government, the more important were the roles of corresponding public operators. In this regard, such agencies as the Ministry of National Economy (MNEK, 2015) and the Committee of Transport in the Ministry of Investments and Development (The Committee of Transport, 2015) have played an important role in these processes.

Moreover, the adoption of the Industrial and Innovation Strategy in 2010 reinforced once again an important role of various national telecommunication corporations (The Presidential Directive No. 958, 2010). As usual, these state-owned companies were indirectly administered and controlled by central government. In this regard, such new players as, for example, the National Innovation Fund, later renamed as the National Agency of Technological Development, and the Center for Engineering and Transfer of Technologies were created to provide additional scientific and technological support for policy makers of these digital projects at various institutional levels. In addition, the implementation of the strategic document – The Information Kazakhstan – 2020 also envisioned an important role of various corporate stakeholders, especially KazPost and Kazakhtelecom.

KazPost is a national postal company which controls a lion’s share of domestic postal and parcel deliveries. One of the projects that were aimed at making the postal delivery process more cost-effective and speedier was the development of modern electronic methods of tracking and delivery control. The system, called mobile postman, was designed in order to integrate it with the mobile version of the national e-government platform (Ospanova, 2015). Kazakhtelecom is the largest telecommunication company in Kazakhstan, which controls a significant share of the market in such areas as the provision of internet services, being a monopolist in providing access to the landline broadband, optic fiber and 4G internet in many regions of the country, cable television and satellite telecommunication services through its various subsidiaries. In this regard, any activities aimed at closing digital divide by connecting remote areas of the country to modern telecommunication services is an important aspect of public sector reforms, too. It is done either through a widespread network of landline internet service providers in major cities and urban areas, or using a group of Kazakh telecommunication satellites (KazCosmos, 2018) in remote regions of the country, such as KazSat-2 and KazSat-3, among others, that have been recently launched into outer space for that purpose.

5.6 The sixth period (2013–currently): focus on advancing open government and open data platforms

The sixth period in the development of technology-driven public sector reforms is probably one of the most interesting stages in the history of the phenomena. The emergence of such new paradigms as open government and open data-driven platforms and, what is more important, the necessity to promote, in this regard, civic engagement and participation projects provided new opportunities for policy makers in Kazakhstan to advance the e-government concept more as a collaborative playground rather than just a technological component of public sector reforms. For example, the introduction of the national open data project in 2013 (The Open Government Project, 2015) could be considered as an experimental undertaking. However, it is promoted in a traditional way where government agencies provide data sets on a systematic basis through a single national open data portal, which itself is based on the same platform as the whole ecosystem of digital government. Therefore, the same rules of strategic planning and
administrative control such as the presence of the single national operator and centralized funding were applied. In this regard, this stage of e-government development could be dubbed as a revolution phase, which, according to Andersen and Henriksen (2006), is characterized by measures on achieving the interoperability of government data sets across various services, higher centralization of digital platforms and focus on data management and even transfer of data ownership to customers. The advent of open data-driven projects, which are usually independently developed and promoted by technically savvy citizens and often outside the traditional ecosystem of digital government, using various government data sets from public portals and depositaries, is the most interesting aspect of such transformation in these e-government reforms.

Probably, one of the most interesting documents aimed at regulating the development of ICT-driven public sector reforms today in Kazakhstan is a strategy named – The Information Kazakhstan – 2020 – which was adopted in early 2013. The main idea of the strategic document was to facilitate the development of the nation in terms of advancement toward information society (The Directive No. 464, 2013). The implementation of the document was divided into two stages: one is for 2013–2017, and the second one is for 2018–2020 time period. In this regard, one of the goals of the plan was to reduce bureaucratic barriers in developing public services, especially in shortening the time of service delivery up to five days or facilitating the development of various civic open data-driven projects. It is also interesting to note that for the first time, the government put concrete strategic goals that were specifically aimed at achieving some progress in global e-government rating, e.g. in plans on entering the list of five most developed countries in e-participation or be in the list of 30 most advanced countries in e-government in the world, truly indicating to the strategic significance of the concept as a very important project in improving the global international image of the state.

One of the most interesting features in the development of e-government in Kazakhstan at that period of time was the launch of the so-called open legislation project (OLP, 2015) that began to provide a free of charge access to a special government depository with full texts of laws, ordinances, charters, rules and other legal acts adopted by public agencies at all levels of government. The project was regarded as one of the steps to close the information divide that existed in the country since the access to almost all legal documents had been provided before only on a commercial basis. Now anyone could access the database (see Figure 6).

The overall administration of the project was carried out by the Republican Center of Legal

![Figure 6. The principle of the open legislation project](source-own-illustration)
Information under the control of the Ministry of Justice. This measure was positively met by civic communities, especially lawyers, researchers, journalists and students.

The introduction of various transactional and interactive services, the main idea of which was to implement an idea of direct civic participation in administrative practices, at least at the central level, provided new opportunities to boost feedback with citizens both at national and local levels within the single ecosystem of digital government, increasing the importance of all public agencies in these reforms. In this regard, such new stakeholders as the Ministry of Industry and New Technologies, which was later renamed as the Ministry of Investments and Development (MIDK, 2015) and Ministry of Justice (MJK, 2015) began to play more important roles in promoting almost all innovation projects in public sector.

The importance of these projects indicated in the strategy required fundamental changes in the work of the main administrator of almost all e-government projects in Kazakhstan, i.e. the Agency of Informatization and Communication, whose role as a public institution that represented central government was important in many senses. In this regard, a special non-profit and non-commercial organization, which was named as a state corporation “Government for citizens,” has been created later to operate the whole ecosystem of e-government platforms. The corporation, whose 100 percent shares are owned by state, was created in 2016 in accordance with a special regulatory act (The Government Directive No. 39, 2016). In this regard, one of the most interesting aspects in promoting the idea of e-government was the organization of special data centers and laboratories in such areas as, for example, cloud computing, big data, mobile and government technologies. Another goal of the corporation was to facilitate the development of technology-driven public projects that would help to close digital divide, especially in rural areas.

6. Discussion
First of all, it is necessary to note that the results of retrospective analysis has confirmed previously made assumptions that typical developing states tend to adopt different implementation strategies in advancing e-government reforms in comparison with developed countries. As it turns out, the continuity of actual stages or levels of such development not always strictly corresponds to the phases of the most popular e-government maturity models in academic literature. As it was argued by Lee (2010), the implementation of e-government development models could be of non-linear character. For example, as it was demonstrated in Kazakh e-government case, infrastructure building was actually the first and, in many senses, the foremost important aspect of development in this area as it helped to establish a new public administration system, which was, in fact, created from the scratch in this post-communist society. Therefore, e-government reforms are often closely associated not only with public sector reforms but also overall technological and even economic transformation of the whole society toward capitalist system. As a result, for national authorities, the implementation of various digital platforms and overall digitalization of public services has been the number one priority in advancing all administrative projects (see Table II), starting from the creation of technological infrastructure and elementary training of public servants, citizens and business (e.g. in organizing education courses on how to use computers, create e-mail accounts and sending electronic application signed by digital keys, etc.) and ending to the promotion of the single e-government ecosystem for all interactive and transactional services and further advancement of open government and open data platforms, which are now aimed to change completely the nature of government-to-citizen interactions. In this regard, from a retrospective point of view, the actual stages of e-government development in Kazakhstan could be highlighted as follows: initial infrastructure building; informatization and training; single ecosystem creation; cross-institutional integration; e-participation; and open government.

One of the primary reasons of such non-linear character of related e-government reforms, especially in regard to the overwhelming focus on preparing infrastructural and
<table>
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<th>Key stages of development</th>
<th>Periods</th>
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<th>Key areas of activity and implementation platforms</th>
<th>Correlation to popular models of e-government development in the world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 – initial infrastructure building</td>
<td>1997–2001</td>
<td>(1) Presidential decree on single information space (1997) (2) Government resolution on single information space and measures for its implementation (1998)</td>
<td>The initial creation of telecommunication networks and purchasing of related computer equipment (e.g. establishing internet and Intranet connections in public institutions, introducing internal government corporate e-mail systems, procuring servers, first websites, etc.)</td>
<td>Setting up an e-mail system and internal network stage (Wescott, 2001) Building infrastructure stage (Zarei et al., 2008)</td>
</tr>
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<tr>
<th>Key stages of development</th>
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**Source:** Own elaboration
socioeconomic aspects of development such as closing digital divide and training, was a relatively weak economic and, thus, technological fundament of such reforms. The special attention that national authorities paid to infrastructure creation in early years of e-government development is mostly explained by the fact that, at that time, everything that was related to socioeconomic aspects of such reforms had to be created from the scratch. In this respect, the central government decided to fund these quite expensive technological and training projects, despite of the economic crisis in late 1990s and early 2000s, which the country was suffering from at that time, hoping to create an army of e-government users and build a cost-effective digital economy in the future.

In addition, there were some specific aspects and nuances of the administrative context, which also affected e-government reforms in this transitional country. The first and foremost important element of such reforms was related to the traditions of decision making in government itself. In this regard, Kazakhstan could be regarded as one of the striking examples of digital centralization in promoting all e-government reforms and implementing related platforms. The creation of a single web portal for all electronic services, regardless of whether they are informational, interactive or transactional ones, for all citizens in the country is quite a rare approach in implementing technology-driven reforms and usually is more popular as an administrative practice in relatively compact nations such as Estonia, Taiwan or Singapore. The fact that national authorities first had to plan and then implement related e-government projects helped to focus on building a single ecosystem as the most cost-effective solution for such a sparsely populated country.

Moreover, the cataloguing and integration of centralized government databases at early stages of administrative reforms in Kazakhstan has significantly increased the role of central government, since many services that were popular among citizens at that time appeared to be related to local matters such as municipal housing, access to local land cadastres, issue of real property and residential address certificates, etc. Red tape and corruption was notorious in these sectors. Therefore, the creation of the single e-government ecosystem, which was controlled and monitored by central government agencies, has helped to solve these challenges, increasing the political and administrative influence of national authorities in the area as a result. Due to the fact that Kazakhstan is a unitary state, all these services are now provided from a single e-government portal, using centrally integrated data sets and unique nationwide personal identification numbers, aggregating all available data from various government sources in one venue, regardless of whether they are generated at national or local levels.

In general, the use of traditional directives in promoting technology-driven public sector reforms has allowed to achieve impressive results in the area. However, the further progress of the Kazakh e-government projects requires new approaches in building collaborative platforms and, more importantly, engaging further civic communities since the recent trends in the area display a fundamental shift toward the advance of more citizens-oriented models of digital government, especially with the advent of open data-driven and peer-to-peer e-participation platforms, whose global diffusion all over the world is transforming the very core of the phenomena from a purely technological and administrative enterprise to a more politically oriented tool of digital democracy. This is one of the reasons why a special state corporation “Government for citizens,” which monitors and supervises all e-government platforms at the national level, was created in Kazakhstan in order to prioritize the development of specific citizen-focused services.

7. Conclusion
For the last two decades, Kazakhstan has been experimenting with various implementation strategies in technology-driven public sector reforms in an attempt to find the most cost-effective and sustainable models of e-government development and is now beginning to
be considered as one of the first pioneers in introducing digital government technologies in the developing world. In this regard, it is necessary to note that as the above-mentioned narrative of the e-government development shows, the scale of progression and temp of diffusion of the phenomena in Kazakhstan has been truly multidimensional whether it is in socioeconomic, technological or administrative domains.

In this respect, the paper claims to present an interesting retrospective story on promising patterns of emerging e-government trends in this transitional society from the perspectives of its key development stages. It demonstrates that the further progress of the e-government movement could open new prospects for the expansion and convergence of this institution with other new niches of public life such, for example, as civic engagement and digital state in a society that has been rarely exposed to traditions of government transparency in its recent history, especially with the development of an extremely popular collaborative digital platforms and generation of myriad stories based on real practices and lessons learnt by not only policy makers and administrators but also representatives of civic and business communities, independent developers and non-governmental sector. These stories demonstrate that e-government as a socioeconomic phenomenon could positively affect the traditional public-administration-only-focused dynamics of digital government reforms, transforming the whole movement as a truly liberating movement in a transitional context of emerging economy, at least in an explicitly digital manner.

References


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