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Research paper

The Impact of Big Data Processing Framework for Artificial Intelligence within Corporate Marketing Communication

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Abstract

This research examines what impact the Big Data Processing Framework (BDPF) has on Artificial Intelligence (AI) applications within Corporate Marketing Communication (CMC), and thereby the research question stated is: What is the potential impact of the BDPF on AI applications within the CMC tactical and managerial functions? To fulfill the purpose of this research, a qualitative research strategy was applied, including semi-structured interviews with experts within the different fields of examination: management, AI technology and CMC. The findings were analyzed through performing a thematic analysis, where coding was conducted in two steps. AI has many useful applications within CMC, which currently mainly are of the basic form of AI, so-called rule-based systems. However, the more complicated communication systems are used in some areas. Based on these findings, the impact of the BDPF on AI applications is assessed by examining different characteristics of the processing frameworks. The BDPF initially imposes both an administrative and compliance burden on organizations within this industry, and is particularly severe when machine learning is used. These burdens foremost stem from the general restriction of processing personal data and the data erasure requirement. However, in the long term, these burdens instead contribute to a positive impact on machine learning. The timeframe until enforcement contributes to a somewhat negative impact in the short term, which is also true for the uncertainty around interpretations of the BDPF requirements. Yet, the BDPF provides flexibility in how to become compliant, which is favorable for AI applications. Finally, BDPF compliance can increase company value, and thereby incentivize investments into AI models of higher transparency. The impact of the BDPF is quite insignificant for the basic forms of AI applications, which are currently most common within CMC. However, for the more complicated applications that are used, the BDPF is found to have a more severe negative impact in the short term, while it instead has a positive impact in the long term.

Keywords: *Artificial Intelligence; Artificial Intelligence; Big Data Processing Framework; Corporate Marketing Communication.*

1. Introduction

The data that is processed about individuals is increasing rapidly, which is one contributing factor to the increased usefulness of Artificial Intelligence (AI) within today's businesses. However, this extensive processing of personal information has become heavily debated, and is an area that the Big Data Processing Framework (BDPF) aims to regulate. At the same time, it has been argued that the formulation of the BDPF is infeasible with AI technology. One industry where an extensive amount of data about customers is processed, including automated processing based on AI technology is Corporate Marketing Communication [1].

Corporate communication is a management function that offers a framework for the effective coordination of all internal and external communication with the overall purpose of establishing and maintaining favorable reputations with stakeholder groups upon which the organization is dependent.

Artificial Intelligence (AI) is described as different technologies that enable computers to perform tasks that historically have required human intelligence [2]. To be able to perform such tasks, AI systems inhabit several different capabilities, where some of the important ones are the ability to acquire knowledge and learn, communicate in natural language, have visual abilities, as well as being able to take action such as answering questions or solving problems [3]. Indeed, AI is a broad field that consists of numerous subfields, including computing, mathematics, linguistics, psychology, neuroscience, statistics, and economics (ibid.). The concept of AI has existed for a long time, but it is explained that it is first in recent years that applications of AI have become more relevant and useful [4-5]. The advancements in the field are attributed to a significant increase in computing power and storage capacity, as well as the extensive amounts of data that is available [6]. It is foremost the AI systems that are capable of performing a narrow set of tasks that have been successfully applied, the approach called Narrow AI [7], which hereafter is meant when reference is made to "AI" in this report.

AI is useful to apply in a broad range of industries [8], among which corporate marketing communication is one [9]. For example, AI systems have surpassed human intelligence within trading in analyzing large and complex quantities of transactions in a short time frame (ibid.). Thereto, complex AI systems have been used as decision support in credit evaluation, within asset portfolio management as well as to predict the behavior of investors [10]. Another area where AI has proven to be successfully applied is for fraud detection within banking systems [11]. To that, AI is used within insurance to predict risks and price premiums, where especially learning instrument is suitable due to the massive datasets that are analyzed [12].

Nonetheless, despite the significant variety of different AI models, a distinction can be made between more basic forms of AI, which are referred to as rule -based systems, and more advanced systems

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that inhabit an element of self-learning, which goes under the term "learning instrument" [13]. However, these two forms are not mutually exclusive, instead, components of both forms of AI can be combined with each other into hybrid systems [14]. A hybrid of rule-based and machine learning has for example been successfully used to forecast the price movement on the stock market [15].

2. Corporate Marketing Communication (CMC)

Develop communication techniques and methods that organizations use to promote, publish or inform individuals and groups in society for at least 150 years. From the industrial revolution of the 1930s, the period of mass production and consumption, the type of communication used by organizations around the world, advertising and distribution in dynamic marketplaces. The trend towards more established and reasonable markets, joined with increased government intervention in various markets and a more difficult economic situation, was evident in many Western organizations in the 1930s. Communication professionals have had to rethink their discipline and develop new practices and skills to respond to changing market conditions and the societies in which they operate. Business communication and marketing were taken into account in their purposes and actions until the 1980s, with each discipline promoting from its own proficient progress [16].

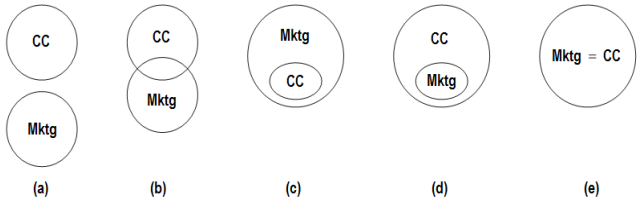

Fig. 1: Models for the Relationships between Corporate Communication and Marketing

At the heart of this old-style view (model (a) in Figure 1) was the modest point where marketing is concentrated on markets, while commercial communication affects all communities (except customers and consumers) in an organization. In this perspective, markets are created by identifying a segment of the population that needs or requires a product or service that includes a communication related to a product or service. Instead, communities are seen as active and mobile when corporations make assessments that affect a group of individuals.

These communities are also more likely to process general business information than product-specific information. This traditional location (model (a)) states that "marketing exists to capture, help and fulfill customer needs with profit", whereas "corporate communication occurs to create the goodwill of diverse business communities". These communities do not interfere with the company's ability to make profits. "

However, over time, the viewpoints of communication and corporate marketing have emerged as two disciplines completely different from their goals and strategies.

Before considering them as distinct communication and marketing, it was known that they had some similarities (model (b) in Figure 1). For example, in the 1980s, concerns about increasing expenses and decreasing the influence of advertising in the mass media led many companies to look for ways to increase awareness and customer loyalty of their products. Brand is to increase sales. Companies are increasingly using marketing communications: the dissemination of information and events related to the introduction and promotion of products or services. Corporate Marketing Communication (CMC) involves the use of enterprise communication technology for marketing purposes. It has proven to be a cost-effective tool to promote brand awareness, usability and credibility of the organization's brand communications. Companies like Tupperware and The Body Shop are constantly relying on their communication technologies, such as free advertising, articles, and general interest campaigns to attract attention and create a brand experience shared by all businesses like Tupperware and Body Shop which the stores is supported.

Corporate Marketing Communication (CMC) is distinct from corporate communications activities in that it focuses on the marketing of a company's products and services. These corporate activities, sometimes referred to as Corporate Communications Activities (CCA), include communication with investors, communities, employees, the media and government. Fig. 2 illustrates a number of basic business communication and marketing disciplines and describes a number of activities (comprising specific techniques and tools) that are shared to illustrate functional overlaps. [17].

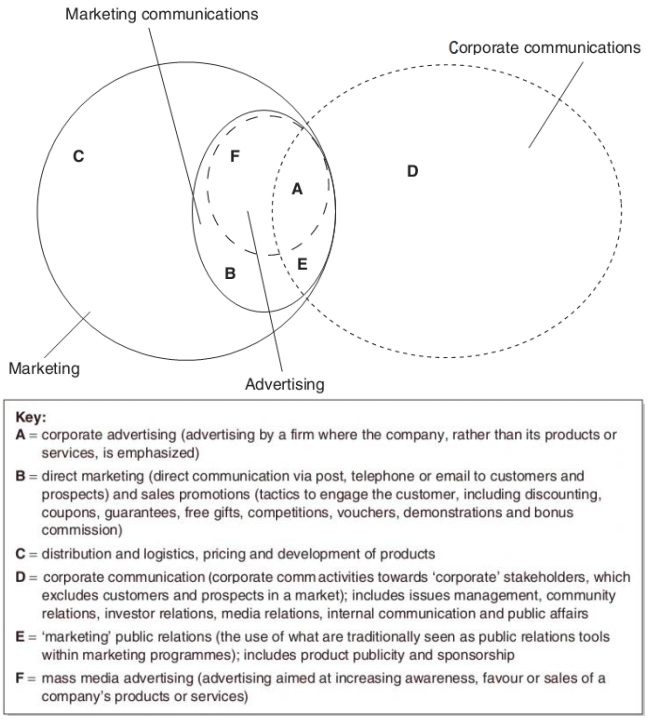

Fig. 2: Corporate Communication and Marketing Activities and Their Overlap

Fig. 2 also demonstrates the difference between corporate marketing communication (CMC) and corporate communication activities (CCA). Of course, on the left side of the illustration, marketing starts with a variety of activities for example pricing, logistics, sales and new product expansion ("C" area in Figure 2), as well as communications marketing. Marketing communication at the center includes corporate advertising ("A") and mass media advertising ("F"), direct marketing and sales promotion ("B"), as well as advertising and marketing with product sponsorship ("E"). Two of these activities, corporate advertising ("A") and product promotion and sponsorship ("E"), intersection with corporate communication. Corporate advertising involves the use of advertisements on radio, television, movies, billboards or the Internet to create or maintain a positive image of the company and its leaders. Although this is a form of advertising, it is the image of society as a "society" and, as such, it differs from mass advertising ("F"), which focuses on the products or services of the company. Awareness or increase in income. Advertising and product sponsorship includes activities to support and market the services and products of the company. Together with these activities are based on corporate communication techniques and skills. In particular, advertising is often done through media coverage. Sponsoring an event or event can serve both the marketing objectives and the business objectives. It can be integrated with programmers who

provide products and services, but it can also be used to improve the overall vision of the company.
In addition to the direct exchange of activities such as sponsoring, corporate marketing and communication activities can complement each other in many ways. For example, it seems that the image of a company created through corporate communication programs can positively reflect the brand of a company's product, enhancing brand awareness and reinforcing the positive perception of consumers.
Another complementary relationship is the guardianship of corporate communications as a "watchdog" or "correction" of marketing. It incorporates stakeholder views and expectations into strategic decision-making, in addition to the requirement to increase sales to customers.
This intersection and complementarity between corporate communication and marketing has shown organizations that it makes sense to adapt or reduce both disciplines. Unsurprisingly, many discussions took place in the 1980s and 1990s on the reputation of combination and its emergence in organizations. As early as 1978, Kotler and Mindak had described three described integration models (models "c", "d" and "e" in Figure 1). Each of these models articulates a different vision of the most effective form of integration.
The "c" model includes the marketing vision as a dominant feature of corporate communication. In this model, enterprise communications is essentially part of a broader marketing function focused on customer satisfaction. An example of this perspective is the idea of Integrated Marketing Communication (IMC), which is defined as follows: A marketing communication planning concept that provides the "added value" of a comprehensive strategic role evaluation plan various disciplines (advertising) (direct marketing, sales) recognizes corporate promotion and communication) and combines these disciplines to achieve clearness, coherence and maximum impact on communication. Within IMC, corporate communications is limited to product advertising and sponsorship activities, ignoring the broader scope of communications with, communities, investors, the media, employees and the government.
Model "d" proposes a different point of view, namely that "marketing should be integrated into corporate communications in order to preserve the goodwill of all audiences".

In this model, the role of customer satisfaction marketing is understood as part of a broader corporate communication aimed at satisfying various audiences and stakeholders of a company. An example of this perspective is the concept of "strategic corporate communication", which undertakes that all communication programs must be coordinated or combined by a corporate communications department, comprising "integrated marketing communication, advertising and marketing communication, "which coordinate a wider role should corporate communications".
Finally, the "e" model advocates a vision of marketing and corporate communications grouped together in the same function of "external communication". According to Kotler and Mindak, "the two purposes could easily be assumed by a Vice Chief of Marketing and Corporate Communications," responsible for planning and managing the company's external affairs.
Despite the preference of Kotler and Mindak for this model, it is not a form of combination often experienced in organizations. As an alternative of integration the two restraints in the same department, enterprises want to dispersed them while actively coordinating corporate communication and marketing communications programs. In remembrance, most organizations appear to use the "b" model to organize corporate communications and marketing communications.

3. Big Data Processing Framework (BDPF) for Artificial Intelligence (AI)

Recently, there has been considerable attention around the new big data privacy regulation, referred to as the BDPF. This regulation aims to strengthen the rights of individuals and restricts the processing of personal data, that including automated processing. Despite the BDPF's good intentions, it has also been argued to constrain the usage of AI technology, a critique that mainly refers to the increased informative requirement in the occurrence of automated decision-making, as well as the data erasure requirement. However, there are different opinions how these requirements should be interpreted and what the practical implications will be for AI. One industry where AI applications have become increasingly adopted, and where companies also process extensive amounts of personal data is the corporate marketing communication business. Hence, this study aimed to answer the following research question:

"What is the potential impact of the BDPF on Artificial Intelligence applications within the corporate marketing communication?"

AI technology is demonstrated to have many useful applications within various corporate marketing communications, such as for advertising, branding, image and reputation. In examining the impact that the BDPF has on AI applications within the corporate marketing communication business, it is derived that a distinction can be made between a short- and long -term perspective, as well as between the different forms of AI, which vary in level of complexity; rule-based systems and learning instrument. The results are visualized in Fig. 3.

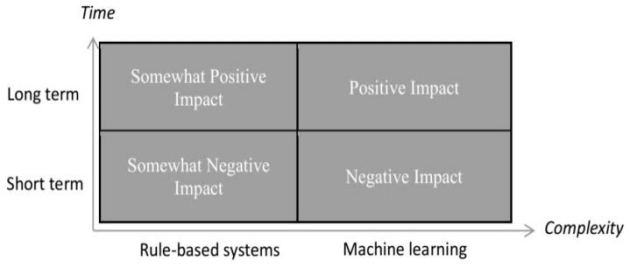

Fig. 3: Long - and Short - Term Impact of the BDPF on AI Applications within Corporate Marketing Communication

These findings were derived by conducting an initial assessment of the impact of six different characteristics of the BDPF in relation to AI applications. Thereafter, the impact of each characteristic was combined to assess the aggregated impact of the regulation, by taking a stance in the parts of the BDPF that have been argued to be problematic for AI. Firstly, the BDPF initially imposes a significant administrative burden on organizations that takes both time and resources away from entrepreneurial activities. This administrative burden stems from the requirement of finding a legal ground to process personal data, and the need to restructure internal systems to be able to comply with the data erasure requirement. In turn, this additional workload has a negative impact on AI applications, particularly machine learning applications. Such applications require extensive amounts of data, and with the BDPF in force, it will require more effort by companies to collect and be allowed to use personal data for the specific purpose of training machine learning models. At the same time, these actions result in greater control of data within companies which is likely to have a positive impact on machine learning solutions in the longer term.
Secondly, the compliance burden that the BDPF imposes on companies within corporate marketing communication is quite low. The reason for this is that there are nearly no solely automated decision-making processes in place, instead it is mainly used as

decision-support and therefore companies are not affected by the extensive informative requirement of explaining automated decisions. Although, noteworthy is that even if solely automated decision-making would be conducted, it would not be a significant burden anyhow since it is quite easy to explain outcomes from the kind of AI models that are used in this business. Regarding the rule-based systems, which is the most common form of AI in this industry, these are particularly easy to understand, but it also seems possible to derive sufficient information about decisions from the kind of machine learning models that are used. However, somewhat of compliance burden is imposed on organizations using machine learning since it becomes more challenging to fulfill erasure requests, as well as a potentially decreased performance of machine learning models due to lower access to training data. While complicated machine learning models currently are not the primary form of AI within this industry, there are many benefits to gain from using such models. In turn, the BDPF is likely to incentivize companies to participate in research and development of more explanatory AI models. Thereby the compliance burden of the BDPF could have a positive impact on machine learning models when considering the long-term impact.

Thirdly, the timeframe until enforcement of the BDPF is concluded to have a somewhat negative impact on both rule-based and machine learning applications since the initial release of the regulation was too unclear to start adjustment processes, and there was too short of time when the final content was established. This limited period of time means that extensive effort is allocated to ensure compliance with the regulation and thereby innovation suffers. In regards to the fourth characteristic, flexibility, the BDPF is found to include a quite high level of flexibility, by specifying what should be achieved by organizations, rather than stating detailed prescriptions of how compliance should be achieved. In turn, this flexibility provides incentive s to invest in new technical solutions to become compliant, such as AI, which is a technology pointed out to be advantageous to apply for achieving BDPF compliance.

Furthermore, in regards to the fifth characteristic uncertainty, the BDPF is concluded to have quite high uncertainty about what the practical implications of the requirements are, which in turn causes projects of AI to be postponed. However, this effect will only be short-lived until court cases have clarified the ambiguities. Finally, besides the five characteristics of a regulation that are identified in the previous literature to impact innovation, an additional sixth characteristic is identified in this study to also contribute to the impact that BDPF has on AI applications, which is "utility". By going the extra mile to implement industry-leading privacy standards and automated decision -making processes with high accuracy and transparency, companies could establish a competitive advantage since these are aspects that customers increasingly value. This opportunity is likely to motivate companies to increase investments into better solutions, and the development of more transparent learning instrument models with higher explanatory power.

In conclusion, as visualized in Fig. 3, the aggregated impact of the BDPF on AI applications within corporate marketing communication turned out to be dependent on the level of complexity of the AI models and thereby what form of AI that is used, as well as the time perspective. In the short term, the BDPF has a negative impact on AI, although the impact is less severe for the simpler applications based on rule-based systems. However, the BDPF's negative impact on AI is not as severe as suggested in the literature, at least not within the corporate marketing communication business. This finding is foremost explained by that this industry is not in the forefront of AI technology and mainly uses the simpler forms of AI, meaning that the industry is not affected by the more severe impact that BDPF has on highly complicated models. At the same time, companies struggle with the interpretation of several ambiguous aspects of the BDPF, especially concerning the use of technology. Hence, the insights of this research help companies to comprehend what the BDPF means for the usage of AI within their businesses.

To that, the ambiguities surrounding technical interpretations also indicates that there is a knowledge gap between law and technology, which highlights a need for closer collaboration between regulators and technicians in the future.

On the other hand, in a longer time perspective, the negative impact on AI applications within corporate marketing communication is likely to be near insignificant since companies then have had time to adapt to the new requirements, and the uncertainties surrounding BDPF have been resolved.

This study showed that even for the companies within this business that do use more complicated AI models, there seem to be ways to continue to use such models. Some methods identified are to anonymous personal data, or only use the data related to an individual that is not personal data. In turn, these findings show that the BDPF does not seem to be as unfeasible with technology as suggested in the literature. This finding is at least true for the kind of AI technology that is used within the corporate marketing communication industry, and when a long-term perspective is considered. To that, this research found that there are many benefits to gain from applying AI within businesses, which makes it likely that companies will focus on developing better AI models rather than allowing the BDPF to impede its usage. In fact, the BDPF is concluded to have a positive impact on AI applications within corporate marketing communication in a longer perspective. This positive impact is particularly significant for applications based on the more complicated machine learning AI models, which are extensively data driven. The reason for this is that companies achieve a greater knowledge of their data, and thereto the regulation creates an increased pressure on corporate marketing communication actors to use transparent AI models in automated decision-making processes. In turn, such pressure enables the development of AI technology to be directed towards models with an increased level of understanding, and thereby consumers will be ensured insight into how their data is processed and how decisions are made about them.

This research makes a theoretical contribution to the field of research about the feasibility of the BDPF with technology, by examining how this regulation will impact one specific technology, that is, Artificial Intelligence. This study also makes a practical contribution by reducing the ambiguities for businesses about how the BDPF will impact AI applications.

4. Future Research

In this study, a recurring topic was that complicated AI models are difficult to understand, and that bias could be included in these decisions. It is pointed out that there currently is no solution for how to ensure that bias is excluded from AI models. Therefore, it would be interesting to conduct research within this area of AI technology, that is, how to ensure that machine learning models have an objective representation of reality, and thereby include less bias.

Moreover, the findings of this study confirmed a previously identified gap between law and technology regarding information irregularity as well as an inconsistency in the pace of regulatory and technology development. This finding indicates that this is a field of research that needs to be examined in greater detail. In this regard, it would be of interest to examine how legal and technical aspects can become more integrated.

Furthermore, this study has taken a business perspective in how the BDPF could affect corporate marketing communication, but it is possible that the impact varies between different organizations. Hence, it would be interesting to conduct a more in-depth case study of how the BDPF impacts AI applications on an organizational level. A case study would allow for a greater understanding how BDPF affects the usage of AI technology within a specific organization.

For example, in this study few fully automated decision-making processes were identified, but examining organizations in greater detail could reveal more extensive use of such processes.
Finally, since a sixth characteristic of the BDPF was identified in this study to contribute to how this regulation impacts AI technology, it would be interesting to examine if this finding can be generalized to other regulations and technologies as w ell. Similarly, it would also be of interest to examine if there is further regulation-specific characteristics that also matter for what impact a regulation has on technologies and innovation.

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