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Marketing in a data-driven digital world: Implications for the role and scope of marketing

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ABSTRACT

We are living in a world of data abundance and rapid technological advances in the digital realm. The consequences for marketing practices have been transformative. The Marketing Edge and Journal of Business Research sponsored this special issue to address the need for research in this domain. We draw upon past literature to trace how data-driven marketing practices and adoption of digital technologies have helped transform and expand the scope of marketing from a function that was primarily related to analyzing advertisements, to crafting analytics-driven customer-centric marketing, to a function that is fiscally responsible and increasingly technology enabled. The collection of nine studies in this special issue richly describes the challenges that marketing practitioners face and highlights research issues that need to be addressed.

1. Introduction

The application of data and digital technologies in marketing has undergone several interesting stages of transformation. Each stage has helped transform and augment the scope and role of the marketing function within the organization. We draw upon past literature and systematically track the applications of data-driven marketing and digital technologies over time. We find that the historical evolution of data-driven marketing may be divided into five discrete stages as described Section 2. Each stage describes how data-driven applications (which were later enabled by digital technologies) were influenced by the business environment in the respective stage and how this ultimately contributed to the expansion of the role and scope of marketing within an organization. In a subsequent section (Section 3) we introduce the special issue of the Journal of Business Research based on the theme of 'Marketing in a Data-Driven Digital World' and provide an overview of the studies included in the special issue.

2. How data-driven marketing helped expand the scope and role of marketing?

2.1. Creativity

In 1879, one of the pioneer advertising agencies, N.W. Ayer & Son, inadvertently provided perhaps one of the first applications of data-driven marketing (Hower, 1939). The goal of the firm was to plan a schedule of advertisements for their client Nichols-Shepard Company – manufacturer of agricultural machinery. The advertising agency wired to state officials and publishers throughout the country, soliciting information on grain production. The data collection exercise resembled a crude version of a market survey and became one of the earliest instances of data-driven marketing (Lockley, 1950). Other early applications include Harlow Gale from the University of Minnesota using mailed questionnaires to obtain opinions on advertising in 1895 and Walter Dill Scott from the Northwestern University conducting experimental research on advertising for the Agate Club of Chicago in 1901 (Coolsen, 1947).

Around this time, John Wanamaker, a successful business person, strong proponent of advertising, and widely regarded as a 'marketing pioneer' made this now famous quote "Half the money I spend on advertising is wasted; the trouble is I don't know which half" (Wikipedia, 2020). His statement indicated the state of marketing in the early part of the twentieth century and helped explain why a good majority of data related research efforts was directed towards advertising.

After 1903, the literature on advertising grew rapidly in tandem with the importance of data-driven marketing applications related to managing *creativity* for crafting meaningful content for consumers. More than one hundred and thirty books on the subject were published before 1950, indicating the popularity of advertising (Bartels, 1976) with surveys and lab experiments emerging as the methods of choice for collecting and analyzing quantitative data.

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2.2. Relevancy

As the role of marketing grew in importance over time, prominent thought leaders such as Peter Drucker emphasized the *relevancy* aspect of marketing to business practices of a firm. According to Drucker, "the purpose of a business is to create and keep a customer' and the most important question companies can ask themselves is "what does our customer find valuable?" (Buchanan, 2009). Similar thinking helped expand the scope of marketing beyond advertisements and underscored the need to collect data concerning important output measures such as profit, sales, and market share as a consequence of firm's marketing efforts.

Data collection efforts started expanding beyond survey based data to scanner panel, and point of sales data, thereby contributing to a wave of studies comprising of marketing-mix models that helped tease out and quantify the impact of different marketing activities such as sales promotion, distribution, price, product attributes, TV and print advertisements, etc. on the market share, sales revenue, or brand equity of a product/service brand (e.g. Yoo, Donthu, & Lee, 2000; Ramaswamy, Desarbo, Reibstein, & Robinson, 1993; Andrews & Srinivasan, 1995). As the emphasis for making marketing *more relevant* increased, marketers began to shift their focus from a product-centric to a customer-centric view. Concepts such as market orientation (Kohli & Jaworski, 1990; Narver & Slater, 1990), the market-driven organization (Day, 1999), and market-based learning (Vorhies & Morgan, 2005) were developed to enable firms to better understand individual customer needs and wants. This entailed embracing the tenets of CRM or customer relationship management (Parvatiyar & Sheth, 2001; Payne & Frow, 2005) in marketing practices and hence closely measuring and managing customer-level output metrics such as customer loyalty, satisfaction, share-of-wallet, cross-selling, and, customer lifetime value (Clark, 1999).

From a data standpoint, marketers now started focusing on collecting and analyzing customer transaction data that systematically and chronologically archived 'which' customer bought 'what' product/service 'when' by capturing the relevant information in their proprietary database systems over time. A strong stream of research and marketing practices related to direct and database marketing emerged that focused on highly targeted, differentiated and customer-centric marketing (e.g. Peppers, Rogers, & Dorf, 1999; Arora et al., 2008; Kumar, Shah, & Venkatesan, 2006). Marketers strived to leverage insights from customer transaction data to sell the right product to the right customer at the right time (Kumar, Venkatesan, & Reinartz, 2006). The outcome was a renewed effort of making marketing more *relevant* than ever before from the viewpoint of a customer rather than just the firm (Shah, Rust, Parasuraman, Staelin, & Day, 2006).

2.3. Analytics capability

In the early 2000s, we witnessed the beginning of a data explosion that would fundamentally change the way the marketing function operated within an organization. Rapid penetration of the Internet, proliferation of smart phones, and increasing usage of social media platforms offered the trifecta effect for unprecedented data generation – most of which came from the digital realm (Press, 2013). Data became not only abundant but also easy to archive as data storage became increasingly digital. For example, 99.2% of all storage capacity was analog in 1986, but by 2007, 94% of all storage capacity became digital, a complete reversal of roles (Hilbert & López, 2011). With advances in microprocessors and cloud computing, data storage costs declined dramatically. It 1967, a 1-megabyte hard drive costed $1 million (Mearian, 2017). Today, it costs less than 1 cent for a similar storage space. All of this contributed to organizations stepping up their infrastructure to collect and store massive amounts of data which began to be referred to as Big Data – a term used to describe large volumes of complex datasets that comprised of both structured and unstructured data and required application of non-traditional data processing methodologies (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012; Sagiroglu & Sinanc, 2013).

As the volume of data increased, marketers started embracing advanced statistical modeling techniques to analyze the increasingly complex customer-level data that comprised of not only traditional transaction data but also unstructured data in the form of conversations, images, videos, audio files, and video footages obtained from digital and social media (Chaffey, Ellis-Chadwick, & Chaffey, 2012). As analytics took center-stage and data-driven applications intensified, the scope of marketing further expanded by augmenting and/or often leading the *analytics capability* of the firm (Davenport, 2006; Hauser, 2007; Wedel & Kannan, 2016). A direct consequence of this data enabled transformation was that the marketing function evolved into more of a *science* than *art*. Further, as information flow and transactions were greatly facilitated by the development of the Internet, analytics capability greatly enhanced the firm's ability to engage in one-to-one marketing, creating personalized content, and targeting the right customers with the right offers at the right prices.

2.4. Accountability

Around the early twenty-first century, the marketing function was facing a challenge of a different kind. Rust, Lemon, and Zeithaml (2004) noted that there was a perceived lack of marketing accountability, which had undermined marketing's credibility, threatened marketing's standing in the firm, and even threatened its existence as a distinct capability within the firm. A large majority of the CEOs felt that CMOs did not demonstrate adequate return on investment and thus failed to show the true potential of marketing (see The CMO Council Report, 2007). Marketing was losing its clout and a seat at the boardroom table (Webster, Malter, & Ganesan, 2003). The clear mandate for the marketers was to shake off their image of being tacticians rather than strategists capable of helping the CEO drive growth and profitability (Kumar, 2004). This entailed relating consequences of marketing efforts with higher-level financial metrics that is of concern to the CEO.

Marketing research responded by linking the consequences of marketing efforts to data pertaining to financial consequences of a firm. Some relevant empirical studies include linking satisfaction to firm value (e.g., Anderson, Fornell, & Mazvancheryl, 2004; Fornell, Mithas, Morgeson, & Krishnan, 2006), brand to firm value (e.g., Kerin & Sethuraman, 1998; Mizik & Jacobson, 2008; Rao, Agarwal, & Dahloff, 2004), customer value to firm value and/or stock performance of the firm (Gupta, Lehmann, & Stuart, 2004; Kumar & Shah, 2011), user generated content to stock performance (Tirunillai & Tellis, 2012), and customer behavior to shareholder value of a firm (Shah, Kumar, Kim, & Choi, 2017). The overarching goal of each of these studies was to quantify the extent to which marketing significantly impacted firm-level performance. Such efforts helped firmly establish the financial *accountability* of marketing efforts and consequently further expand the overall scope of marketing within an organization.

2.5. Technology

Fast forward to the present business enviroment. Currently, we are witnessing an era of digital disruption that is causing an unprecedented upheaval of firms across industries. The average tenure of companies on the S&P 500 is expected to shrink from 33 years in 1965 to about 14 years by 2026 (Mochari, 2016). According to Forrester research, by the end of 2020, every business would have either become a digital predator or a digital prey (Evans, 2012). Forrester's ominous premonition is supported by the fact that consumers are increasingly adopting digital technology-powered products and services that are cheaper, better, and/or faster. Consequently, the opportunity for marketing now lies in embracing digital transformation technologies with the overarching goal of offering a superior value proposition to

customers.

Marketing research has begun to delve deeper into marketing practices that may be enabled by transformative technologies such as artifical intelligence, mixed reality (i.e., (augmentation of the real world by blending physical and virtual elements of the world with the help of technology), and blockchains or a peer-to-peer distributed decentralized ledger (Shah & Shay, 2019). For example, machine learning (subset of artificial intelligence) is one of the most popular transformative technologies being widely adopted by firms (Teradata 2017). It turns out that the marketing and sales function is adopting machine learning/artificial intelligence faster than any other department in an enterprise as of today (Columbus, 2019). Related streams of research have discussed several promising areas of adoptions that include customer service (see Huang & Rust, 2018 for a review), analyzing large noisy customer databases (Cui, Wong, & Lui, 2006; Chintagunta, Hanssens, & Hauser, 2016), sentiment analyses and/or natural language processing (Dhaoui, Webster, & Tan, 2017; Berger et al., 2020) and improving targeted outreach marketing program (Chen et al., 2020).

Marketing practices are also increasingly embracing other transformative technologies such as the IoT or the internet-of-things (a system of interrelated computing devices – physical and digital – that are connected to the internet and capable of collecting and sharing data over the network without requiring any human-to-human or human-to-computer interaction. Collectively, transfromative technologies are opening a myraid possibilies of marketing applications. Some examples of promising applications include Newman's (Newman, 2019) description of how blockchain is disrupting digital marketing, rapid growth in development of IoT-enabled consumer devices such as smart watches, fitness trackers, security devices, kitchen appliances, and home assistants (Morrissey, 2019), and using mixed reality for winning customers (Nishi, 2019), testing new products, and/or enhancing shopping experience (Cook, Ohri, & Kusumoto, 2020). The outcome is further expansion of the scope of marketing with *technology* enabled marketing practices offering the potential of delivering improved operational efficiencies, better marketing insights, and more innovative ways to engage with customers of the firm (Shah & Shay, 2019).

In sum, we have witnessed an interesting evolution of data-driven marketing in a constantly changing business environment that has increasingly become digital and technology-enabled. Over time, this evolution has helped expand the role and scope of the marketing function from being primarily involved in developing and managing creative communication to implementing data-driven and technology-enabled marketing practices that are not only relevant to the firm and consumers but also financially accountable. Fig. 1 summarizes the evolution of marketing to date.

3. Introduction to the special Issue: Marketing in a data-driven digital world

Consistent with the growing importance of data-driven marketing, the Marketing Edge organized a Conference in New Orleans in October 2017 and the theme was 'Marketing in a data-driven digital world'. The conference chairs sought and obtained partnership with the Journal of Business Research and its Editor-in-Chief, Dr. Naveen Donthu agreed to produce a special issue on the topic of digital marketing (Webster et al., 2003). In total, fifty-two papers broadly based on the conference theme were selected for presentation at the Conference and the respective authors were invited to submit their research papers for a possible publication in the special issue of the Journal of Business Research. The call for papers was restricted to papers presented at the 2017 Marketing Edge Conference. Subsequently, we received 29 papers from the conference participants. Each paper went through the regular peer-review process of the journal. Ultimately, seven papers were accepted for publication. In addition, we invited two eminent scholars – Dr. Jagdish Sheth and Dr. V. Kumar to offer their thoughts related to the theme of the special issue.

The papers included in this special issue span a number of areas, digital technologies, and research methods. While more papers focus on B2C, there are papers relevant to B2B as well. Within B2C area, papers span luxury goods, healthcare, non-government organizations, and direct marketing. Similarly, the digital technologies that these papers cover include social media, omni-channel information, Internet of Things (IoT), Blockchain, artificial intelligence (AI) and machine learning. The collection includes empirical papers employing state-of the art econometrics, behavioral structural equation models (LISREL), text-mining, and conceptual analysis and hypotheses generation.

We broadly divide the nine studies into three themes: (1) *Impact of social media* (including studies that focus on Facebook, Snapchat, or Twitter) *and text mining analyses*, (2) *Insights from survey-based data* (in the context of healthcare and data marketing industry), and (3) *New technologies and emerging research areas* as summarized in Fig. 2. The next section offers a brief overview of the papers included in the special issue in the same order as it appears in the printed version of the special issue.

3.1. Will techniques keep up with data?

The first paper in this special issue is an invited commentary from Dr. Jagdish Sheth titled 'Next Frontiers of Research in Data Driven Marketing: Will Techniques Keep Up With Data Tsunami?' The paper offers an interesting perspective on the evolution of data-driven marketing and suggests next frontiers of research opportunities as a consequence of increase in availability of data, advances in digital technologies and lowering of data storage costs. Collectively, this contributes to what Sheth (2020) calls a digital and data 'tsunami' that will heavily impact future research and will or has brought a paradigm change. Earlier, techniques were in search of data but in the future data will be in search of techniques, especially in the era of social media such as Twitter, Facebook, YouTube, WhatsApp, and Instagram.

Sheth (2020) identifies six promising areas of research opportunities in digital and data driven marketing. These are (i) text mining, (ii) biometric data, (iii) video analytics, (iv) emoji analytics, (v) pattern recognition, and (vi) forensic research. However, there are several challenges for marketing scholars as they embrace the six new frontiers of research. He argues that these challenges will relate to (a) data curation - ensuring that the data collected is relevant and authentic, (b) data analysis – selecting the right set of techniques to analyze the increasingly complex and diverse data, (c) insights – dealing with multiple perspectives or overcoming biases related to interpretation of complex data and (d) half-life of knowledge – the changing context can challenge the declining half-life of marketing knowledge. The next five papers investigate the impact of social media and text mining analyses on substantive marketing and business outcomes.

3.2. Using corporate (vs. product) brand names on Facebook for social media engagement

In the context of services and social media posts, Swani, Milne, and Miller (2020) seek to understand whether corporate brand names have a different effect on customer engagement (number of likes) and purchase intention than product brand names? In their paper titled 'Social Media Services Branding: The Use of Corporate Brand Names' they provide a compelling case for the existence of such differential effects. They focus on services as opposed to products, because the risk is relatively higher and word-of-mouth from friends matters more. They employ brand self-identity theory to suggest that consumers identify with corporate brand names more than they do with product brand names, more so in a social media context where individuals share rich content with others as a way of self-expression. They conduct a field study using Facebook brand posts to provide evidence to support their main hypotheses. In addition, they conduct four experiments to identify the boundary conditions and support the links in the process.

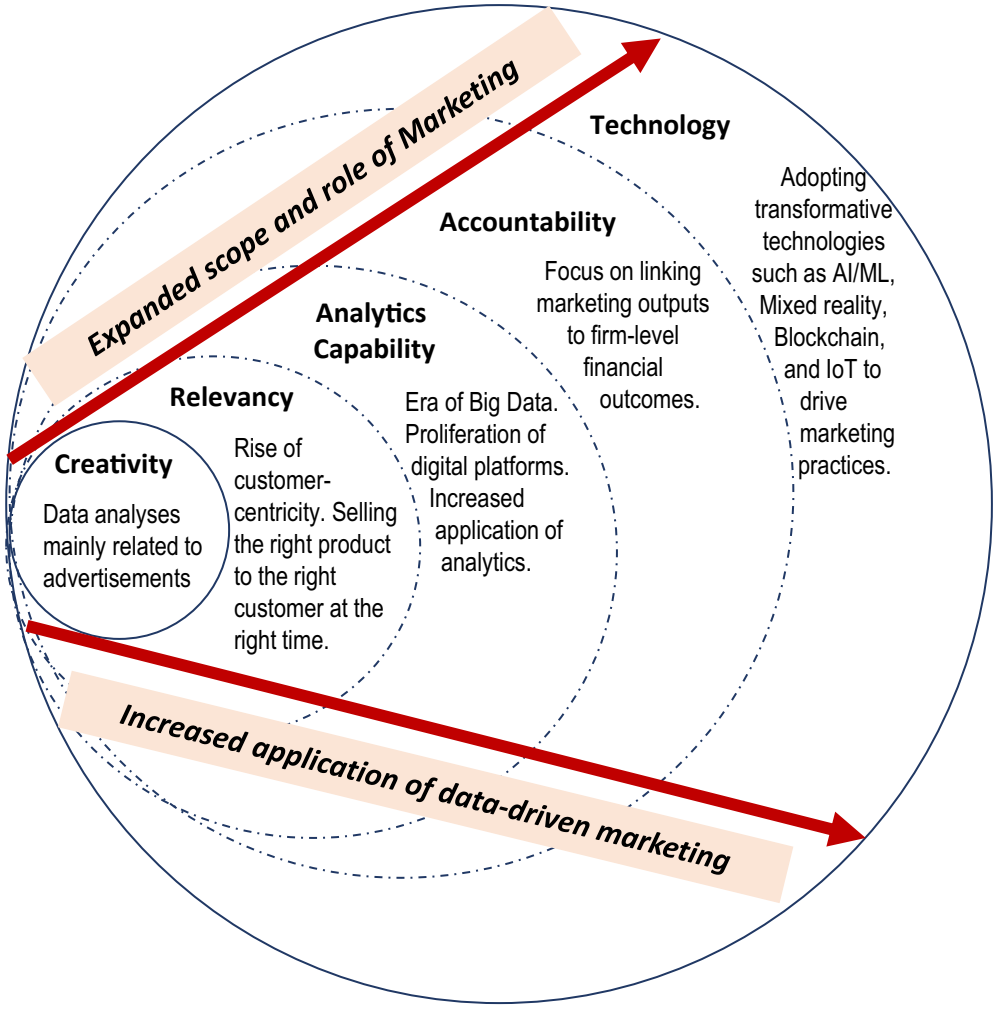

Fig. 1. The expanding role and scope of Marketing with increasing application of data-driven marketing.

They find that for service firms, the use of corporate brand names in Facebook posts increases the number of likes more than the use of product brand names. The experiments provide evidence of a link between use of corporate brand names and both liking intentions as well as purchase intentions. Further, they show that brand identification drives the intention to like a message, which in turns enhances purchase intention. In the last experiment, they define a boundary condition and show that for both highly familiar and for highly unfamiliar brand names (both corporate and product brand names), this effect is much lower. They find that the results hold for both hedonic as well as utilitarian services. The use of different methods – field study and experiments- is noteworthy. The only puzzling result is that the use of product names negatively impacts likes and purchase intention. One would normally expect positive or non-significant effect, but the strong negative effects need to be explored in future research. They do establish the benefit of using corporate brand names in the context of services and social media posts.

3.3. Millennials & Snapchat

In their paper, 'Millennials & Snapchat: Self-expression Through its Use and its Influence on Purchase Motivation', Flecha, Corrada, Vega, Dones, and Lopez (2020), describe the process by which millennials engage on Snapchat, a popular social media platform and how that impacts their use of the platform as well as their purchase intentions. They employ uses and gratification theory (Ruggiero, 2000) to develop their hypotheses and then test them using a structural equation model. The authors argue that the main reason for millennials' attraction towards Snapchat is for self-expression using rich media, which lasts for a short period of time. Uses and gratification theory posits that usage of social media platforms for self-expression provides gratification from four sources - different types of content, users' ability to spread or share information, interactivity, and navigability. Gratification reinforces both usage and purchase intention. Stable factors (individual's personal values, traits, preferences) lead to dynamic factors (goals, and social code of conduct) through social media use. The ephemeral nature of Snapchat encourages a greater need for instant gratification, and faster participation. Advertisers encourage such behavior and provide tools for users to generate ephemeral content by interacting with the brands. This results in greater sharing, interaction with content, and intensity of Snapchat use that positively impacts purchase motivation and loyalty to a brand. They provide empirical evidence based on a partial least squares structural equation model (SEM) on a sample of millennials.

3.4. Role of social media in organizational buying

The third paper on social media is 'The Social Buyer: A Framework for the Dynamic Role of Social Media in Organizational Buying' by Gustafson, Pomirleanu, Mariadoss, and Johnson (2020). It focuses attention on the mechanisms through which social media affects buying decisions and organizational outcomes in a business-to-business (B2B) context. The authors argue that this subject has not been discussed adequately in extant research and therefore merits a detailed inspection of processes and research issues. They undertake a critical review of the

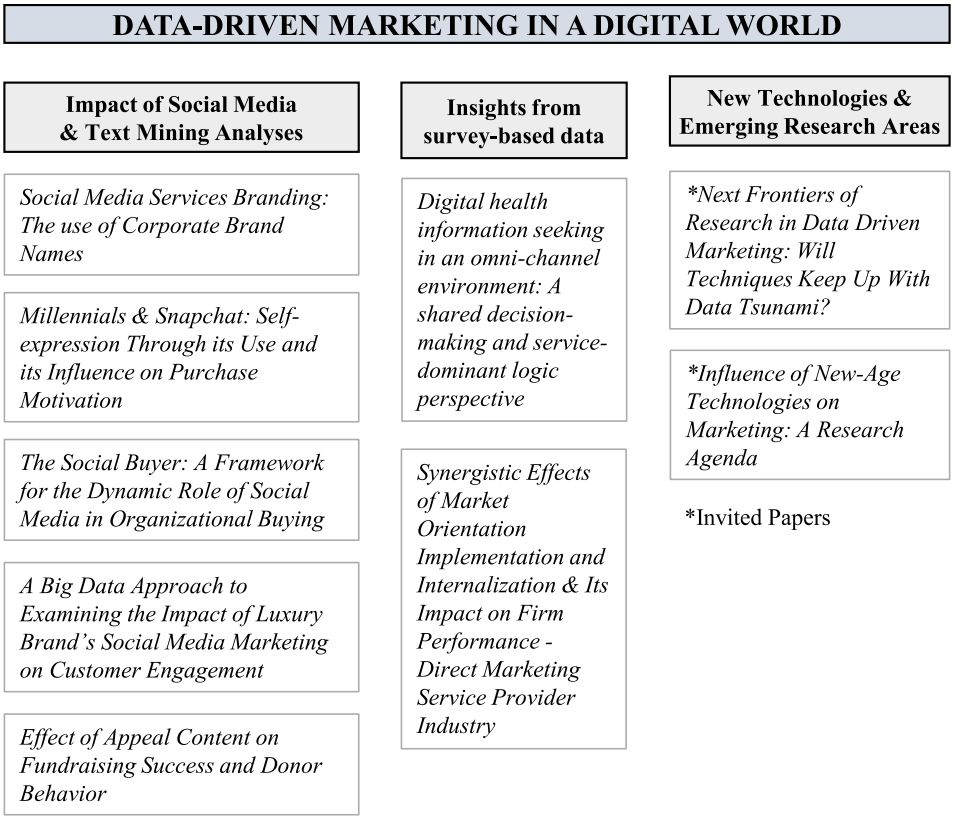

Fig. 2. Overview of papers in the Special Issue.

literature, discuss relevant theories, and develop a set of propositions that govern the processes. They propose two processes attributable to social media – conveyance and convergence – that enable knowledge discovery and dissemination. Conveyance is the process of collecting and sharing useful information for the firm (Dennis, Fuller, & Valacich, 2008) and convergence refers to the group activity of aligning interpretation of this information to form a shared understanding (Lind & Zmud, 1991). They develop a set of testable propositions that link characteristics of social media such as engagement and media richness to speed and quality of knowledge discovery, sharing, and interpretation. This knowledge discovery in turn is associated with cost reductions and/or efficiency gains. They further suggest buying situation and buying unit characteristics as moderators of the influence of social media. These propositions provide a rich foundation for empirical testing and validation in future work and open avenues for examining the influence of social media in an organizational buying setting.

3.5. Social media marketing of luxury brands

Social media has changed the way luxury brands interact with their customers in several different ways. Kim and Ko (2012) proposed five key activities related to a firm's social media marketing efforts in the context of a luxury fashion brand. These are: entertainment, interaction, trendiness, customization, and word of mouth. Liu, Shin, and Burns (2020) build upon this framework in their study titled 'A Big Data Approach to Examining the Impact of Luxury Brand's Social Media Marketing on Customer Engagement' in the context of Twitter as the social media platform. The authors employ a relatively large dataset comprising of 3.78 million tweets from top fifteen (based on the number of Twitter followers) luxury brands over a time period of five years (July 2012-June 2017). The authors apply a fixed-effects regression model to establish a relationship between customer engagement and social media marketing activities of the respective luxury brands. Consequently, the authors evaluate actual behavior of customers in response to social media marketing activities of firms over time rather than relying on survey-based measures that tend to evaluate 'intentions' and not actual behaviors.

The authors find that luxury firms' social media marketing activities related to enhancing entertainment, interaction, and trendiness positively affects customer engagement with brand related social media content. However, in the context of Twitter (as the social media platform), customization efforts of luxury brands' social media activities fail to affect customer engagement. This may be due to lack of data on personal interactions between the firm and customers and/or general lack of luxury brands using Twitter for personalized communications with their followers/customers. The findings from the study bear implications for the design, delivery, and management of social media marketing by luxury brand firms.

3.6. Text mining analyses of fund-raising appeal content

Crowdfunding is the practice of funding a project or venture by raising small amounts of money from a large number of people, typically via the Internet. However, success could prove to be elusive. For example, teachers at over 80% of all K-12 public and charter schools in the US use online crowdfunding platforms such as DonorsChoose.org for acquiring classroom supplies while reaching their goals only 75% of the time (Kamatham, Pahwa, Jiang, & Kumar, 2020). In the study titled 'Effect of Appeal Content on Fundraising Success and Donor Behavior', the authors employ a data-driven approach to understand how appeal content can possibly influence fundraising success and donor behavior. Towards this endeavor, the authors use data from 439,198 donors who made 888,308 individual donations toward 168,675 projects over a time period of five years in the context of a crowdfunding platform for K-12 teachers. Given the overarching objective, the authors apply text analyses to parse the content and create content-based measures such as word count, sentiment, readability, and fog index corresponding to every fundraising appeal to analyze the effect of appeal content on

funding success and donation amount. The authors also examine how framing information provided on crowdfunding platforms influences donor behaviors.

The study finds that longer appeals attract lower donations and hurt funding success, but the effect is moderated by sentiment and sophistication. Sophistication of the appeal has a positive effect on fundraising and the amount donated. Providing information on the state of a project has a positive effect on donations made by subsequent donors, a result that corroborates reinforcement models of donor behavior. Overall, the study offers substantive data-driven insights for both fundraisers and platforms. The next 2 papers offer insights from analyses of survey-based data.

3.7. Consumers' health information seeking in an omni-channel environment

We are living in a world of sophisticated consumers that employ omni-channel information seeking. Omni-channel implies integration and orchestration of multiple channels for information seeking. Another stream of research related to the notion of service dominant logic has emphasized the importance of marketers to seek ways to facilitate consumers' value co-creation (Vargo & Lusch, 2017). Dahl, Milne, and Peltier (2020) argue that consumers' health information seeking in today's omni-channel information environment is a critical value co-creation activity that increases consumers' engagement. They bring the concept of omni-channel and service-dominant logic together in their study titled 'Digital health information seeking in an omni-channel environment: A shared decision making and service-dominant logic perspective'.

The study explores the consequences of consumers' omni-channel health information seeking by collecting data from 310 health consumers as part of a healthcare organization's annual door-to-door wellness study and analyzing it within a structural equation model framework. The authors empirically validate several interesting relationships including a positive association between health accountability and consumers' health self-awareness and external digital information seeking by consumers and consumers' health self-awareness. Substantively, the study contributes to the call for improving health outcomes by transforming the health service ecosystem directed at engaging consumers to adopt a mindful approach to their health-related decision making.

3.8. Synergistic Effects of Market Orientation

The pace of business is changing faster than ever before. Inability to respond to changes can often pose serious challenges to survival for business. In the study titled 'Synergistic Effects of Market Orientation Implementation and Internalization & Its Impact on Firm Performance - Direct Marketing Service Provider Industry', Abbu and Gopalakrishna (2020) build upon the important construct of market orientation as a means for firm performance. More specifically, the authors introduce market orientation internalization as a mediator between market orientation implementation and firm performance relationship. In addition, they conceptualize the impact of learning orientation as a moderator that strengthens the relationship between market orientation implementation and market orientation internalization.

The authors evaluate the hypothesized relationships with data from 143 firms in the direct mail/marketing service provider industry and find that firms that practice high degree of market orientation implementation are in a better position to not only effectively generate, disseminate, and respond to changing market needs but also serve customers better. Furthermore, higher levels of marketing orientation implementation enable firms to identify customer needs and to develop new products quickly to solve customer problems. Similarly, the presence of higher market orientation internalization enables firms to fully realize the benefits of market-sensing, market-learning, and customer-linking capabilities, thereby allowing them to create customer value and proactively build long term collaborative relationships. Collectively, the study underscores the importance of market orientation implementation and internalization to go in tandem and complement each other to enable firms to perform in rapidly changing business environment.

3.9. New-age technologies and implications for future research

So, where do we go from here? How will data-driven marketing in an increasingly digital world help shape future research? We conclude the special issue with an invited commentary from Dr. V Kumar and his colleagues. The paper "Influence of New-Age Technologies on Marketing: A Research Agenda" provides a great summary of the impact of evolving digital technologies in the near future. Kumar, Ramachandran, and Kumar (2020) focus on the relevance and impact of four key technologies, namely The Internet of Things (IoT), Artificial Intelligence (AI), Machine learning (ML) and Blockchain technologies. They undertake an in-depth explanation and analysis of each technology, outline areas in marketing that these technologies are likely to have a major impact and develop research questions that need to be considered by future researchers. They provide a number of thought-provoking frameworks to set the stage for a discussion of the topics. For instance, they develop a principal orientation for each technology – IoT in data generation, AI and ML in processing and analyzing the data and blockchain in providing security. Then they focus on issues facing the firm, the customers, and the intermediaries thus providing a comprehensive set of about twenty research questions that need to be answered. The examples of use cases are all novel and forward looking. They present an array of customer facing changes that are likely to come in the near future such as grocery stores where customers walk out with merchandise, health checkups and monitoring by machines and mobile devices, custom entertainment and service options in the hospitality industry. All of these require a greater sharing of data, trust, and responsibility on part of the firm for their successful use and adoption. They develop a large set of hypotheses that will provide researchers with a rich set of ideas for empirical investigation.

Overall, the collection of nine studies included in this special issue richly describes the challenges that marketing practitioners face and highlights research issues that need to be addressed. We hope the special issue will be very useful to students, researchers and practitioners as they encounter volumes of data and revolutionary digital technologies.

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