LEOPOLDINA
FORTUNATI

2019

Fortunati, L., & O' Sullivan, J. (2019). Situating the social sustainability of print media in a world of digital alternatives. *Telematics and Informatics*, 37, 137-145.

Situating the social sustainability of print media in a world of digital alternatives

Leopoldina Fortunati and John O'Sullivan

Abstract
The aim of this paper is to discuss the social sustainability of print newspapers amidst the decline of their revenues and readerships and the rise of digital media. After a general introduction on sustainability, we focus on social sustainability and in particular on how the media system is an important factor of social participation and sustainable social change. How media practices currently support social sustainability are described and discussed. Then, we present our line of inquiry on print newspapers, which have come to be seen as the weakest layer in the network of personal media. We analyze the specific relationship between sustainability and the model of communication of print newspapers. In particular, we attempt to articulate a comparison between the model of print newspapers and that of online information in order to explore whether the communication model of print remains sustainable by complementing the digital media and the social media network. Then we compare the two economic models – print and online. Finally, we explore the specific contribution that print newspapers give to the debate on sustainability in comparison with the contribution of the digital world

1. Introduction

Other than in relation to the destruction of trees, or to dirty paper mills, or their much-heralded demise at the hands of digital progress, newspapers do not often feature in discussions of sustainability. When it does so, the question of print newspaper sustainability fits within the framework of late capitalism, still dedicated to the aim of growing GDP at the expense of 'natural capital' (Comitato per il Capitale Naturale, 2017) and largely deaf to arguments for degrowth (Latouche, 2004; 2007). Such arguments, challenging the notion of sustainable development, receive popular support, as shown in a recent study in six European countries (Astarea, 2016), along with a more general sensitivity to the environment as a social good (Flash Eurobarometer 256, 2008).

Comparisons of sustainability of media platforms typically confine themselves to energy consumption, waste and pollution, focusing in particular on the promoted switch from paper to digital, such as the never-achieved paperless office (Sellen and Harper, 2002). A good way to address these questions is to take account of the materiality of new and old media. This means considering the substances – paper, plastic, and toxic rare earth metals – each with its associated wastes, from which we build media. Similarly, it means considering resource consumption in which each media technology's demand for energy is met from paper production to power for devices and server farms. As awareness grows of the mining of ores, energy and other environmental costs of digital devices production and media consumption, dispelling the notion of magically harmless virtual consumption (Maxwell and Miller, 2012; Taffel, 2012), the opposition of dirty, resource-heavy paper against clean, post-industrial digital increasingly is being challenged. A Swedish study conducted in 2013 bears testimony to the complexity of the problem, introducing differentiation according to the degree of consumption. Paper was found to have less environmental impact in the case of heavier readers of news, while digital devices fared better in this regard for those reading less than 10 min each day (Omega Institute, 2014). While we are cognizant of the material dimensions of

sustainability, in this article we do not propose to achieve a settled assessment of this techno-social conundrum. Nevertheless, it is fair to say that the digital claim to superior environmental virtue is in question.

The present work seeks to argue for the relevance of the print newspaper, both in terms of its own place in the evolving media ecology and in terms of its role in social sustainability (Braidotti, 1994). As Littig and Griessler (2005) pointed out, a clear theoretical concept of social sustainability had been missing from the debate. To fill this gap, they proposed three sets of indicators. The first deals with the satisfaction of basic needs and with quality of life, and the second with equality. The third deals with social coherence, understood as inclusion in social networks, involvement in voluntary activities, solidary and positive attitudes toward marginal groups. We aim to contribute to the concept of social sustainability by introducing another aspect, which transverses these three categories: the availability and the access to media as fundamental dimensions of social participation and sustainable social change. In particular, we propose a discourse on the social sustainability of print newspapers, related to a continuity of research into evolving media platforms, and specifically into print newspapers as they relate to the Internet (e.g., van der Wurff, 2005; Fortunati et al., 2010; O' Sullivan and Heinonen, 2008). Our thesis is that print newspapers, in spite of the narrative of obsolescence that has emerged around them, form a sustainable medium that in turn is particularly relevant to the communication of sustainability and environmental concern. The framework for our discussion is based on categories and concepts generated from research data, which are further elaborated and structured theoretically.

The article is structured as follows: in the next section, we discuss how media practices, especially regarding news produsage, relate to social sustainability. In the following section, we focus on the changing relationship between social sustainability and the newspaper model and articulate a broad comparison with online news. Then, we compare the communication and the economic models of print and online news. Finally, we explore the specific contribution that print newspapers offer to sustainability knowledge and debate, and we examine their role in environmental communication, before drawing lessons from our analysis.

2. Media and social sustainability

The production and consumption of news are relevant components of active citizenship and participation in the public sphere. The relationship between media and the public forms the basis of a wide and varied field of study, much of it critical, not least in relation to journalism and its institutions (e.g., Conboy, 2013; Zelizer, 2004). Information and communication media reduce complexity and uncertainty. In addition, media social sustainability is further implemented by a series of social practices such as re-use and recycling. In respect to media, these practices are connected to processes such as digitization and its effects on analogue media, re- and trans-codification, competition between old and new media, and the development of users' agency. Such processes have introduced radical changes in the network of personal media regarding information, even as newspapers remain at the core of the selection, production and diffusion of news. Bolter and Grusin (1999), drawing on McLuhan's concept of "mediation", introduce the useful notion of "remediation", whereby media forms compete with, inform and reshape one another. They argue that media history does not have a linear historical evolution so that, for example, older media can also remediate newer ones. Remediation strategies – we stress – develop in the context of social –

including users' and audiences' – initiatives and practices. The notion of remediation enables us to understand how readerships use old and new media to extract the best from them: they use online newspapers, news sites and blogs to recover the timeliness that print newspapers lack and instead use print copies to read authoritative articles. These practices, of necessity, have reshaping effects both on print newspapers and on new media.

In the same vein, though with substantial differences, Nail (2017), drawing on Deleuze and Guattari (1994), proposes a discourse on assemblage, a practice in which a multiplicity of elements is subject to recombination and change. Assemblage offers an alternative to the idea of the essence of things, since it poses itself as indifferent to what a thing is and instead as interested to the process of the becoming of things. Online, users build their own virtual newspapers created with the pieces read in various outlets, blogs and news sites, while the loyalty to original newspapers fades. A connected theoretical perspective that addresses user and audience agency is that of bricolage. Deuze applies this concept to describe "the remixing, reconstructing and re-using of separate artifacts, actions, ideas, signs, symbols and styles in order to create new insights and meanings" (2006, p. 70). Bricolage occurs regardless of whether the elements used originate in old or new media. Schmidt and de Kloet (2017) develop this approach: drawing on LéviStrauss's (1966) and Derrida's (1978) discourses on bricolage, which they interpret as a cheap way of producing content and creating new meanings by recycling available fragments. Bricolage, therefore, incorporates both print and digital media, in accordance with the blended media environment that prompted Ludovico's (2012) conception of the post-digital era.

Bruns (2008), hailing transformation in the model of news production and consumption, introduced the concept of produsage, in which the user also has become a producer. Such user practices are the norm in an era of liquid news (Karlsson, 2012). Connected to the mixing of content and social roles is the trajectory for the development of the material supports through which news currently is accessed through devices such as smartphones and voice assistants, not only in relation to their popular adoption, but also in terms of their falling short of expectations. These include the cases of Google Glass or the plateauing of tablets, commercially driven upgrade culture, linked to status consumption (Eastman and Goldsmith, 1999), engineered obsolescence (Lomas, 2018) and the implications for software's transience for the Internet of Things (Berg Olsen and Selinger, 2016). More speculatively, media sustainability can be linked to issues of personal customization, the sharing of tools, and the downward movement of technology knowledge, engagement and production through education around, for example, coding and robotics (Fortunati et al., 2014; Kucuk and Sisman, 2017; Lomas, 2017). It is against this background of foment that we focus on the newspaper, perceived as the weakest link of the network of personal media in terms of sustainability, an analogue medium positioned in a moment of digital disruption.

3. Social sustainability and print newspapers

The reasons for which newspapers are consigned to sustainability's weakest media category may be outlined as follows: 1) They are based on an old model of communication, top-down and one to many, while online platforms have been touted as democratic. This means that newspapers' structure, with its associated practices and

culture, evolved and embedded in print, is at stake in the discussion on the sustainability of the medium. 2) They continue to struggle in market terms, shedding readers and losing advertising revenue, while in a variety of countries they continue to depend on public subvention based on the need to defend communication plurality. 3) The standard of journalism is considered to be in decline. The narrative that depicts print newspapers as the weakest link of the media network actually reflects a wider crisis of journalism. Questions as to the viability of digital news and the effects, in some ways deleterious, of social media and new media platforms arise inevitably. Most acutely, it is argued in the current wave of concern surrounding fake news and echo chambers that the quality of public deliberation has suffered alarmingly.

The conclusion of this compelling narrative is that newspapers, long seen as vulnerable to substitution by other media forms, especially electronic media, are obsolete. The trope of the unsustainable newspaper has often served as a lens through which the crisis in journalism has been framed, and with a perhaps not fully intentional reference to wider sustainability in the dubbing of the print edition as a 'dead tree' format (Ellman, 2015) and the celebration of print's failure (Rosenbaum, 2008). This Anglophone-originated discourse is set within a vision of transformation via the acceleration of digital platforms, eliding the innovation and adaptation implemented by newspapers. Similarly underplayed have been the material properties that make it unlikely that newspapers can be unproblematically substituted or subsumed in newer media formats by dint of expanding digital affordances. In the following section, we address the elements of this narrative as they relate to sustainability.

3.1. Is the model of communication of print newspapers socially sustainable?

In this section, we will pick up the first and the third point, while the second will be developed in the next section. As to the first point – the claimed unsustainability of print newspapers – let us premise that the quality print model is based on a hierarchical organization with clearly distinct roles both inside the newsroom and in its external presentation (i.e., in the relation to audiences). It works within a system based on professional work and assumption of responsibility (journalists are identified by what they write) and it strives to inform about some important dimensions of the everyday life (economy, politics, etc.). But in the last decades it has been challenged by the online, which presents another model of communication based on a many-to-many structure. The digital model is managed by a network system, and thus it is not hierarchical but, basically, peer-to-peer (Bauwens, 2005; Benkler, 2006; Kostakis and Bauwens, 2014). It is characterized by several features: variable roles (whereby users are also prod-users and vice versa, with the blurring of the boundaries between news producers and readerships); an amateur approach to news, which does not allow for either competent elaboration or checking for standards; and, frequently, anonymity. Conventional criticism of mainstream, professional media, often focusing by default on newspapers, has extended recently to the field of environmental communication, typically with the Internet seen as providing alternative spaces, (Maeseele and Raeijmaekers, 2017). Active consideration of newspapers' potential positive role (e.g., Matthews, 2017) in this context is a rarity.

We will develop our discourse by contrasting these two models of communication to show that, contrarily to the "death" narrative on print newspapers we mentioned above, the first model is sustainable. We argue that the online model, rather than presenting an improvement and a superseding of print, has introduced mixed effects

but, ultimately, a worsening of news quality, while print continues to offer functions that make it useful and necessary.

If we look at the material practices of print news, it emerges that the format still has much to offer to readers such as having more capacity to catalyze multisensorial and co-present social events (such as reading together and sharing the newspaper) than online news (Fortunati et al., 2015). For its part, the online model is perceived as more democratic and convenient, not least when delivered into a smartphone. In the rhetoric of digital reform, it appears to escape the logic of news commodification and control, since it comprises individual voluntary work, political engagement and bottom-up creativity. However, Jürgen Habermas, the theorist perhaps most cited in scholarly discussion of the potential of the Internet in sustaining public deliberation, has been pessimistic on this score. In a rare email interview, in which he directly references the democratic function of the press, Habermas says: '… the web itself does not produce any public spheres. Its structure is not suited to focusing the attention of a dispersed public of citizens who form opinions simultaneously.' The press had been the backbone of democratic discourse, he says. But now, amidst intimidating social complexity, and with failing political education, 'no one has come up with a model to ensure the survival of the important national newspapers on the Internet' (Habermas, quoted in Jeffries, 2010). Such sentiment is of a piece with conventional thinking on the role of the traditional press (Christians et al., 2009). Even when the news media has been seen as an instrument of undemocratic influence favoring elites, (Herman and Chomsky, 2002; Curran and Seaton, 2003; Freedman, 2014), it has become clear that digitization, far from redressing such ills, exacerbates them, or even replaces them with more damaging structural changes to the public sphere, such as the increase of conformism to polarized opinions (Sunstein, 2001).

Thus, albeit imperfect, top-down, professional model of print newspapers has deteriorated further with the rise of the Internet, while the latter, rather than improving and reforming journalism, has reproduced, amplified and added to its negative features. So far, newspapers have been unable effectively to adapt their hierarchical model to include readers' voices, and the idea that journalism should embody the freshness of users' input appears more aspiration than reality. Instead, in the rush for audience share, the accumulated news sense of the professional reporter or editor is deemed in need of algorithmic augmentation implemented by digital mavens who want to 'connect with readers. Such thinking is endorsed by the claims of news now becoming a conversation that includes 'the people formerly known as the audience' (Marchionni, 2013) But empirical analysis reveals the tension between such rhetoric and the evolution of journalism culture (Netzer et al., 2014; Xiong and Zhang, 2018). Recent political upheavals and the hysteria around fake news as well as the politically driven dismissal of 'mainstream media', tend toward a pro-Habermas conclusion that the Internet is not delivering a public sphere that can support rational-critical debate.

Though certainly with important exceptions, the digital media system displays weaker resistance to the powerful forces of online information chaos, which arguably are more corrosive of the public sphere than the lies of fake news and the alternative realities of the new political order. Social media in particular has provided not only a forum for reasoned debate and activism, but also a platform for fake news, astroturfing, racist and sexist bullying and hate speech (Mihailidis and Viotty, 2017). Closer to the functions of journalism and the press, such developments have raised questions over the activities of profit-seeking digital behemoths who, using a cover of technical neutrality, have disavowed editorial responsibility in filtering extreme content. The

confusion and uncertainty inherent in this landscape is evident in Facebook's abrupt announcement that it is to demote news in its users' feeds, in favor of personal communication (Benton, 2018).

More generally, an outcome of digital media's effect on public debate has been the shift to the right of US news media, even as it was already in thrall to a neoliberal agenda. The change has been influenced by the popular appeal and reach of the ideologically driven alt-right movement, symbolized by the Internet creation that is Breitbart, guided in its ultra-partisan journalism by Steve Bannon before his appointment as strategic adviser to US President Donald Trump (Benkler et al., 2017). This is not to say that the Internet is solely responsible for a radical political phenomenon. Rather, it accelerates an already-in-train narrowing of the spectrum of political debate (Jones, 2014; Brandenburg, 2005) while newsrooms and professional journalism weaken in the face of profit driven cuts. Less immediately related to political tensions, the hyper-commercialized online battle for attention and, with it, advertising revenue (Wu, 2016) increases the volatility of news.

Where, formerly, news had been anchored in material practices and discipline of typically slower, more deliberative analogue media, now it evidently has become more susceptible not only to the histrionics solutions of the right (Nagle, 2017), but also to the rise of public relations and information subsidy, on top of the dangers of clickbait and the accelerated news cycle. Perhaps less visibly, news has become perniciously tilted toward elite policy formation through the plausible contributions of the phenomenon of agenda driven, opaquely funded think tanks (Arshed, 2017) who have become authoritative primary definers in social media (Anstead and Chadwick, 2017).

The coexistence and competition between print and online models have not only produced negative outcomes. The Internet has fostered a culture of disclosure via Wikileaks and engendered something of a renaissance in investigative journalism exemplified by the International Consortium of Investigative Journalists, with high-profile success in their reporting of Luxleaks (Ryle, 2014) and the World Bank's policies (Pitt and Green-Barber, 2017) and with invaluable new entrants adding investigative, reporting and analytical heft such as The Intercept and ProPublica. But such successes do not characterize the wider media system, particularly as it relates to more regional concerns, and showcase spectaculars alone do not make for a healthy news ecology.

As to the third issue – the decline of journalism standards – an important but often overlooked dynamic in readership trends in western democracies is the perceived reduction in the quality and relevance of content, not necessarily associated with digitization. A decline in writing quality may be observed among younger generations generally, but the phenomenon is particularly discernible for journalists, who had been cast in the role as defenders of common communication standards. This is not only a matter of cultural change or a re-emphasis of priorities as part of a shift to screen: it also comes as news organizations embrace notions of disruption (Creech and Nadler, 2017) and journalism educators join the bandwagon of New Literacies (Doherty, 2012; Long, 2015). Parallel to such processes has been the rise of journalism by analytics, in which the asserted wisdom of the crowd, interpreted through metrics, with traffic figures, social media referrals and 'most viewed' league tables have created a feedback loop that may favor the immediate and the sensational over the substantial (Tandoc and Thomas, 2015).

We have shown that, although the comparison between the print and Internet news models points to a downward game, the print model of communication still has reasons to exist. If, on balance, digital communication adds to rather than repairs

damage to the public sphere, then the decline of print newspapers would add an alarming dimension, since the bulwark against public ignorance, propaganda, disinformation and public relations spin continues to be, as in the past, journalism's professional attitude of skepticism and active filtering of bullshit (Frankfurt, 1986; Miller and Dinan, 2000). Such a view is convincingly expressed in Paul Starr's discussion of the projected demise of local US newspapers (2011) and is reinforced with reports of closures of print titles or of shifts to digital-only format.

Nor are newspapers uniquely challenged. It emerges clearly that both the print and online models of communication are nowadays much more intertwined than in the past and thus their combined evolution challenges them reciprocally. The point is that beyond substitution of old by new, each medium must reshape its role in respect to a more complex and varied medial landscape, since people rely in everyday life on a network of various media that is both analogue and digital. Digital news has obliged classic media to share their audiences as part of a blended or hybrid mix, but, likewise, new media such as online newspapers, news sites and blogs must share their audience with the most recent new media (namely social media). It is in this context that the sustainability of the communication model of newspaper reading should be assessed.

Furthermore, the network of analogue and digital technologies that now typifies everyday media consumption shows stratification according to age and gender, but on the other hand, usage that is dynamic and subject to change. In Italy, for example, young people's interest in news across both analogue and digital media is increasing (CENSIS and U.C.S.I., 2016). A US assessment of print and online readership patterns shows that print remains much more relevant, across all age groups, than the familiar story of decline might suggest (Chyi and Tenenboim, 2017). And, contradicting the widespread notion that the young do not read print news, emerging research based on more nuanced measurement of attention, or time spent reading, shows strong preference for print among younger UK readers (Thurman, 2014; Thurman and Fletcher, 2017). Thus, also considering the new alignment of audiences the print newspaper model of communication reveals to be necessary and useful in terms of its sustainability.

3.2. Is the newspaper economic model sustainable?

In this section, we focus on the second issue set out above – the struggle in market terms by print newspapers – to understand if they are economically sustainable. The analysis will try to contrast the two economic models. The print model has specific characteristics if compared to online platforms: it is organized and works following an industrial logic; it is professionally produced, as against users' production of news online, and it implicates a planned, regular distribution of news; it is costly for print readers when compared to the readily available flow of 'free' news online; its bundled content makes it more difficult to target advertising. Finally, it is often subsidized by the state in an attempt to defend the plurality of political voices. The online model converges professional with amateurs' work, with all the positive and negative consequences such collaboration may entail. From a consumer perspective, it mixes news for free with various forms of charges, such as paywalls, subscriptions and micropayments, and it relies on a viral diffusion of news, including passing through search engines. But behind this seemingly frictionless online model, there are two elements to consider. The first is that online news content has long been subsidized by newspaper publishers, which continue to struggle to establish business models even as they trumpet their digital-first identities. It remains the case that the bulk of news read

online originates with print newspapers, while the prime, original journalism has been found to come largely from a print newsroom (Wheatley and O'Sullivan, 2017). This pattern persists even when, in much journalism studies discourse, publishers still are chastised for repurposing print content, or 'shovelware' for their online offerings, forgoing the opportunities afforded by the digital.

The second element derives from the revenue side, with, as outlined above, print and online in an embrace of mutual decline. Rather than constructing a complementary response to digital developments, publishers' divided stake on print and online has resulted in gain for neither. As print revenues decline and news outlets pursue audiences based primarily on advertising, digital revenues remain tiny in comparison to the print income they were meant to substitute (Ross, 2016). Amid the rounds of innovation, it has been the tech monopolies, most especially Facebook and Google, who have reaped the rewards, capturing the news system by putting themselves between news producers and media audiences (Bell et al., 2017; Nechushtai, 2017).

These two elements reveal the frailty and vulnerability of a media system that is increasingly intertwined. The production and circulation of news online for free have been used in the neoliberal order against professional journalism with the purpose of devalorising it. Thus, the economic difficulties of news are not those of a Fordist industry's encounter with digital innovation but are rooted in the contours of late capitalism and its monopolistic tendencies, in which news work is more commodified and separated from its public role (Fenton, 2011; Cawley, 2017). These changes in the status of newspapers and the proletarianization of news producers, driven by 'hard' commercial realities, are rooted in the transformations and technology-led disruptions of recent decades. They are compromising one strategic feature of the print economic model: its professional journalism, which risks becoming yet more passive, more engaged in press release-fed churnalism, and less willing to offend established interests. Media owners, as well as being subjected to the forces of creative destruction, have been complicit in them. Even as publishers pursue a macho, performative contest of technical can-do, they have engaged with less fanfare in newsroom cutbacks and rationalizations that undercut the basis of journalism (Robinson, 2011; Siegelbaum and Thomas, 2016), as we will see better later. Along with the now normal precarity for many news workers (Deuze, 2008; Vobič and Milojević, 2014), and increases in workloads, newsrooms' material support for output standards have been undermined, especially at editing stages which have been hollowed out in the rush to the digital (Vultee, 2015).

The most common strategy pursued by media groups to counter the loss of readers has been rationalization and cost cutting. The size of print newspapers has not been reduced to favor readership; rather they have thinned in the interests of publishers. Allied to this has been the strategy of disinvesting from their human resources, in a short-term crisis response that ultimately undermines the longer-term underpinning, in people's skills and cultures, of such enterprises.

As argued by O'Sullivan et al. (2017), the simple story of the market economics-driven, universal decline of newspapers is complicated by the relative health, in readership terms, in contexts outside Anglophone news cultures, in Europe and Asia; by the overwhelming dominance of print editions' revenues compared with the most modest contributions of digital initiatives; and by the flexibility that 'static' paper has shown in bridging with digital networked technologies. Even within markets where newspapers have seen circulation and advertising drops, the situation is not so straightforward, as illustrated by Marc Edge's analysis of the business performance of

British news publishers, many of which, after some decades of prosperity, continue to show often double-digit returns (2017).

Accounts of newspapers' struggle for survival in the US and UK often have excluded subvention of journalism as a public good while in continental Europe print newspapers continue to receive support in this role (Picard, 2004, 2011). However, there is a danger that investment in the sector, along with legal and regulatory protection, is regarded as the duty of the state, so that such spending substitutes private initiative on the part of media owners. An interesting shift toward recognition of the public role of quality print journalism is the raising of the agenda of public subsidy for newspapers in Ireland (Collins, 2016). Although still vague in outline, this new thinking, prompted by the current panic around fake news, is significant, since such support potentially would alter Irish journalism's association with the Anglo-Saxon model of cut-throat competition between news outlets (Hallin and Mancini, 2004). Nevertheless, however desirable public subvention of newspapers might seem, the print model will be sustainable only if with radical changes to business strategies that incorporate competing with and learning lessons from digital.

In conclusion, neither print nor online news presents an economic model that displays the fundamentals of long-term commercial sustainability. So far, media organizations have only implemented short-term strategies. Competition has led to a less than zero sum game in which the online model has been used against print and results of which have been the proletarization of the journalism and the deteriorization of the news quality. Only when media groups can dramatically improve their economic model, incorporating the positives brought by the Internet and radically change their strategic vision, can the print newspaper model be fully sustainable.

3.3. Newspapers' role in environmental communication

The notion of sustainability connects the question of newspapers' prospects with news media's role in disseminating (or distorting) information and supporting debate on environmental concerns (Brainard, 2015), within discourses around the public understanding of science and specialist journalism. An example: in a brief article in The Irish Times, environmental columnist Michael Viney (2017) describes how plants, especially in temperate zones, have been found via satellite observation to be bearing more leaves and flowers due to increased levels of atmospheric carbon. He relates how the study that produced these findings (Zhu et al., 2016), has been used by climate change deniers to minimize the perceived effects of carbon emissions. But he explains that the study also states that plants acclimate to increased carbon-dioxide, so that the effect diminishes in time, and he reminds readers of the calamitous results of the Anthropocene, such as melting glaciers, rising seas, droughts, storms and other weather extremes. This is the sort of discussion that needs to be communicated to publics using both authority and skill in engagement. Viney's highly crafted, weekly column, set on his 'acre' of remote rural property in the West of Ireland, and based on characterful observation informed by science, is of a sort less likely to appear spontaneously and to be maintained over a prolonged period in a blog or on social media. Rather, it is the designed product, not solely of the author's imagination and initiative, but of a commissioning editor working within an institutional framework that seeks to balance its offerings for general consumption and not aimed at specialists or committed climate activists. That framework, the newspaper, also provides more routine reporting on environmental issues as part of its 'bundle', albeit one that also includes much official and pro-growth, business-friendly material and whose journalism

is open to question in many other ways. It is this structure, with its associated processes and culture, evolved and embedded in print, but cut adrift in digital fragmentation, that is at stake in the discussion of the sustainability of the newspaper. Nor can such coverage be reduced to a fluid abstraction of content that persists independent of medium, as has been imagined by proponents of 'platform-neutral' news. Sustainability may be a less emotively polarized category label than climate change, but it is nevertheless the site of contestation over its meaning and purpose, with a strong thread of corporate PR and 'greenwashing', often in areas of complex scientific debate. The concept has connections to corporate legitimation strategies for development proposals (e.g., see Goes and Skorstad, 2017, re Norwegian mining), with specialized, professionalized and often jargon-filled inputs that are challenging to communicate clearly to 'ordinary' citizens and that require careful analysis, interpretation and translation for wider debate. With weak or late regulation (and lax official stances), such a field is open to exploitation and gaming for corporate ends. In a convincing account, Laufer (2010) invokes descriptions of shallow compliance strategies and specious gloss in response to regulatory regimes. He observes, 'The very firms that wash their reputations through public relations, complex front coalitions, sponsored "think tanks," and who publicly lead the fight against global warming, nuclear waste, and water pollution, remain some of the worst corporate offenders' (p. 257). More recently, the diesel emissions scandal revealed the scale of the evasions of Volkswagen's regulation in the US, through deceptive manipulation, in spite or even because of a declared culture of corporate social responsibility (Siano et al., 2017). It is here that the interpretive and monitorial roles of newspapers, as primary actors in the news sphere, producing most of the reporting and reaching mass audiences, in contrast to niche websites or social media spaces, come into play (Neilsen, 2016).

The persistent, organized and sustained initiative needed for citizens to cope with such strategies and to be informed on environmental issues is unlikely to be fostered in a meaningful way, accessible to mass audiences, in the digital commons, other than with the participation of 'legacy' media institutions. In particular, this is most likely to come through the deeper and long-form treatments that routinely characterize high quality print news outlet.

Newspapers typically have been framed negatively in terms of their dominant power, with newer media platforms presented as offering solutions to the democratic shortcomings of media incumbents. Coleman and Ross (2010) trace the evolution of ideas of audience empowerment and media citizenship, predating the Internet, appearing in the early rhetoric around broadcasting and including experiments in teledemocracy using technologies such as the telephone, radio and two-way cable TV. Overlapping with this stream is the somewhat hopeful holding up of alternative, citizen or community media as an answer to mainstream media shortcomings, including with respect to climate change. Such discourses fit with wider theories of climate communication in which journalism's shortcomings in communicating risk are exposed. Their sometimes-sweeping categorization is evidenced, however, in Robert Cox's account. In his discussion of media effects, it is reported that heavy media exposure can be associated with lower concern for the environment (2010, p. 178). But one of the foundational empirical studies cited in support of this assertion reported that newspaper use, along with education, was associated with increased effects on environmental knowledge and behavior, in contrast to television (Ostman and Parker, 1987). More recently, a Singaporean study found consumption of both newspaper and

television media to be associated with a closing of the environment knowledge gap (Yang and Ho, 2017).

Format matters also in the blend of analogue and digital media that now makes up news consumption. Within the rapid adoption of mobile media, newspapers have retained a central role, with traditional journalism remaining important in the emerging information repertoire (Wolf & Schnauber, 2014; Mukerjee et al., 2017), even as mobile is characterized by a more superficial 'snacking' model of consumption (Molyneux, 2017). Moreover, in spite of the hopes for horizontal communication outlined above, the limitations of social media in wider public deliberation are by now widely recognized (Karlsen et al., 2017; Narayanan et al., 2018), while Facebook's recent confusion in its role as a global behemoth in news has added an alarming spectacle (e.g., see Thompson and Vogelstein, 2018). Recognition of this weakness extends not least to the role of social media in risk communication (Priest, 2017). Parallel to various technically based, crowd-sourced solutions to such problems, efforts to repair corporate cutting of specialist newspaper journalists (Weiss, 2018), however worthwhile in their specific function, serve to bring into relief the vital role of conventional newspaper reporting as a 'keystone' of journalism based on a 'deep reservoir of stability' (Ryfe, 2017, p. 461).

3.4. Print's resurgent role in the sustainability information and debate

It is in the context of so-called legacy news and its place in a post-digital media system that the problem of sustainability of informed public debate has come to reside. For all of its recognized shortcomings, and, conversely, for all of the myriad instances of important online initiatives, the journalism, more relevant to the task of dealing with informationally challenging issues in society and the natural world, is most consistently and reliably supported by the newspaper. Where print news generally provides deeper journalism than online (Reich, 2016), and is read more deeply (e.g., Young, 2014; Sillessen et al., 2015), its distinct nature has become of strategic relevance to news about and discussion of sustainability. Its value has become the focus of attention in responses to fake news (Newman and Fletcher, 2017) with a reassessment of trust in newspapers relative to other platforms, including by younger readers (Kantar, 2017). In short, beyond technology-focused expectations, print carries a weight of historical esteem, and a set of professional practices and norms that give it a privileged position in the emerging hybrid media ecology. This value holds good even as it extends its content into the digital, via online editions, and enhanced by multimedia, interactivity, participatory features, and social media connections, but it is founded in print.

Compelling journalism success stories that are played out on the transnational or US national planes tend to dominate much discussion of online news, even on sustainability. High-profile outlets, such as The New York Times and The Guardian, whose institutional social capital, or in commercial terms, branding, derives substantially from print, rightly or wrongly have adopted digital global strategies. But closer to the realities of communities, at the level where environmental issues impact on the lifeworld, news in print also has been building a role in local coverage, even where it has been fashionable to proclaim the power of the digital at the level of the 'hyper-local' (Hess and Waller, 2016). In their account of climate coverage, Hackett et al. (2017) are gloomy, for reasons that we already have touched on above, regarding the potential of online news, even more subjected to the disciplines of the market and the pursuit of mass audiences. While they see grounds for optimism in non-profits such as The Guardian, (although its highprofile digital strategy has cost it dearly) they cite US examples of effective local print reporting, by the Palm Springs daily The Desert Sun

or British Columbia's Burnaby Now. Similar journalism was recognized in 2017 by the award of a Pulitzer Prize to Iowa's Storm Lake Times for its success in exposing agricultural pollution (Warren, 2017). The UK has seen a flowering of hyperlocal titles (Ponsford, 2013), while in Ireland a serious, pro-environmental new entrant, the Dublin Inquirer, boasts a print edition. Thus, a counterweight to corporatized news is emerging, albeit on the periphery, through print, while it is open to discussion as to whether such journalism can also influence the dynamics of commercialized journalism. These early developments resonate with the 'peripheral visions' that are seen as adding a qualifying dimension to views of a global media system as dominated by western perspectives or, on the other hand, giving hope for a new global public sphere (Cottle, 2009, p. 32).

4. Discussion and final remarks

It is clear that, in spite of predictions to the contrary, print newspapers have the potential to be sustainable in mature industrialized societies, and to make a critical contribution to communication on urgent environmental concerns. Ultimately, they are at the agenda-setting core of the news chain, which expands across television, radio, online and into social media, with a platform specific capacity, difficult to replicate, for coping with the complexity of social, political and environmental change. We have outlined above the danger posed to the news system by the domination of social media platform, and the arbitrary power of these information monopolies. There remain two unknowns in the debate on the sustainability of newspapers: to what extent will readers support this format, and to what extent will media groups believe in their project and will invest in journalism. These two questions are connected with the following challenges: can newspapers develop a new model of communication that includes readers and takes on demand for a more democratic news system? And can professional journalism maintain a quality of coverage that justifies the financial support of both individual reader and the state? Although this discussion has focused on the inherent worth of the newspaper, set against the disappointments and dangers arising from online news, it is not proposed that newspapers do not need to adapt and change. Rather, they should be conceived of as part of the blended media system, and as such should strive not to survive unchanged but to work to deploy new affordances to facilitate more audience engagement and more transparency (O'Sullivan et al., 2017). As we have outlined, there are strong reasons for actors interested in the communication of environmental concerns to recognize their stake in the newspaper as a pillar of public debate. There are now signals that these challenges can be overcome, but there also is a need to investigate the sustainability of print news more deeply and more empirically. Research to establish that newspapers can achieve sustainability in terms of aiding social coherence, participation and responsibility needs to be implemented in future studies. Beyond that, whether the use of newspapers can be a relevant factor in achieving sustainable social change also needs to be verified by new research.

References

Anstead, N., Chadwick, A., 2017. A primary definer online: the construction and propagation of a think tank's authority on social media. Media, Cult. Soc. http://dx.doi.org/10.1177/0163443717707341.

Arshed, N., 2017. The origins of policy ideas: the importance of think tanks in the enterprise policy process in the UK. J. Bus. Res. 71, 74–83. Astarea, 2016. Europa allo Specchio. Come si sentono gli Europei?
Bauwens, M., 2005. The political economy of peer production. CTheory J (accessed 1.12.2018).
Bell, E., Owen, T., Brown, P., Hauka, C., Rashidian, N., 2017. The Platform Press: How Silicon Valley re-engineered Journalism. New York.
Benkler, Y., 2006. The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press, New Haven, CT.
Benkler, Y., Faris, R., Roberts, H., Zuckerman, E., 2017. Study: Breitbart-led right-wing media ecosystem altered broader media agenda [WWW Document]. Columbia J. Rev. URL < https://www.cjr.org/analysis/breitbart-media-trump-harvard-study.php > (accessed 6.2.17)
Benton, J., 2018. If Facebook stops putting news in front of readers, will readers bother to go looking for it? » Nieman Journalism Lab [WWW Document]. NiemanLab.URL < http://www.niemanlab.org/2018/01/if-facebook-stops-putting-news-in-front-of-readers-will-readers-bother-to-go-looking-for-it > (accessed 1.12.18).
Berg Olsen, J.-K., Selinger, E., 2016. The internet of heirlooms and disposable things. North Carolina J. Law Technol. 17, 183–200.
Bolter, J.D., Grusin, R., 1999. Remediation: Understanding New Media. MIT Press, Cambridge, Mass, London.
Braidotti, R., 1994. Women, the Environment and Sustainable Development: Towards a Theoretical Synthesis. Zed Books, London.
Brainard, C., 2015. The changing ecology of news and news organizations: implications for environmental news. In: Hansen, A., Cox, R. (Eds.), Routledge Handbook of Environment and Communication. Oxon, pp. 168–175.
Brandenburg, H., 2005. Political bias in the Irish media: a quantitative study of campaign coverage during the 2002 general election. Irish Polit. Stud. 20, 297–322.
Bruns, A., 2008. Blogs, Wikipedia, second life, and beyond: from production to produsage. Digital Formations. Peter Lang, New York.
Cawley, A., 2017. Johnston Press and the crisis in Ireland's local newspaper industry, 2005–2014. Journalism 18, 1163–1183.
CENSIS, UCSI, 2016. Tredicesimo Rapporto Censis-Ucsi sulla comunicazione. I media digitali tra élite e popolo. Milano.
Christians, C.G., Glasser, T.L., McQuail, D., Nordenstreng, K., White, R.A., 2009. Normative theories of the media: journalism in democratic societies. History of Communication. University of Illinois Press, Urbana.
Chyi, H.I., Tenenboim, O., 2017. Reality Check: multiplatform newspaper readership in the United States, 2007–2015. J. Pract. 11, 798–819.
Coleman, S., Ross, K., 2010. The media and the public: "Them" and "Us" in media discourse. Communication in the Public Interest. Wiley, Chichester.
Collins, S., 2016. Minister raises prospect of State funding for print media [WWW Document]. The Irish Times. URL < https://www.irishtimes.com/news/politics/minister-raises-prospect-of-state-funding-for-print-media-1.2829055 >(accessed 1.13.18).

Comitato per il Capitale Naturale, 2017. Primo Rapporto sullo Stato del Capitale Naturale in Italia.
Conboy, M., 2013. Journalism Studies. Routledge, London.
Cottle, S., 2009. Global Crisis Reporting: Journalism in the Global Age. Open University Press, Maidenhead.
Cox, R., 2010. Environmental Communication and the Public Sphere, 2nd ed. Sage, Thousand Oaks, CA.
Creech, B., Nadler, A.M., 2017. Post-industrial fog: Reconsidering innovation in visions of journalism's future. Journalism 146488491668957. http://dx.doi.org/10.1177/1464884916689573.
Curran, J., Seaton, J., 2003. Power without Responsibility: The Press, Broadcasting, and New Media in Britain. Routledge, London.
Deleuze, G., Guattari, F., 1994. What is Philosophy? European Perspectives. Verso, London.
Derrida, J., 1978. Structure, sign, and play in the discourse of the human sciences. Writing and Difference. Chicago University Press, Chicago.
Deuze, M., 2006. Participation, remediation, bricolage: considering principal components of a digital culture. Inf. Soc. 22, 63–76.
Deuze, M., 2008. The professional identity of journalists in the context of convergence culture. Obs 2, 103–117. http://dx.doi.org/10.15847/obsobs242008216.
Doherty, S., 2012. Will the geeks inherit the newsroom? Reflections on why journalists should learn computer science. Int. J. Technol. Knowl. Soc. 8, 111–121.
Eastman, J.K., Goldsmith, R.E., 1999. Status consumption in consumer behavior: scale development and validation. J. Mark. Theory Pract. 7, 41–52.
Edge, M., 2017. Are UK newspapers really dying? A financial analysis of newspaper publishing companies, in: European Media Management Association Conference. Ghent.
Ellman, B., 2015. Dead-Tree Media Is Useful Again Now That You Can Compost in Newspaper Boxes [WWW Document]. New York Mag. URL < http://nymag.com/daily/intelligencer/2015/11/paper-box-compost-bins.html (accessed 1.4.18).
Flash EuroBarometer 256, 2008. Europeans' attitudes towards the issue of sustainable consumption and production.
Fenton, N., 2011. Deregulation or democracy? New media, news, neoliberalism and the public interest. Continuum (N.Y) 25, 63–72.
Fortunati, L., O'Sullivan, J., Raycheva, L., Harro-Loit, H., 2010. Interactivity as a metaphor of online news. Javnost 17, 43–61.
Fortunati, L., Esposito, A., Ferrin, G., Viel, M., 2014. Approaching Social Robots Through Playfulness and Doing-It-Yourself: Childrenin Action. Cognit. Comput. 6, 789–801. http://dx.doi.org/10.1007/s12559-014-9303-y.
Fortunati, L., Taipale, S., Farinosi, M., 2015. Print and online newspapers as material artefacts. Journalism 16, 830–846.
Frankfurt, H., 1986. On bullshit. Raritan Q. Rev. 6. http://dx.doi.org/10.1080/10584600701641920.
Freedman, D., 2014. The contradictions of media power. Bloomsbury Academic, New York.
Goes, S., Skorstad, B., 2017. Legitimizing business? environmental awareness in the norwegian mining industry. In: Dale, B., Bay-Larsen, I., Skorstad, B. (Eds.),

The Will to Drill - Mining in Arctic Communites. Springer International Publishing, Cham, pp. 61–80.
Hackett, R.A., Forde, S., Gunster, S., Foxwell-Norton, K., 2017. Journalism and climate crisis: public engagement. Media Alternatives. Routledge, Oxon.
Hallin, D.C., Mancini, P., 2004. Comparing Media Systems: Three Models of Media and Politics (Communication, Society and Politics). Cambridge University Press, Cambridge.
Herman, E.S., Chomsky, N., 2002. Manufacturing Consent: The Political Economy of the Mass Media. Pantheon Books, New York. Hess, K., Waller, L., 2016. Hip to be Hyper. Digit. J. 4, 193–210.
Omega Institute, 2014. Print or Digital: It All Has Environmental Impact | Omega [WWW Document]. URL < https://www.eomega.org/article/print-or-digital-it-allhas-environmental-impact > (accessed 6.1.17).
O'Sullivan, J., Heinonen, A., 2008. Old Values, New Media. Journal. Pract. 2, 357–371.
O'Sullivan, J., Fortunati, L., Taipale, S., Barnhurst, K., 2017. Innovators and innovated: Newspapers and the postdigital future beyond the 'death of print'. Inf. Soc. 33, 86–95.
Jeffries, S., 2010. A rare interview with Jürgen Habermas [WWW Document]. Financ. Times. URL < http://www.zunehmender-grenznutzen.de/wp-content/uploads/2010/05/Habermas_Greece_Financial_Crisis.pdf > (accessed 6.24.01).
Jones, O., 2014. The Establishment: And How They Get Awa with It. Penguin, UK London. Kantar, 2017. Trust in News. London.
Karlsen, R., Steen-Johnsen, K., Wollebæk, D., Enjolras, B., 2017. Echo chamber and trench warfare dynamics in online debates. Eur. J. Commun. 32, 257–273.
Karlsson, M., 2012. Charting the liquidity of online news Moving towards a method for content analysis of online news. Int. Commun. Gaz. 74, 385–402.
Kostakis, V., Bauwens, M., 2014. Network Society and Future Scenarios for a Collaborative Economy. Palgrave Macmillan, Basingstoke, UK.
Kucuk, S., Sisman, B., 2017. Behavioral patterns of elementary students and teachers in one-to-one robotics instruction. Comput. Educ. 111, 31–43.
Latouche, S., 2004. Survivre au dévelopement : De la décolonisation de l'imaginaire économique à la construction d' une société alternative. Mille et Une Nuits, Paris.
Latouche, S., 2007. Petit traité de la décroissance sereine. Mille et Une Nuits, Paris.
Laufer, W.S., 2010. Social Accountability and Corporate Greenwashing. J. Bus. Ethics 45, 253–261.
Lévi-Strauss, C., 1966. The Savage mind [1962]. Nature of Human Society. University of Chicago Press, Chicago.
Littig, B., Griessler, E., 2005. Social sustainability: a catchword between political pragmatism and social theory. Int. J. Sustainable Dev. 8, 65.
Lomas, N., 2017. Raspberry Pi Foundation and CoderDojo to code club together [WWW Document]. TechCrunch. URL < https://techcrunch.com/2017/05/26/raspberry-pi-foundation-and-coderdojo-to-code-club-together/ > (accessed 6.1.17).
Lomas, N., 2018. France probes Apple over iPhone planned obsolescence complaint | TechCrunch [WWW Document]. TechCrunch. URL < https://techcrunch.com/2018/01/09/france-probes-apple-over-iphone-obsolescence-complaint /> (accessed 1.10.18).

Long, A., 2015. The coding challenge: an exploration of the increasing role of computing skills in journalism education. J. Assoc. J. Educ. 3, 27–36.
Ludovico, A., 2012. Post-Digital Print: The Mutation of Publishing Since 1894. Onomatopee, Eindhoven.
Maeseele, P., Raeijmaekers, D., 2017. Journalism and democracy: towards a sustainable future. In: Berglez, P., Olausson, U., Ots, M. (Eds.), What Is Sustainable Journalism? Integrating the Environmental, Social, and Economic Challenges of Journalism. Peter Lang, New York, pp. 115–134.
Marchionni, D.M., 2013. Journalism-as-a-conversation: a concept explication. Commun. Theory 23, 131–147.
Matthews, R., 2017. The socio-local newspaper: creating a sustainable future for the legacy provincial news industry. In: Berglez, P., Olausson, U., Ots, M. (Eds.), What Is Sustainable Journalism? Integrating the Environmental, Social, and Economic Challenges of Journalism. Peter Lang, New York, pp. 333–350.
Maxwell, R., Miller, T., 2012. Greening the Media. Oxford University Press, Oxford.
Mihailidis, P., Viotty, S., 2017. Spreadable spectacle in digital culture: civic expression, fake news, and the role of media literacies in 'Post-Fact' society. Am. Behav. Sci. 61, 441–454.
Miller, D., Dinan, W., 2000. The rise of the PR industry in Britain, 1979–98. Eur. J. Commun. 15, 5–35.
Molyneux, L., 2017. Mobile news consumption: a habit of snacking. Digit. J. 811, 1–17. http://dx.doi.org/10.1080/21670811.2017.1334567.
Mukerjee, S., Majo-Vazquez, S., González-Bailón, S., 2017. Networks of audience overlap in the consumption of digital news. J. Commun. http://dx.doi.org/10.2139/ssrn.3032609
Nagle, A., 2017. Kill All Normies: Online Culture wars from 4chan and Tumblr to Trump and the Alt-right. Zero Books, Alresford.
Nail, T., 2017. What is an assemblage? SubStance 46, 21–37. http://dx.doi.org/10.2307/2246769.
Narayanan, V., Barash, V., Kollanyi, B., Neudert, L.-M., Howard, P.N., 2018. Polarization, partisanship and junk news consumption over social media in the US-data memo. Computational Propaganda Research Project. Oxford University.
Nechushtai, E., 2017. Could digital platforms capture the media through infrastructure? J. Theory Pract. Crit. http://dx.doi.org/10.1177/1464884917725163
Neilsen, R.K., 2016. The Business of news. In: Witschge, T., Anderson, C.W., Domingo, D., Hermida, A. (Eds.), The Sage Handbook of Digital Journalism. Sage, Los Angeles, pp. 51–67.
Netzer, Y., Tenenboim-Weinblatt, K., Shifman, L., 2014. The construction of participation in news websites: a five-dimensional model. J. Stud. 15, 619–631.
Newman, N., Fletcher, R., 2017. Bias, bullshit and lies: Audience Perspectives on Low Trust in the Media. Oxford.
Ostman, R.E., Parker, J.L., 1987. Impact of education, age, newspapers, and television on environmental knowledge, concerns, and behaviors. J. Environ. Educ. 19, 3–9.
Picard, R., 2004. Commercialism and newspaper quality. Newsp. Res. J. 25, 54–65.
Picard, R.G., 2011. The Economics and Financing of Media Companies. Fordham University Press Series. Fordham University Press.
Pitt, F., Green-Barber, L., 2017. The Case for Media Impact. New York.S

Ponsford, D., 2013. Print is the future for local journalism says founder of new weekly newspaper [WWW Document]. Press Gaz. URL <http://www.pressgazette.co.uk/print-future-local-journalism-says-founder-new-weekly-macclesfield-today > (accessed 12.6.16).
Priest, S.H., 2017. Nanotechnology and the public: risk perception and risk communication. Perspectives in Nanotechnology. CRC Press, Boca Raton.
Reich, Z., 2016. Comparing news reporting across print, radio, television and online: still distinct manufacturing houses. J. Stud. 17, 552–572.
Robinson, S., 2011. Convergence crises: news work and news space in the digitally transforming newsroom. J. Commun. 61, 1122–1141.
Rosenbaum, R., 2008. The Good Life of a New-Media Guru [WWW Document]. Slate. URL <http://www.slate.com/articles/life/the_spectator/2008/11/the_good_life_of_a_newmedia_guru.html > (accessed 1.10.18).
Ross, T., 2016. The Year Everyone Realized Digital Media Is Doomed [WWW Document]. New Repub. URL >https://newrepublic.com/article/139288/yeareveryone-realized-digital-media-doomed > (accessed 6.9.17).
Ryfe, D., 2017. Newspapers and reporting: keystones of the journalistic field. In: Franklin, B., Eldridge, S.A. (Eds.), The Routledge Companion to Digital Journalism Studies. Routledge, London, pp. 459–468.
Ryle, G., 2014. Eden not Apocalypse: a golden future for investigative journalism. Village November, 38–41.
Schmidt, L., de Kloet, J., 2017. Bricolage: role of media. In: Rössler, P. (Ed.), The International Encyclopedia of Media Effects. Wiley, New York, pp. 1–9.
Sellen, A.J., Harper, R.H.R., 2002. The myth of a paperless office. Journal of Chemical Information and Modeling. MIT Press, Boston.
Siano, A., Vollero, A., Conte, F., Amabile, S., 2017. 'More than words': expanding the taxonomy of greenwashing after the Volkswagen scandal. J. Bus. Res. 71, 27–37. Siegelbaum, S., Thomas, R.J., 2016. Putting the work (back) into Newswork. J. Pract. 10, 387–404.
Sillessen, B.L., Ip, C., Uberti, D., 2015. Journalism and the power of emotions. Columbia J. Rev.
Starr, P., 2011. Goodbye to the age of newspapers (hello to a new era of corruption): why american politics and society are about to be changed for the worse. In: McChesney, R.W., Pickard, V.W. (Eds.), Will the Last Reporter Please Turn Out The Lights: The Collapse of Journalism and What Can Be Done to Fix It. The New Press, New York, London, pp. 3–17.
Sunstein, C.R., 2001. Republic.com. Princeton University Press, Princeton, N.J.
Taffel, S., 2012. Escaping attention: digital media hardware, materiality and ecological cost. Cult. Mach. 13, 1–28.
Tandoc Jr., E.C., Thomas, R.J., 2015. The ethics of web analytics: implications of using audience metrics in news construction. Digit. Journal. 3, 243–258.
Thompson, N., Vogelstein, F., 2018. Inside Facebook's Hellish Two Years—and Mark Zuckerberg's Struggle to Fix it All [WWW Document]. Wired. URL < https:// www.wired.com/story/inside-facebook-mark-zuckerberg-2-years-of-hell > (accessed 2.14.18).
Thurman, N., 2014. Newspaper consumption in the digital age. Digital J. 2, 156–178.
Thurman, N., Fletcher, R., 2017. Has digital distribution rejuvenated readership? J. Stud. 1–21. http://dx.doi.org/10.1080/1461670X.2017.1397532 .

van der Wurff, R., 2005. A Profile of Online and Print Newspapers in Europe. In: van der Wurff, R. (Ed.), Print and Online Newspapers in Europe: A Comparative Analysis in 16 Countries. Het Spinhuis, Amsterdam, pp. 27–51.

Viney, M., 2017. The beautiful early bloom has taken on a troubling edge [WWW Document]. The Irish Times. URL < http://www.irishtimes.com/news/environment/the-beautiful-early-bloom-has-taken-on-a-troubling-edge-1.3108348 >(accessed 6.10.17).

Vobič, I., Milojević, A., 2014. 'What we do is not actually journalism': role negotiations in online departments of two newspapers in Slovenia and Serbia. Journalism 15, 1023–1040.

Vultee, F., 2015. Audience perceptions of editing quality. Digital J. 3, 832–849.

Warren, J., 2017. Tiny, family-run newspaper wins Pulitzer Prize for taking on big business [WWW Document]. Poynter. URL < http://www.poynter.org/2017/tinyfamily-run-newspaper-wins-pulitzer-prize-for-taking-on-big-business/455465/ > (accessed 6.9.17).

Weiss, R., 2018. The Struggle to Keep Science Reporting Scientific [WWW Document]. MediaShift. URL <http://mediashift.org/2018/02/the-struggle-to-keepscience-reporting-scientific/ > (accessed 2.23.18).

Wheatley, D., O'Sullivan, J., 2017. Pressure to Publish or Saving for Print? Digit. Journal. 5, 965–985.

Wolf, C., Schnauber, A., 2014. News consumption in the mobile era. Digital J. 811, 1–18. http://dx.doi.org/10.1080/21670811.2014.942497.

Wu, T., 2016. The Attention Merchants: The Attention Merchants: From the Daily Newspaper to social media, How our Time and Attention is Harvested and Sold. Atlantic Books, London.

Xiong, H., Zhang, J., 2018. How local journalists interpret and evaluate media convergence: an empirical study of journalists from four press groups in Fujian. Int. Commun. Gaz. 80, 87–115.

Yang, X., Ho, S.S., 2017. Decreasing the knowledge gap among different socioeconomic status groups on the issue of climate change. Environ. Hazards 16, 276–290. Young, J., 2014. A study of print and computer-based reading to measure and compare rates of comprehension and retention. New Libr. World 115, 376–393.

Zelizer, B., 2004. Taking Journalism Seriously: News and the Academy. Sage, London.

Zhu, Z., Piao, S., Myneni, R.B., Huang, M., Zeng, Z., Canadell, J.G., Ciais, P., Sitch, S., Friedlingstein, P., Arneth, A., others, 2016. Greening of the Earth and its drivers. Nat. Clim. Change 6, 791–795.