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Atilla Wohllebe

University of Kaposvár, Hungary, atilla.wohllebe@gmail.com

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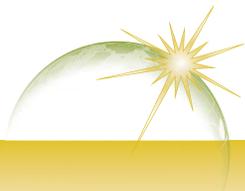
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Dialogue Marketing: Ecological Sustainability of Letter and E-Mail in Comparison in Germany

Atilla Wohllebe

Szent István University - Kaposvár Campus

atilla.wohllebe@gmail.com

ABSTRACT: With the spread of the Internet, e-mail has also steadily gained in relevance over the past years and decades. Especially in the form of newsletters, e-mail marketing is probably the most important channel of digital dialogue marketing today. This paper examines the carbon dioxide emissions of advertising e-mails in Germany on the basis of existing sources and compares them with the emissions caused by sending letters by post. Despite significantly lower CO₂ emissions per piece compared to a letter, e-mails seem to be a much greater burden on the environment due to their practically unlimited scalability in terms of cost. The author suggests that the introduction of a fee for sending or reading e-mails should be considered.

I. INTRODUCTION

Not only since the Fridays For Future movement, climate change and environmental sustainability have been receiving a lot of attention worldwide. Even the Kyoto Protocol, adopted in 1997, and the Paris Agreement, which came into force in 2016, focus on the question of how mankind can live in harmony with the environment and nature in a sustainable manner (BMU n.d., BMWi n.d.).

The 17 Sustainable Development Goals of the United Nations, which also came into force in 2016, also contain many objectives relating to climate and the environment. These include securing food supplies through sustainable agriculture, the sustainable use of water as a resource, a sustainable, reliable and at the same time affordable energy supply, sustainable

consumption and production, the protection of terrestrial ecosystems, the sustainable use of the oceans and the adoption of immediate measures to mitigate climate change (UN n.d.). Nevertheless: Of course, awareness of climate change and the need for environmental sustainability is not equally high everywhere in the world (Ogunbode et al. 2019).

At the same time, the Internet has also gained worldwide and significantly in popularity and relevance in recent decades (ITU 2019). The spread of the smartphone is likely to have acted as a catalyst in recent years in particular (Newzoo 2019). Modern communication technologies enable people from different countries to communicate with each other - for private purposes, for research purposes and in terms of commercial and entrepreneurial activities.

Indeed, even in the age of social media and messaging apps, traditional e-mail is still likely to play an important role in digital communication (DRV 2018).

In recent years, many companies have increasingly shifted their advertising budgets to the digital world and are using the Internet to place advertising for their services and products (Horizon 2016). For many companies, e-mail as an advertising tool in the form of newsletters is one of the most important means of communication (ZHAW & Swiss Post 2019). E-mail marketing can be assigned to dialogue marketing (Lammenet 2009, p. 46). Marketing measures and channels in which known contacts, often customers, are addressed individually, often in a personalized way, can be described as dialogue marketing (based on Wirtz (2005), p. 14). Examples of this are newsletters by e-mail as well as postcards or letters. In dialogue marketing, too, efforts have increasingly shifted to the digital domain in recent years.

On the consumer side, it has been shown that Internet use and environmentally friendly behavior are positively correlated (Gong et al. 2020). Although Internet penetration does not appear to have a direct influence on environmentally conscious consumer behavior, it does have an indirect one; in particular, it helps to bridge the attitude-behavior gap (Wang & Hao 2018). However, it should also be noted that with regard to developing countries projects to promote Internet access are aimed primarily at economic rather than environmental sustainability (James 2003). Indeed, at least in the context of social responsibility, successful corporate social responsibility management seems to have a positive influence on the purchasing decision of potential customers (Deng & Xu 2017). Moreover, this positive effect of corporate social responsibility appears to be of a long-term nature and is also reflected in the context of B2B transactions (Lee & Lee 2019). Furthermore with regard to the Internet in general, it appears that the quality of the environment

as perceived by consumers decreases with increasing Internet use (Zhang et al. 2019).

Against the background of these developments, the question arises as to what extent the digitalization of dialogue marketing on the part of companies, i.e. the increase in the relevance of e-mails with simultaneous relevance loss of paper-based marketing approaches, leads to an increase in ecological sustainability.

In fact, only a few scientific papers have ever dealt with the connection between digital marketing and ecological sustainability (Diez-Martin, Blanco-Gonzalez & Prado-Roman 2019). In the context of dialogue marketing, some few papers examine ethical issues, but focus primarily on aspects of privacy and data protection, while ecological sustainability is ignored (Brubaker 2007, Kaiser & Wagner 2018). In any case, marketing that is also sustainable from an environmental point of view seems to be opposed by the need for growth in a capitalist-oriented system (Schaefer 2005). It is precisely for this reason that ecological sustainability must be anchored in the processes and structures throughout the company in order to actually be taken into account (Zvezdov 2012).

In the context of this paper, “ecological sustainability” is generally understood to mean the far-sighted and considerate use of natural resources (Nowak n.d.). The concept of ecological sustainability is thus very close to the concept of environmental sustainability, which Goodland & Daly (1997) define as the scarcity of natural capital and derive from it that waste should be avoided, management must take place with renewable resources and non-renewable resources must be replaced step by step by renewable ones in the value creation process. The actual applicability of research findings on sustainability management in companies must be seen as a particular challenge (Breitbarth & Herold 2018). The focus here therefore is particularly on the CO2 footprint:

this concept attempts to measure, e.g. for products and services, how much carbon dioxide is emitted during the production or provision of the service and can be seen as a simple way of measuring ecological sustainability. It should be noted that a large part of the CO₂ emissions caused in a globalized world are of an indirect nature, i.e. they are not generated in the country where goods and commodities are consumed, but where these products are manufactured (Yunfeng & Laike 2010, Zhang et al. 2017).

This essay brings together current developments and statistics and examines the question of the extent to which the digitalization of dialogue marketing is accompanied by an increase in ecological sustainability in terms of CO₂ emissions.

II. DISCUSSION

CO₂ footprint per letter and per e-mail

For a first overview, the carbon dioxide footprint of letters or postcards and - in comparison - that of electronic alternatives, in this case e-mail in particular, is considered first. For example, the carbon dioxide footprint of a printed letter delivered by post is quantified as 20 grams of emissions (Selfmailer n.d.). Other sources put the CO₂ emissions of a letter at 26 grams, here calculated on the basis of the CO₂ balance of the Royal Mail (Hickman 2009). The main factor in the CO₂ footprint of letters is primarily transport (RENN.süd & LUBW 2019). In Germany, for example, Deutsche Post, compared to other DAX companies, is one of the smaller emitters with 6.6 million tons of CO₂ according to the Handelsblatt (2019). In comparison, the energy company RWE emits 125.4 million tons of carbon dioxide.

The footprint of letters is offset by an apparently much lower CO₂ consumption of e-mails. There are many different ways of calculating and looking at this: For example, the sending of a conventional mail

is quantified with 10 grams of emitted carbon dioxide (Selfmailer n.d.). In contrast, the software company McAfee (2009) calculates a CO₂ consumption of around 4 grams for an “average serious e-mail” and 0.3 grams for a (unopened) spam e-mail. The significantly lower carbon dioxide consumption of a spam e-mail is due to the fact that most spam e-mails are detected early on by mail servers and automatically deleted - before they are actually delivered and opened or downloaded. The CO₂ emissions of an email are significantly increased if, for example, an image is attached. The emissions are then an average of 50 grams per e-mail (Science Focus 2020) and thus even higher than those of a letter delivered by Royal Mail (Hickman 2009).

Similar surveys are also available for other forms of electronic direct communication. An SMS, for example, emits between 0.00215 grams and 0.014 grams of CO₂, depending on the measurement method, but is also limited to 140 bytes (Goncalves 2019).

In a calculation of the e-mail CO₂ footprint of an average office worker, Richards (2018) estimates that he receives 121 e-mails a day. Assuming that half of the e-mails are spam, a quarter standard e-mails and another quarter e-mails with attachments, the author calculates a carbon dioxide emission of 1.652 kilograms per day per office employee or about 0.6 tons of emitted CO₂ per year. For an improved CO₂ footprint, she emphasizes in particular the importance of not using e-mail attachments and mass-mailing (HTML-based).

OVO Energy & Berners-Lee (2019) are also looking at the CO₂ consumption of e-mails in an office context. They call for the campaign “Think Before You Thank”: Because 49 percent of Britons send daily e-mails to colleagues and friends within talking distance, which in the opinion of the authors are superfluous (e.g. “Thank you”, “Received”, “You

Table 1: CO₂ emissions of selected communication instruments at a glance (based on Selfmailer (n.d.), McAfee (2009), Gonçalves (2009))

Instrument		CO ₂ -emissions (Grams)
Letter		26
E-Mail	Standard	4
	With picture attached	50
	Spam	0.3
SMS		0.014

too”), massive carbon dioxide savings can be made here. They calculate the savings potential for Great Britain, thanks to one e-mail per person per day less, at 16,433 tons per year.

Although not all measurements of carbon dioxide emissions per communication instrument come to the same results, it can be seen that a letter, calculated per consignment, at 26 grams obviously costs considerably more CO₂ than an e-mail, at least as long as it is sent without an attachment (see Table 1)

Development of letter and e-mail dispatch volumes

In addition to considering the CO₂ emissions per shipment, the development of the volume of letters and e-mails sent is also interesting. Here it may be possible to derive trends that indicate the future relevance of letters and e-mails.

In 2019 Deutsche Post sent a total of 17.367 billion letters. With CO₂ emissions per letter of 26 grams, this is equivalent to 451,542 tons of carbon dioxide. In fact, the number of letters carried by Deutsche Post has been declining slightly for years, and was still 18.628 billion in 2016, 18.590 billion in 2017 and 17.820 billion in 2018 (Deutsche Post 2020a).

These figures are also in line with international surveys at European level on the development of the number of letters per capita: In Germany, this figure fell from 240 to 223 letters per capita between 2011 and 2017, in the

UK from 289 to 218 and in France from 238 to 159 letters per capita (Bundesnetzagentur 2019). Based on these figures, letter mail appears to be steadily losing relevance in Germany and Europe.

The relevance of postcards also seems to develop analogously: In a 2014 survey of 405 Austrian respondents, 58.5% said that they send slightly or much fewer postcards today than 10 years ago (Marketagent 2014a). In addition to the desire to make others happy or to feel pleasure in doing so, many people see sending postcards as a traditional part of their holidays (Marketagent 2014b). Although 55 percent in Germany say they send their holiday greetings by postcard or letter, messenger services such as WhatsApp or Telegram are now playing a greater role (56 percent). The channels SMS and e-mail only play a secondary or subordinate role here, with 20 and 7 percent respectively (Bitkom 2019). In this respect, the postcard also seems to be losing relevance in daily use as a print medium and has already been replaced by digital alternatives, at least with regard to holiday greetings.

In contrast to the volume of letters sent, e-mail is developing in a different direction: For years, the number of e-mails sent in Germany every year has been rising. Whereas in 2006, the figure was 151.3 billion e-mails, by 2010 it had more than doubled to 317.6 billion. In 2018, 848.1 billion e-mails (excluding spam) were sent in Germany (GMX 2019). The proportion of the population in Germany that uses the Internet to send and receive e-mails has

developed analogously: From 60 percent in 2006, the proportion rose to 86 percent in 2019, so that sending and receiving e-mails can be regarded as one of the most important functions of the Internet (Eurostat 2020). Worldwide forecasts regarding the volume of e-mails sent assume that 306.4 billion e-mails will be sent daily in 2020 - that is, around 112 trillion e-mails cumulated over the entire year (The Radicati Group 2019).

In summary, the letter plays only a secondary role compared to e-mail in terms of the volume of e-mails sent: The example of Germany shows this very clearly with 17.820 billion letters sent compared to 848.1 billion e-mails sent in 2018 - almost 48 times more e-mails were sent than letters. Based on the assumptions made by Richards (2018) and the CO₂ emissions per dispatch as shown in Table 1, this results in 463,200 tonnes of CO₂ emissions for the letters sent (see Formula 1).

$$CO_2^{Letter} = (17.820 \text{ billion letters}) \\ * (26g CO_2) = 463,320t CO_2$$

Formula 1: Calculation of CO₂ emissions for letters in Germany 2018 (based on Hickman 2009, Deutsche Post 2020)

Similarly, the e-mails sent result in 22,898,700 tonnes of CO₂ emissions (see Formula 2).

$$CO_2^{Mail} = (848.1 \text{ billion mails} * 50% * 4g CO_2) + \\ (848.1 \text{ billion mails} * 50% * 50g CO_2) = 22,898,700t CO_2$$

Formula 2: Calculation of CO₂ emissions of e-mails in Germany 2018 (based on McAfee 2009, GMX 2019, Science Focus 2020)

In an overall assessment, the sending of e-mails (excluding spam) in Germany in 2018 caused around fifty times more greenhouse gas emissions than the sending of letters.

The role of advertising by letter and e-mail

In order to be able to compare letter and e-mail in the sense of dialogue marketing, the following section discusses statistics and findings relating to the advertising use of the two communication instruments.

Of the approximately 17.3 billion letters carried by Deutsche Post in 2019, around 8.2 billion were used for dialog marketing, i.e. advertising. This means that around 47 percent of Deutsche Post's nationwide letter delivery is attributable to advertising. This share has remained more or less the same in each of the years 2016 to 2019, with the volume of 8.52 billion Dialog Marketing letters in 2016 declining to 8.197 billion in 2019, thus largely analogous to the total volume of letters sent (Deutsche Post 2020a).

Based on the 2018 dispatch volume (8.417 billion Dialog Marketing letters), the CO₂ emissions of the letters sent via Deutsche Post's Dialog Marketing will be determined below, using the already known 26g CO₂ per letter as a reference. CO₂ emissions of 218,428 tons are calculated for letters sent via Dialog Marketing (see Formula 3).

$$CO_2^{Dialog Marketing} = (8.417 \text{ billion letters}) \\ * (26g CO_2) = 218,842t CO_2$$

Formula 3: Calculation of CO₂ emissions of letters (Dialog Marketing) in Germany 2018 (based on Hickman 2009, Deutsche Post 2020a)

This is also in line with the development of sales in the "publishing of catalogues, postcards and posters" industry as surveyed and forecast by the Federal Statistical Office in and for Germany. While the industry's turnover in 2011 was still at 3.541 billion euros, it will probably only be 3.120 billion euros in 2020. In 2023, according to forecasts, sales are expected to fall to EUR 2.960 billion, thus falling below the EUR

3 billion mark for the first time in the period under review (Federal Statistical Office 2019a).

This development is contrary to the perception of many consumers: According to a survey conducted by Austrian Post, personally addressed advertising mail, but also flyers and brochures will be perceived by 92 and 91 percent of consumers, respectively. This figure is more than twice as high as that of e-mail newsletters, which are perceived by only 44 percent of those surveyed (Austrian Post 2017).

Nevertheless, based on data from Switzerland, many advertisers are shifting their dialogue marketing budgets more and more to the Internet: Between 2015 and 2017, budgets in this area grew by about one third, while investments in physical mailings and print media decreased by about one quarter each (Swiss Dialogue Marketing Association 2017).

For the e-mail channel, even after intensive research, there seem to be no reliable statistics on the share of advertising e-mails in the total e-mail sending volume.

Of the 561 users surveyed by Germany's two largest e-mail mailbox providers, web.de and GMX, 65 percent said they received newsletters several times a day (United Internet 2019). In another survey of 1,009 Internet users, 22 percent of those surveyed stated that they receive up to 5 newsletters per week. According to the survey, 20 percent of those surveyed receive up to 10 newsletters per week and 27 percent of those surveyed receive more than 20 newsletters per week (Statista 2017). These figures once again underscore the meanwhile business-critical importance of the e-mail channel - not only as a private and business communication channel, but also as an advertising medium (Christina, Karpagavalli & Suganya 2010).

Based on these figures, it is assumed in the further course of the study that every Internet user in Ger-

many who uses the Internet to send and receive e-mails receives 2 newsletters per day, which is probably a conservative estimate.

Because an e-mail newsletter often consists not only of pure text, but also contains images that are retrieved by HTML from a server at the moment the e-mail is displayed, the carbon footprint of a newsletter is shown here with the mean value of the carbon dioxide emissions of standard mail and mail with attachments: From 4g or 50g results an average value of 27g CO₂ emission per newsletter.

Assuming that in 2018 85 percent of the population in Germany will use the Internet to send and receive e-mails (Eurostat 2020) and assuming a population of 83.019 million (Federal Statistical Office 2019b), the CO₂ footprint of newsletters and e-mail marketing in 2018 can be put at 1,390,859 tonnes (cf. Formula 4)

$$CO_2^{Newsletter} = (83.019 \text{ mio. citizens} * 85\% \text{ mail users}) \\ * \left(2 \frac{\text{newsletter}}{d} * 365 \frac{d}{\text{year}} \right) \\ * (27g \text{ CO}_2 \text{ per newsletter}) = 1,390,859t \text{ CO}_2$$

Formula 4: Calculation of CO₂ emissions e-mail newsletter in Germany 2018 (based on McAfee 2009, Statista 2017, Federal Statistical Office 2019b, Eurostat 2020, Science Focus 2020)

Based on this calculation, the CO₂ emissions caused by sending newsletters by e-mail in Germany are likely to be 6.36 times higher than the emissions caused by Deutsche Post's Dialog Marketing service.

In addition to these CO₂ emissions caused by sending, receiving and reading newsletters as measures of (legitimate) dialogue marketing, the emissions caused by spam e-mails must also be added.

Around 55 percent of the global e-mail volume, measured in September 2019, was spam, with the

proportion regularly fluctuating between 50 and 60 percent since the beginning of 2015 according to Kaspersky Lab (2019). This is consistent with Symantec (2019), which estimates that 55 percent of all email traffic worldwide in 2018 was spam. In the past, some scientific studies have reported even higher levels of spam (Grech & Hugo 2008).

Assuming that 848.1 billion emails were sent in Germany in 2018 without taking spam into account (GMX 2019) and 55 percent of all emails were spam (Symantec 2019), this means a total email volume in Germany in 2018 of 1.542 trillion emails or 693.9 billion spam emails. Assuming CO₂ emissions of 0.3g CO₂ (McAfee 2009), this means an additional 208,170 tons of CO₂ emitted by spam emails in Germany in 2018 (see Formula 5).

$$CO_2^{spam} = (693.3 \text{ billion spam mails})$$

$$* (0.3g \text{ CO}_2 \text{ per spam}) = 208,170t \text{ CO}_2$$

Formula 5: Calculation of CO₂ emissions spam e-mails in Germany 2018 (based on McAfee 2009, GMX 2019, Symantec 2019)

Spam e-mails are therefore not only a massive problem on the Internet from the user's point of view, but also with regard to ecological sustainability (Singh & Bansal 2013).

In fact, the greenhouse gas emissions caused by spam e-mails are thus roughly in the range of the emissions caused by dialogue marketing letters. In this respect, one can certainly speak of a rebound effect in the context of technological development (Dorner 2019).

Business costs of letter and e-mail

In order to understand the popularity of advertising e-mail communication compared to letter communication in companies, it is important to also consider the costs incurred by the company - here to be distinguished from the social costs arising from the emission of carbon dioxide, which can be seen as the central ethical dilemma

of marketing in this case (Hensel & Dubinsky 1968).

In both cases, the advertising material must be created in a creative process and the appropriate target group must be selected. To simplify matters, we assume here that these costs are roughly the same for both channels, letter and e-mail.

The significant difference arises in printing (which is omitted in the case of e-mail) and dispatch: in the digital Print Mailing Planner of Deutsche Post, the dispatch of 80,000 print mailings as a letter, DIN A4, one sheet, printed on one side, is stated at 32,560 euros (Deutsche Post 2020b). This corresponds to 0.4070 euros per advertising medium including printing and dispatch.

The e-mail marketing system "Newsletter2Go" is used as a comparison in the e-mail channel. Here, the sending of 80,000 e-mails costs 275 euros, corresponding to 0.0034 euros per advertising material sent (Newsletter2Go 2020).

Accordingly, sending a letter in this exemplary quantity structure costs around 120 times more than sending a newsletter by e-mail - although the social costs in terms of the CO₂ footprint are likely to be comparable (see Table 1).

III. SUMMARY, LIMITATIONS AND CONCLUSION

Based on the above-mentioned sources and the calculations made, it can be seen that CO₂ emissions from the sending of letters are significantly lower overall than those from the sending of e-mails. Also in the advertising sector, especially comparing dialogue marketing via and newsletters via e-mail, sending newsletters causes significantly more CO₂ emissions than sending letters. The emissions of dialogue marketing and e-mail spam, on the other hand, are similarly high.

Table 2: Overview of the calculated CO2 emissions for Germany 2018 (cf. formula 1-5)

Instrument		CO2-emissions (Tons)
Letter	Total	463,320
	“Dialog Marketing“ Service	218,842
E-Mail	Total	22,898,700
	Newsletter	1,390,859
	Spam	208,170

In fact, however, paper-based dialogue marketing is probably clearly undervalued in this analysis: The CO2 calculations made here only refer to the services provided by Deutsche Post within the framework of the product of the same name, “Dialog Marketing”. Not included here are those forms of postal dialog marketing in which companies send letters, postcards, flyers and catalogs to their existing contact database, for example to prospective or existing customers. It can be assumed that these volumes are again significantly higher than those of Deutsche Post’s “Dialog Marketing” service.

Nonetheless, it must be noted that the ecological balance of an e-mail - no paper consumption, no transport routes - which is good at first glance, appears much worse at second glance when carbon dioxide emissions are considered. There are three reasons for this:

As a result, one can certainly speak of a rebound effect when sending advertising e-mails (Dorner 2019). Because an advertising message sent by e-mail costs a company practically nothing or causes no variable costs, the advertising is not simply sent on another channel; above all, much more advertising is sent massively. Due to the significantly better scalability in terms of costs, digital dialog marketing ultimately is possibly less sustainable than classic dialog marketing; even without paper consumption.

In order to increase the ecological sustainability of the Internet, the reduction of the e-mail volume, especially the advertising volume, can be an important component. How appropriate measures for this could look like is to be discussed. For example, it would be conceivable to introduce fees for the display of e-mails, implemented, for example, via the inbox service providers. Monetary incentives also show a positive regulatory impact for more sustainability in other contexts (Hughes & Troy 2017). Users could initially only see the sender and subject line, as has been the case to date, and would pay a fee to the inbox service providers for opening an e-mail. The inbox service providers could then forward that fee to a higher-level government agency, which would then distribute the revenue to projects that improve environmental sustainability. Whether, how and to what extent such a fee could be a viable option, and what alternative methods are available, e. g. a fee for sending (instead of receiving) commercial emails, needs to be discussed.

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