

# INNOVATION AND STRATEGY

# REVIEW OF MARKETING RESEARCH

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REVIEW OF MARKETING RESEARCH VOLUME 15

# INNOVATION AND STRATEGY

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# ABOUT THE GUEST EDITORS AND AUTHORS

## GUEST EDITORS

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He is Fellow of the American Marketing Association and Distinguished Fellow of the Academy of Marketing Science. He served as Editor of the *Journal of Marketing* from 1993 to 1996 and as Editor of the *Journal of the Academy of Marketing Science* from 2000 to 2003. He currently serves on the Editorial Review Boards of a number of journals including the *Journal of Marketing*, *Journal of the Academy of Marketing Science*, and *Journal of International Marketing*.

He is a recipient of a number of honors and awards including the Texas A&M University Mays Business School Lifetime Achievement Award for Research and Scholarship (2016), American Marketing Association-Irwin-McGraw Hill Distinguished Marketing Educator Award (2015), American Marketing Association Paul D. Converse Award for Contributions to the Field of Marketing (2008), University of Massachusetts Distinguished Alumnus Award (2008), Academy of Marketing Science Distinguished Marketing Educator Award (2003), American Marketing Association Marketing Strategy Special Interest Group Vijay Mahajan Award for Lifetime Contributions to

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His current research (1) investigates the influence of marketing assets and/or marketing presence on the top management team on firm financial performance

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His articles appear in the *Journal of Marketing*, *Journal of the Academy of Marketing Science*, *International Journal of Research in Marketing*, *Journal of Retailing*, *Marketing Letters*, and *Journal of Product Innovation Management*, among others, and he has written several *Harvard Business School Publishing* case studies that bring his academic research into the classroom.

He is recognized for his research activity and is a recipient of numerous teaching awards for courses taught at both the graduate- and undergraduate-level, including being named: a 2017 Top 40 Undergraduate Business Professor by *Poets & Quants*, recipient of the 2017 Most Outstanding MBA Faculty Member Award, and recipient of the 2017 *Allen H. Keally Excellence in Teaching Award*.

He has also served as Consultant and Seminar Leader for government clients and leading multinational corporations, and as Faculty at Temple University, Babson College, University of Texas at Austin, and University of Chicago. Prior to earning his doctorate, he worked in product and price management at Miller Brewing Company.

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Prior to joining Lehigh University he worked for hi-tech firms such as Intel and IBM. Most recently, he was Head of Engineering at a hi-tech startup in Dallas. He teaches in the executive programs and consults with leading firms worldwide on the topics of Developing Leaders, Breakthrough Creativity & Innovation, Product Design, Brand Management, and Customer Delight. His current topics of interest are Innovation, Entrepreneurship, Economic Globalization, and National/International Security.

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She is also an acclaimed Teacher. She has taught courses in ethics, corporate social responsibility, and marketing strategy for over 25 years. Her awards

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She is the inaugural winner of the Erin Anderson Award for an Emerging Female Marketing Scholar and Mentor (2009) and American Marketing Association's Varadarajan Award for Early Career Contributions in the area of marketing strategy and management (2010).

Her 2005 article on marketing in a recession published in *International Journal of Research in Marketing* won the best article award. She has reviewed for many journals and currently serves on the Editorial Review Board of the *Journal of Marketing* and is an Associate Editor for the *Journal of the Academy of Marketing Science*.

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editorial review boards of the *Journal of the Academy of Marketing Science* and the *Journal of Business Research*. In 2009 and 2012, he was honored by the University of Mississippi Business School with their Senior Researcher of the Year Award in addition to winning the Award for Best paper by a Business School Faculty member in 2012.

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# INTRODUCTION

## OVERVIEW

*Review of Marketing Research*, now in its 15th volume, is a publication covering the important areas of marketing research with a more comprehensive state-of-the-art orientation. The chapters in this publication review the literature in a particular area, offer a critical commentary, develop an innovative framework, and discuss future developments, as well as present specific empirical studies. The first 14 volumes have featured some of the top researchers and scholars in our discipline who have reviewed an array of important topics. The response to the first 14 volumes has been truly gratifying and we look forward to the impact of the 15th volume with great anticipation.

## PUBLICATION MISSION

The purpose of this series is to provide current, comprehensive, state-of-the-art articles in review of marketing research. Wide-ranging paradigmatic or theoretical, or substantive agendas are appropriate for this publication. This includes a wide range of theoretical perspectives, paradigms, data (qualitative, survey, experimental, ethnographic, secondary, etc.), and topics related to the study and explanation of marketing-related phenomenon. We reflect an eclectic mixture of theory, data, and research methods that is indicative of a publication driven by important theoretical and substantive problems. We seek studies that make important theoretical, substantive, empirical, methodological, measurement, and modeling contributions. Any topic that fits under the broad area of “marketing research” is relevant. In short, our mission is to publish the best reviews in the discipline.

Thus, this publication bridges the gap left by current marketing research publications. Current marketing research publications such as the *Journal of Marketing Research* (United States), *International Journal of Marketing Research* (United Kingdom), and *International Journal of Research in Marketing* (Europe) publish academic articles with a major constraint on the

length. In contrast, *Review of Marketing Research* can publish much longer articles that are not only theoretically rigorous but also more expository, with a focus on implementing new marketing research concepts and procedures. This also serves to distinguish this publication from *Marketing Research* magazine published by the American Marketing Association (AMA).

Articles in *Review of Marketing Research* should address the following issues:

- critically review the existing literature;
- summarize what we know about the subject – key findings;
- present the main theories and frameworks;
- review and give an exposition of key methodologies;
- identify the gaps in the literature;
- present empirical studies (for empirical papers only);
- discuss emerging trends and issues;
- focus on international developments;
- suggest directions for future theory development and testing; and
- recommend guidelines for implementing new procedures and concepts.

## CHAPTERS IN THIS VOLUME

This special issue focuses on marketing strategy and innovation. A key aspect of how a firm competes in its chosen markets is through innovations of various types such as product, process, and business model innovations. Innovation can be fostered at various levels such as firm, business, product, and brand. Such innovations can be a source of generating and sustaining competitive advantage in the marketplace. The chapters in this volume represent an eclectic mix of substantive issues and methodological approaches to strategy and innovation contained in conceptual and empirical papers.

Bharadwaj introduces a taxonomy of approaches available for strategic decision making in an information-rich environment in the era of Big Data. He then applies this taxonomy to an innovation context, mapping a stylized version of the phases of the innovation process onto the four decision-making approaches. This results in an organizing framework for understanding strategic decision making in the realm of innovation.

Spanjol, Xiao, and Welzenbach synthesize the literature on concepts related to successive innovation that is fragmented and limited across marketing and management disciplines. They identify the core dimensions of successive innovation and provide a cohesive framework to guide future research in this area. On this basis, they identify several directions for future research.

Customer Involvement in Innovation is an intriguing area. Cui and Wu review empirical research in this field in a way that better connects this research with marketing strategy literatures and offer opportunities for further

theoretical development. There remains a need for research conducted from the firm's strategic perspective to understand how firms may effectively manage the challenges of customer involvement in innovation and to examine its implications for a firm's long-term innovation strategy and overall performance.

The challenges of assessing the relative impact of major sources of innovation on the brand equity of a firm are well recognized. Kumar, Anand, and Nim introduce a taxonomy of various costs and benefits related to innovations and apply that to understand the relative strengths of various sources of innovation affecting a firm's brand equity. Their conceptual framework identifies six distinct sources of innovations – firm, customers, external network, competition, macro-environment, and technology – and explains how they create value and affect brand equity. They find that the customers and the technology as a source of innovation have the maximum impact on the firm's brand equity, followed by the marginal impact of macro-environment and external network of a firm. The firm itself has a moderate impact on its brand equity, while competition has the minimal impact. Such thinking can help firms focus on the most pertinent sources of innovation for enhancing brand equity.

Varadarajan provides an overview of the conceptual domains of innovation, innovation strategy, and strategic innovation. He does so by defining innovation, product innovation, business model innovation, marketing innovation, innovation strategy, and strategic innovation, and elaborating on their literature and conceptual underpinnings. Such a perspective can be useful in synthesizing the number of definitions of innovation and specific types of innovation that exist in the literature.

A number of empirical papers in this volume shed light on important issues in strategy and innovation. Market foresight is the knowledge of market changes ahead of competitors and the conversion of that knowledge into creative and timely new product offerings. Based on a discovery-oriented process, working closely with managers throughout the research process, we foresight. McCardle, White, and Calantone develop and test a framework delineating market information determinants and new product outcomes of market foresight. Their results indicate that external (active scanning, lead user collaboration, and market experiments) and internal sources (boundary spanner input and interdepartmental connectedness) of market information positively affect market foresight. Furthermore, the organization's open-mindedness positively moderates the effects of active scanning, market experiments, and interdepartmental connectedness on market foresight. They provide evidence that firms with superior market foresight develop more creative products, introduce them to the market faster, and introduce them at a more opportune time.

Chitturi explores the differences in consumers' willingness to pay for different types of design attributes due to different levels of specific anticipatory emotions evoked by them. He conducts three experiments to test the hypothesized relationships between design attributes (functionality, aesthetics, and

environmental sustainability), specific emotions, and willingness to pay. The findings reveal that different attributes of design, namely, functionality, aesthetics, and sustainability, evoke different types of emotions and different levels of willingness to pay. Firms can leverage these findings by positioning and pricing products according to emotional requirements of the target customer segment and their willingness to pay.

Srinivasan and Lilien propose the construct of design orientation denoting a firm's ability to integrate functionality, aesthetics, and meaning in its new products. Using data from surveys of 252 US firms, they validate the construct of design orientation and establish its distinctiveness from related constructs of creativity, technological orientation, and customer orientation using structural equation modeling. They found that, individually, design orientation, technological orientation, and customer orientation improve new product performance. Also, customer orientation decreases the positive effect of design orientation while willingness to cannibalize increases the positive effect of design orientation on new product performance.

Morgan and Vorhies draw upon the behavioral theory of the firm and the competing values theory perspective on organizational culture to develop a theoretical framework to examine the business performance outcomes of market orientation (MO) culture and behaviors. Using confirmatory factor analysis and seemingly unrelated regression, they find that MO culture has an important direct effect on firms' financial performance as well as an indirect effect via MO behaviors and innovations. Organizational culture domain of MO appears to be at least as important in explaining firm performance and implies that researchers need to revisit the conceptualization and the operationalization of MO as an important construct in strategic marketing thought.

Cunningham synthesizes the literature on rapid-growth SMEs (gazelles) through a unifying theoretical lens. She offers interesting insights as to why some privately held small- and medium-sized firms (SMEs) have been able to outperform their peers in terms of revenue growth, profit growth, growth in number of employees and markets. Based on elite interviews with 47 informants drawn from 21 rapid-growth, private companies, several findings emerged using qualitative methodology. Early strategic choices made by the owners of private firms along with their attitudes and capabilities positioned the private firms for rapid growth. She proposes a modified, two-stage model. The first stage focuses on respect for the value employees bring and building their trust and commitment that subsequently drives the second stage of the model — building customer trust and commitment.

Together these chapters lead to new insights, approaches, and directions for research on strategy and innovation. It is hoped that collectively the chapters in this volume will substantially aid our efforts to understand more about both strategy and innovation and to provide a broader arsenal of research methods

as well as fertile areas for future research. The *Review of Marketing Research* continues its mission of systematically analyzing and presenting accumulated knowledge in the field of marketing as well as influencing future research by identifying areas that merit the attention of researchers.

Naresh K. Malhotra  
*Editor-in-Chief*

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# **CONCEPTUAL PAPERS**

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# STRATEGIC DECISION MAKING IN AN INFORMATION-RICH ENVIRONMENT: A SYNTHESIS AND AN ORGANIZING FRAMEWORK FOR INNOVATION RESEARCH

Neeraj Bharadwaj

## ABSTRACT

*Purpose – In the era of Big Data, larger volumes of data arrive in various forms at an increasing pace but of questionable quality and value. The abundant information (that emanates from these 5Vs – volume, variety, velocity, veracity, and value) taxes the bounded capacity of managers. This chapter introduces a taxonomy of approaches available for strategic decision making in an information-rich environment, several of which showcase that automation can help to augment (not supplant) managerial decision making. This taxonomy is then applied to an innovation context. Mapping a stylized version of the phases of the innovation process (i.e., front-end innovation, new product development, commercialization) onto the four decision-making approaches yields an organizing framework for understanding strategic decision making in the realm of innovation. The chapter concludes by identifying promising areas for future research.*

*Methodology/approach – This conceptual chapter: (1) explicates the foundational terminology regarding strategic decision making in a marketing*

*context; (2) provides a primer on the era of Big Data and making strategic decisions in an information-rich environment; (3) introduces a taxonomy, which features approaches to decision making in an information-rich environment; and (4) applies the taxonomy in an innovation context to yield an organizing framework.*

*Findings – This chapter focuses on the nascent field that is emerging at the intersection of innovation, marketing strategy, and information-rich environments, and breaks new ground by exploring automation available to aid managerial decision making in this realm.*

*Practical implications – The main practical implication is to elucidate that managers can apply different approaches to decision making in today's information-rich environment. Tables 2–4 provide to managers 12 examples of the types of decision making in an innovation context.*

*Originality/value – This chapter introduces a new taxonomy to classify four approaches for making strategic decisions in an information-rich environment, and extends that framework to the innovation realm. This framework aims to prompt researchers to explore important topics that exist at the intersection of innovation, marketing strategy, and managerial decision making in an information-rich environment.*

**Keywords:** Innovation; Big Data; information-rich; attention; strategic decision making; marketing strategy

Today's decision-making environment is information-rich. Managers have at their disposal a trove of customers' prepurchase, transactional, and post-purchase data that is being captured, processed, indexed, and stored so that useful information is available in real time. The information can be combined with text, images, and video from Internet and social media activity, and such external macroenvironmental inputs as the state of the economy, regulatory conditions, and weather patterns to generate a more complete understanding of buyer behavior and new product opportunities. Walmart managers, for example, rely on a state-of-the-art analytics computing ecosystem consisting of over 200 streams of internal and external information on demand and supply to make important business decisions (Marr, 2017a).

While the availability of abundant, diverse information in real time can represent a boon, the potential of having a "God-like view of the marketplace" (Stucke & Ezrachi, 2016) can also represent a bane. The reason is that the wealth of information comes at a cost: it "creates a poverty of attention"

(Simon, 1971, p. 40). Current scholarly discourses have recognized that the abundance of information taxes the bounded cognitive capacity of managers (see, e.g., assertion from managers that “we are drowning in data!” noted in [Bharadwaj & Noble, 2015](#)), as have exhortations from executives. Satya Nadella, chief executive officer of Microsoft, summarizes that “the true scarce commodity is increasingly human attention” ([Mosendz, 2014](#)).

Fortunately, advances in technology represent a means to automate some tasks that previously absorbed managerial attention ([Hodson, 2016](#); [Ng, 2016](#); [Zilis & Cham, 2016](#)). Increasingly, an organized collection of devices (e.g., sensors, computer portals, servers), software, and databases serve as decision-making aids that permit managers to capture data, index the data so that it is organized into useable information for decision making, and store it in the form of reports (outlining lessons learned), datasets, and real-time dashboards that are readily accessible (see, e.g., [Nonaka & Takeuchi, 1995](#); [Pugh & Dixon, 2008](#)). These decision-making aids are referred to as marketing management support systems (MMSS) in the literature, and deemed as “useful tools to help marketing decision makers carry out their jobs” ([Van Bruggen & Wierenga, 2009](#), p. 209).

Decision-making experts recognize that management teams must have multiple approaches to decision making in their repertoire, ranging from the traditional rational approach to intuition-based and other approaches ([Bazerman & Moore, 2011](#); [Kahneman, 2011](#); [Simon, 1997](#)). Accordingly, the first objective of this manuscript is to create a taxonomy of some approaches available for strategic decision making in information-rich environments. Several of these approaches showcase that automation can help to augment (not replace) managerial decision making. The second objective is to couple a stylized version of the phases of the innovation process (i.e., front-end innovation, new product development, commercialization) onto the four decision-making approaches to create an organizing framework for understanding decision making in the realm of innovation, and identify a representative exemplar that can fit into each of the 12 different cells. The third aim is to identify promising areas for future research for those scholars interested in exploring new boundaries at the intersection of marketing strategy, innovation, and managerial decision making in an information-rich environment.

This chapter proceeds as follows. The second section explicates the foundational terminology regarding strategic decision making in a marketing context. The third section discusses strategic decision making in the era of Big Data, and introduces the challenge that is imposed by the copious amount of information available in the decision-making environment on managerial attention. The fourth section advances that technological advances can aid managerial decision making, and advances a taxonomy of four strategic managerial decision-making approaches found in an information-rich environment. The fifth section generates an organizing framework to structure thinking on innovation in information-rich environments. The sixth section identifies future research directions.

## **EXPLICATING THE MEANINGS OF STRATEGY, MARKETING STRATEGY, AND STRATEGIC DECISION MAKING**

It is necessary to begin with an overview of some basic terminology to establish the foundation for the ensuing discussion. The terms that require elaboration include: strategy, marketing strategy, and strategic decision making. Each is addressed in turn.

Strategy refers to “a central, integrated, externally oriented concept of how the business will achieve its objectives” (Hambrick & Frederickson, 2001, p. 52). This definition of strategy establishes the objectives that represent what the business wishes to achieve, and strategy represents the means that are available to reach the desired ends. Furthermore, it advances that strategy consists of five elements: arenas, differentiators, vehicles, staging, and economic logic.

1. Arenas equate to the domain(s) in which the business intends to be active. At a broad level, this entails determining which market segments to pursue and the product categories to offer to the respective segments. The reason is that “who is the customer?” is the crucial question in defining the purpose of the business (Drucker, 1973), and whether to pursue current and/or new customers is critical to marketing (Varadarajan, 2010). In acquisition decisions, firms often obtain other ventures that are complementary in nature to better serve their existing customer base (e.g., the goods-dominant retailer Best Buy acquiring the Geek Squad service team).
2. Differentiators pertain to how the business intends to win in the domains in which it elects to compete. This requires detailing the basis for the customer value proposition, ranging from operational excellence (i.e., focus on operations to make available low price goods and/or services) to customer intimacy (i.e., focus on customers to offer customized solutions at varying price points) to product leadership (i.e., focus on R&D to make available the best-in-class offering) (Treacy & Wiersema, 1993). Microsoft CEO Satya Nadella, for example, has shifted from the product-centric view of his predecessor that the firm was a device and services company to one whose evolution demands improving productivity “of every person and organization on the planet” (Mosendz, 2014).
3. Vehicles take into consideration how a firm will enter into a market. This encompasses specifying whether the business will opt to “make” (do everything in-house) or “buy.” If the latter, the business needs to determine the collaborators (i.e., suppliers, intermediaries, etc.) who can assist to compete in the chosen domains.
4. Staging pertains to the sequence in which the business intends to pursue the arenas and vehicles. This requires designating market segments (i.e., primary, secondary, and tertiary) and determining the speed of expansion given the firm’s (financial, managerial, technical, and production) available resources.

5. Economic logic encapsulates assessing the financial viability of each of the alternative pursuits into the respective arenas. This requires constructing a model that can trace the path (based on economic logic) from an investment to profits, which exceed the cost of capital.

It is commonplace to hear in academic and practitioner discourses alike that marketing is “the science and art of finding, retaining, and growing profitable customers” (Kotler & Armstrong, 2001). Thus, if the objective of business is to make a profit that exceeds the cost of capital, then marketing’s objective is to ensure that the firm receives revenues from its customer portfolio that exceed the costs incurred to obtain new customers and maintain existing ones (Kumar, 2008).

It follows that marketing strategy refers to

an organization’s integrated pattern of decisions that specify its crucial choices concerning products, markets, marketing activities, and marketing resources in the creation, communication, and/or delivery of products that offer value to customers in exchanges with the organization and thereby enables the organization to achieve specific objectives. (Varadarajan, 2010, p. 128)

This definition suggests that marketing strategy requires firms to engage in decisions that specify how the firm should: (1) balance customer retention (a defensive strategy) versus acquisition (an offensive strategy); (2) deliver value to the chosen set(s) of customers through products, channels, and/or communications; and (3) capture value for the firm via its pricing, and optimally allocate resources across the customer portfolio.

Finally, decision makers participate “in the enactment of the environment and the social construction of organizational moves” (Ocasio, 1997, p. 200). These individuals generate a solution when confronted with a problem or opportunity. In order for the decision making to be deemed strategic, it requires adding “to achieve some predetermined objective(s)” to the back end of the above definition to complete the five elements of strategy introduced earlier. Thus, such pressing marketing questions that involve strategic decision making can include: should the firm pursue a new arena?; can the firm improve the algorithm upon which the current recommender system is based to more effectively broaden and deepen relationships with existing customers?; will leveraging social media conversations help the firm attract new customers?; and can the firm enhance its existing go-to-market strategy?

## **MAKING STRATEGIC DECISIONS IN THE ERA OF BIG DATA**

The term Big Data refers to “data that is too big, too unstructured, or too diverse to be stored and analyzed by conventional means” (Davenport, 2012).

So what makes the “big” data that is available today different from that available in the past? McAfee and Brynjolfsson (2012) outline the well-known 3Vs (volume, variety, and velocity), and I include two other Vs (veracity and value) mentioned in contemporary discourses.

Volume refers to the sheer amount of data that is now being created. Reports suggest that 90% of the data that exists today was created in the last two years (IBM, 2013), and that the amount of data in the universe will continue to double every year (EMC, 2015). This growth – mirroring Moore’s law, which maintains that processing capabilities of microchips (or also known as microprocessors and integrated circuits) double approximately every two years (Moore, 1965) – has resulted in the introduction of such prefixes as peta- ( $10^{15}$ ), exa- ( $10^{18}$ ), zetta- ( $10^{21}$ ), and yottabytes ( $10^{24}$ ) to extend the general lexicon beyond gigabytes ( $10^9$ ) and terabytes ( $10^{12}$ ) in order to accurately describe how much data is available for decision makers. It has also resulted in the need for new technologies – such as Hadoop – that permit the distributed storage of and accessibility to massive amounts of data.

Variety refers to nature of the data that is being created. Whereas structured data exist in numeric forms and can be readily placed in predefined fields (e.g., rows and columns in an Excel spreadsheet), most data being generated today are unstructured. Unstructured data arrive in such forms as text (e.g., postings from social media platforms), sound (e.g., conversations from a call center interaction), images (e.g., pictures and videos from in-store cameras), sensors (e.g., from tracking product components or weather-related data), and geographic information system data (e.g., consumers’ location based on tracking by mobile phone or sensors). An important nuance of unstructured data is that it requires further processing so that it can be placed in predefined fields to become usable by decision makers. A simple example can be provided from the realm of text mining. For those researchers interested in evaluating conversations in social media, the totality of the text can be compiled into a corpus and then processed using computerized text analysis software. Linguistic inquiry and word count (LIWC), for example, is a software that can assess a corpus and reveal a broad range of social and psychological insights, including the sentiment (i.e., positive emotion, negative emotion) as well as the cognitive thinking style that underlies the text. The output generated by the LIWC software appears in over 80 different columns, and the numeric equivalent can be entered in empirical analyses (for more details, please see <http://liwc.wpengine.com> and Bharadwaj, Noble, Tower, Smith, & Dong, 2017).

Velocity refers to the rate at which the data is being created. With advanced information technologies and sensors, a greater amount of pretransaction, purchase, and consumption structured and unstructured data are digitized and available for real-time decision making. Walmart, with 20,000 stores in 28 countries, processes some 2.5 petabytes ( $10^{15}$ ) of data every hour, which managers can access to model and visualize solutions to complex business problems in real time (Marr, 2017a), and the reports are that Walmart will

continue to grow their Data Café (where Café stands for Collaborative Analytics Facilities for Enterprise) in order to provide their managers access to data from such valuable sources as A.C. Nielsen, social media postings, telecom activity, credit card usage, and the external macro-environment (e.g., weather, gas prices, economic state) to make informed decisions and predictions about such critical items as product assortment, stocking levels, pricing, and in-store merchandising (Kern, 2017).

In addition to the 3Vs, IBM advances that veracity – which refers to the quality of the data that is made available to decision makers (Biehn, 2013) – ought to be another consideration. Big datasets are often incomplete, as certain fields may be sparsely populated (e.g., a customer's salary, web search history, social media activity; Wedel and Kannan, 2016). Other times, the data captured may not be fully reliable. Consequently, it is necessary to verify the accuracy and completeness of the data that is available, which is reflected in the report that approximately one-third of business leaders indicate that they do not trust the information that is readily available to make decisions (<http://www.ibmbig-datahub.com/infographic/four-vs-big-data>).

A 5th V is also mentioned in the popular press: value. Biehn (2013) explains that having the appropriate data will allow the data scientist to explore unique combinations with the varied data and pursue more sophisticated queries. In this regard, software vendors like Hortonworks aim to ensure that the various streams of data collected must be amenable to being assembled in unique permutations to further inform managerial decisions (Den Bleyker, 2017). As noted at the outset, Walmart makes available over 200 streams of internal and external information on demand and supply that managers can harness (Marr, 2017a).

In summary, it is maintained that Big Data encompasses the 5Vs, and a data-rich environment “is one in which decision makers must process larger volumes of data which arrive in various forms at an increasing pace and may be combined with other data, but may be incomplete or of questionable quality” (Bharadwaj & Noble, 2017, p. 560). Also, it is necessary to make the observation that data are not useful per se. Although it is correct to advance that data represent “the oil of the digital economy” as they are an invaluable resource (Wedel & Kannan, 2016), it is necessary to recognize that data (akin to crude oil) are a raw material that requires further processing. Crude oil is a mixture of many different hydrocarbon molecules, which the refining process separates into useful components (fractions). Those fractions are further processed to remove impurities, and create the desired product (e.g., diesel, jet fuel, or gasoline). Thus, capturing data becomes a necessary condition, but they must be processed to be translated into information that is meaningful for decision makers (see, e.g., writings on organizational learning: Senge, 1990; Huber, 1991; Nonaka & Takeuchi, 1995).

The fact that an organization possesses an abundance of data (or be data-rich) does not guarantee that managers will make good decisions (Shah,

Horne, & Capella, 2012). This can result if the organization is not adept at filtering, processing, indexing, and storing the data to be useful for managerial decision making. The basic idea is that some mechanism must exist to translate the raw data into a meaningful form (i.e., information) that can be utilized by a manager to make a strategic decision.

In this regard, Walmart serves as an exemplar of being information rich. Walmart's Data Café harnesses the abundant data that are available in various forms and growing exponentially and validates and indexes the data so that information is readily available to be applied to answering such pressing managerial questions as: how do weather patterns affect consumption across current customers?; what has led to the rash of stockouts in the Northeast?; what is the optimal pricing strategy for a new private-label line to entice a competitive retailer's customers?; and will acquiring a new online channel permit the firm to increase appeal to "digital natives"?

The next section examines managerial decision making in an information-rich environment, and delves into a central thesis advanced by Herbert Simon (1971) that is even more true today: that the abundance of information imposes a cost on managerial attention. Given that managerial attention is scarce, it becomes necessary to understand how automation can augment (not supplant) managerial decision making.

## **STRATEGIC DECISION MAKING IN AN INFORMATION-RICH ENVIRONMENT**

Strategic decision makers enact the environment and are responsible for the social construction of organizational moves to achieve some predetermined objective(s) (see, e.g., Bazerman & Moore, 2011; Simon, 1997; Weick & Sutcliffe, 2001). These individuals (be they mid- or upper-level managers) are required to generate a solution when confronted with an important problem or opportunity (referred to as an issue hereinafter) requiring managerial attention (Scott, 1992).

According to the attention-based view of the firm (Ocasio, 1997), attention encompasses

the noticing, encoding, interpreting, and focusing of time and effort by organizational decision makers on both (a) *issues*: the available repertoire of categories for making sense of the environment: problems, opportunities, threats; and (b) *answers*: the available repertoire of action alternatives: proposals, routines, projects, programs, and procedures. (p. 189)

Thus, attention in a strategic management context is viewed more broadly than in a consumer behavior setting where the focus may be on just initially noticing some stimulus (e.g., Venkatraman et al., 2015).

In today's decision-making environment, however, the amount of time that is available to a manager to devote to strategic issues is dwarfed by the time



spent on non-strategic activities. This is reflected in a large-scale global survey, which reveals that the bulk of a manager's time (54%) is devoted to routine work that falls under the rubric of "administrative coordination and control" (e.g., scheduling, preparing employee evaluations, preparing monthly status reports), and only limited time (30%) is available to attend to strategic decisions which require "solving problems and collaborating [with others]" (Kolbjornsrud, Amico, & Thomas, 2016). To this point, one study estimates that 25% of an executive's time is spent on administrative tasks that are ripe for being relegated to automation, thereby freeing up managerial attention for strategic choices as the arenas in which the firm ought to compete (Manyika, Chui, & George, 2017).

Fortunately, the availability of machine intelligence tools means that managers can devote their attention to certain strategic tasks and rely on automated solutions to serve as a strategic advisor on others. The low cost of acquiring, indexing, and storing data coupled with the availability of a host of analytic tools and software allows managers to process the data and have access to technological solutions that can aid decision making. For instance, a manager can rely on software to track a current customer's social media and text activity to ensure a continually favorable customer experience, and automate the interaction to enhance engagement, operational efficiency, and revenues (see, e.g., the omnipresent conversational commerce messaging tool available from msg.ai that provides instant personal support to customers when they require a communication, and seamlessly escalates sensitive issues requiring an immediate response to a human agent). The availability of these tools is an important development in light of the well-established fact that human beings have a bounded capacity to be rational decision makers (Simon, 1947, 1997).

The preceding discussion suggests that managers can deploy a host of approaches to arrive at the chosen course of action. It is possible to extend contemporary summaries of managerial decision making (Bazerman & Moore, 2011; Fox, 2014; Lilien, 2011) by creating a taxonomy that is premised upon: (1) the level of automation that gets deployed and (2) the amount of managerial attention that get devoted. The level of automation can range from low to high, and is premised on earlier discourses on decision support systems that describe that the noted goal is to support (not replace) the marketer in exploring solutions to strategic marketing issues (Van Bruggen & Wierenga, 2009). Another consideration is the attention that is required to generate a solution for the issue at hand, and can range from low to high managerial attention. This results in the  $2 \times 2$  matrix found in Fig. 1, and serves as a basis to outline some possible approaches to decision making in an information-rich environment.

The well-known "rational" approach (noted as "traditional" in the first cell in Fig. 1) requires a great deal of managerial attention to the issue at hand and relies on a low level of automation. As shown in Fig. 2, the traditional decision-making approach – which assumes that the world is predictable and data readily available (see, e.g., Bazerman & Moore, 2011) – begins with the

|   |                             |                 |
|---|-----------------------------|-----------------|
|   | <b>Managerial Attention</b> |                 |
| <b>Level of Automation<br/>Employed by Decision Maker</b> | Traditional                 | Intuition-based |
|   | Joint Cognitive Systems     | Algorithm-based |

Fig. 1. Approaches to Making Strategic Decisions in an Information-rich Environment.

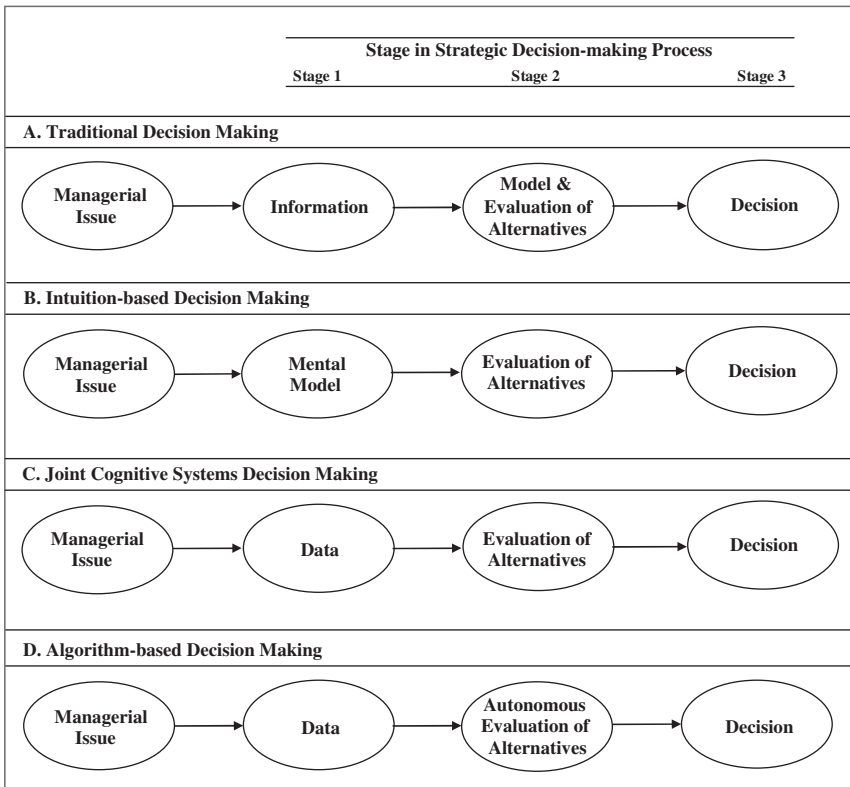


Fig. 2. Managerial Decision-making Approaches in an Information-rich Environment.

managerial team defining the issue, and then gathering information from within the firm and the external environment to understand the contextual forces (e.g., competition, economy, technological advances, regulatory environment, and so on) and the parameters within which they must work. They then couple that

information with the team's managerial intuition (which is tacit knowledge based on the managers' background, experience, and expertise) to better understand the situation and identify the potential alternatives (Nonaka & Takeuchi, 1995; Shah et al., 2012). The next step is for the team to construct a model – which is a simplified representation of the potential impact of a given alternative on a desirable outcome that can be evaluated on logical grounds (Hambrick & Frederickson, 2001; Lazer, 1962; Lilien, Kotler, & Moorthy, 1992) – for each possible marketing action and then evaluate the potential impact on the desired outcome. Given that multiple paths can be pursued to achieve the goal (equifinality), it is up to the decision makers to deliberate and choose the option that is likely to deliver the optimal results (Huber, 1991; Senge, 1990).

At times, managers may not pursue a structured, systematic approach. This can happen when they encounter a complex, ambiguous, or novel situation in which there is a lack of reliable information and/or the problem is ill-defined. In such uncertain settings (in which a probability cannot be assigned to the possible outcomes in different states of the world), evidence-based Big Data decision making may lead to inaccurate predictions because there are too many parameters to estimate and a large error can be introduced (Fox, 2015). It, therefore, becomes necessary to rely on the managerial background, experience, and expertise – or simply intuition (Gavetti & Rivkin 2005). Given that little automation is required and that managers do not have to go through a prolonged, formal marketing research process (i.e., they can draw on experience), the second entry shown in Fig. 2 is deemed intuition-based decision making.

When following the intuition-based approach, a manager envisions a potential opportunity or spots a problem on the horizon and filters out anything which may be unnecessary or distracting. Instead of devoting time and effort to undertake extensive formal data collection, a manager draws on past experiences and information stored in his/her mental model to trace out the various paths that are available to capitalize on the issue at hand. Managers possessing extensive domain knowledge have richly developed mental models and can leverage their deep insights to make connections and judgments about what is possible and what is likely to be met with interest in the marketplace (Vance, 2015). After considering the various alternatives and potentially conferring with others, the manager determines the course of action to be taken.

Delving into autobiographies of prominent CEOs illustrates that many successful leaders have often relied on the intuition. This is revealed in the autobiography of Steve Jobs (Isaacson, 2011), who believed that the tablet could become the most important device in Apple's ecosystem. He envisioned various scenarios that made the tablet central in the Apple ecosystem, and proceeded to evaluate various types of product concepts (including nixing any idea of a tablet with a stylus) before ultimately settling on the iPad. He then devised and marshaled a market-driving strategy, which required changing the market structure to make that opportunity a reality (Jaworski, Kohli, & Sahay, 2000).

Recognizing that larger volumes of data can tax cognitive bounds, the field of engineering has had a long-standing interest in joint cognitive systems: the development of computer-based systems to aid in managerial problem solving (see historical overview in Woods & Hollnagel, 2006). The marketing engineering literature similarly describes that managers can utilize a marketing decision support systems (MDSS) to conduct a “what-if” analysis by running computer simulations to test out an array of models (Lilien & Rangaswamy, 2004; Little, 1979; Reinartz & Venkatesan, 2008). Given that managers rely heavily on automation and devote high levels of attention (i.e., they “must still use critical thinking to set up questions and the criteria to test – to ensure the right information is collected – and to make the final decision” (Markham, Kowolenko, & Michaelis, 2015)), joint cognitive systems becomes the third entry in Fig. 2.

A managerial team can start with the working hypothesis about a given issue. For example, that a new product introduction by a rival can affect the marketplace success of the firm’s own products, the category, and perhaps even disrupt the industry. This working hypothesis gets reified via a model regarding the possible business implications of the rival’s new product introduction. The managers can conduct a set of “what-if” analyses to understand the impact of different rates of consumer acceptance for the rival offering under differing marketing interventions (e.g., sales promotions to consumers and the trade, sales territory reassignments, advertising), and simulate the likely competitive reaction. Based on assessing the outcomes of the various responses, the managers can then opt for the optimal decision.

In the era of Big Data, it is being advanced that algorithms will increasingly aid the decision maker in sifting through the noise to find the signal. Such leading enterprises as Amazon, Baidu, Google, and Netflix have come to recognize that many tasks that previously required complete managerial immersion can be codified into a set of instructions that can suggest the optimal decision in less time and at a lower cost and in a more impartial way (Kolbjornsrud et al., 2016; Ng, 2016; Shih, 2016).<sup>1</sup> Managers at a financial institution, for instance, can devote time upfront to codify the decision rule for loan applications, set up instructions (i.e., algorithm) to automate the process, and be informed by the machine-based recommendation to determine whether to approve (1) or deny (0) a prospective client. Thus, algorithm-based decision making relies on the ability of machines to learn to fulfill objectives based on data and reasoning, and can provide decision makers information to support their final decision (Hodson, 2016; Markham et al., 2015). This low level of attention and high level of automation make the algorithm-based approach the final entry in Fig. 2.

In the algorithm-based approach to decision making, managers identify the key issue(s) a priori, and draw on their tacit knowledge to develop a set of instructions which codify alternative responses for differing situations (Schrage, 2017). Informed commentaries refer to this as “machine intelligence” – a

moniker which is more suitable and “neutral” term for corporate decision making than the science-fiction based term “artificial intelligence (AI)” (Zilis & Cham, 2016), and one which suggests the use of computer devices and software to translate information into a useable form to solve a certain issue – to augment but not replace human judgment.<sup>2</sup> The model that gets developed resides in inanimate lines of code which specify the key performance indicators, acceptable thresholds of performance, and sources of required information. The computational infrastructure monitors salient digital signals to produce a stream of salient information, and the algorithm evaluates the various alternatives and recommends the required response.

In summary, this section began with the assumption that the wealth of information can impose great demands on managerial attention (Simon, 1971), and advanced that the strategic issues that the firm faces can vary in the amount of managerial attention that they demand. Also, machine intelligence is viewed as a decision tool that can provide managers with real-time, salient information about strategic marketing issues, and the strategic issues that the firm faces can vary in the extent to which they are amenable to being relegated to an algorithm. Both the extent to which an issue requires managerial attention and can be relegated to automation can range across a continuum, and yield the four different approaches to managerial decision making identified in Fig. 1 and depicted in Fig. 2. The next section explores how the four different approaches to managerial decision making introduced above play out in the context of innovation.

## **INNOVATION AND STRATEGIC DECISION MAKING IN AN INFORMATION-RICH ENVIRONMENT**

It has long been understood that innovation and marketing are of paramount importance to the organization because these functions determine a firm’s financial success (Drucker, 1973). The former – which refers to the process of translating an idea into a customer value proposition that is commercially viable (Chandy & Tellis, 1998) – results in new products, which are referred to as the lifeblood of the organization. Given that new products continually account for a significant percentage of a firm’s annual revenues (Crawford & Di Benedetto, 2008) and that product life cycles are getting shorter and shorter (D’aveni, Dagnino, & Smith, 2010), one authority declares that “product innovation is perhaps the most important endeavor of the modern corporation” (Cooper, 2001, p. 256). The latter activity (i.e., marketing) is responsible for guiding customer-facing activities that can stimulate customer purchases, which shape the revenues that determine firm value (Rao & Bharadwaj, 2008).

These two activities are also intertwined. As described earlier, marketing strategy entails determining the extent to which a firm will pursue a defensive

(i.e., customer retention) and/or an offensive (i.e., acquisition) strategy. The relative emphasis placed on a(n) defensive and offensive strategy will determine whether the firm will pursue innovation in an attempt to enhance the value proposition for its present and/or new customers (Varadarajan, 2010).

So how do organizations develop new products? Practice-based research reveals that firms tend to follow a systematic procedure in their innovation attempts. Robert Cooper's (2001) stage-gate system serves as an oft-cited means to guide new product projects from their initial inception through commercialization, and can be condensed into a three-phase process.

The first phase, *front-end innovation* (or what has also been referred to the "fuzzy front-end") consists of opportunity recognition, idea generation, concept definition, testing, and evaluation (Koen & Bertels, 2011). This requires harnessing the voice of the customer to gain a deep understanding of user problems and requirements and uncover meaningful ideas that can serve as the basis for potential solutions (Bharadwaj, Nevin, & Wallman, 2012; Crawford & Di Benedetto, 2008; Griffin & Hauser, 1993). Those potential solutions are crafted into descriptions and images which reify the idea, and those concepts are tested among prospective customers. A business analysis is then undertaken to evaluate whether the concept can achieve a desired level of marketplace success, and if so, proceeds along the second phase. The second phase consists of the *new product development* process, ranging from developing the concept into a physical prototype, testing the prototype, and utilizing feedback to arriving at the physical product. An updated financial analysis is also prepared to assess potential costs and revenues, and regulatory-, legal-, and patent-related issues are addressed. A market test may also be conducted to gauge consumer acceptance and/or fine-tune the marketing activity. The third phase is the *commercialization*, and encompasses launching the product in which all tasks are coordinated to inform customers about the virtues, availability, and pricing of the new offering as well as product training and sales support (Ernst, Hoyer, & Rübсаamen, 2010; Urban & Hauser, 1993). A set of prespecified key performance indicators are tracked to ensure that operational and financial goals are met (Talke & Hultink, 2011, p. 111), and changes are made in the spirit of continuous improvement.

The three phases of the innovation process can be blended with the four decision-making processes noted in Fig. 2 to generate an organizing framework for current thinking on innovation in information-rich environments. The 12 possible cells are shown in Table 1.

In what follows, the aim is to provide an exemplar endeavor for each of the 12 cells in Table 1. In Tables 2–4, examples are drawn from either the academic literature or business press to explicate the managerial decision-making approaches depicted in Fig. 2. After identifying the business issue, an exemplar application is presented, and the three subsequent stages are detailed.

**Table 1.** Innovation Decision Making in an Information-rich Environment.

| Front-end Innovation    | New Product Development | Commercialization |
|-------------------------|-------------------------|-------------------|
| Traditional             |                         |                   |
| Intuition-based         |                         |                   |
| Joint cognitive systems |                         |                   |
| Algorithm-based         |                         |                   |

## FUTURE RESEARCH DIRECTIONS

The new normal in managerial decision making is the availability of abundant, diverse information in real-time (Marr, 2017a) and short product life cycles (D’aveni et al., 2010). This chapter focuses on the nascent field that is emerging at the intersection of innovation, marketing strategy, and information-rich environments, and breaks new ground by exploring automation available to aid managerial decision making in this context. Given the paucity of research into strategic decision making in an information-rich environment in the realm of innovation, many fertile research opportunities exist. Eight important areas are highlighted next.

First, it will be fruitful to identify the managerial issues that qualify as “strategic” at various levels of the organization. The decisions made at the C-suite pertain to firm-level investments, and tend to be evaluated with respect to an increase in shareholders’ wealth (Rao & Bharadwaj, 2008). The question that Fang, Palmatier, and Steenkamp (2008), for instance, studied empirically can serve as an exemplar in this regard: when should a goods-dominant firm pursue service innovation and take the organization into another strategic arena? On the other hand, strategy in new product development refers to

“the defining and planning of a vision and focus for research and development (R&D), technology management, and product development efforts at the SBU, division, product line, and/or individual project levels; includes the identification, prioritization, selection, and resource support of preferred projects. (Barczak & Kahn, 2012, p. 294)

It will be interesting to explore how the cash flows generated by decisions made by mid-level innovation managers can be linked to shareholders’ wealth, and thereby deemed “financially accountable.” Such investigations will contribute greatly to the burgeoning interest in research at the finance-marketing strategy interface.

Second, it will be important to better understand decision-making processes that managers can undertake. This will require delving into a finer-grained assessment than what is currently depicted in Fig. 2, which can be achieved by deploying such neurophysiological methods as fMRI and eye tracking (see,

**Table 2.** Managerial Decision-making Approaches Exemplified during Front-end Innovation.

| Decision-making Type    | Managerial Issue   | Application                      | Strategic Decision-making Process <sup>a</sup>   |  |  |
|-------------------------|--|----------------------------------|--|--|--|
|                         |  |                                  | Stage 1  | Stage 2  | Stage 3  |
| Traditional             | How can a firm improve upon its existing go-to-market strategy?                      | Domino's (Gianatasio, 2015)      | Management learned from research that customers wanted "their pizza to be as hot and fresh out of the oven as possible."                         | Management (at Domino's) determined that the interior of the pizza delivery vehicle should be fully redesigned to achieve the customer request, and worked with Local Motors, which hosted a five-stage crowdsourcing competition that yielded 385 car-design proposals.   | Domino's decided upon a modified Chevy Spark equipped with a warming oven that keeps perpetually at 140 degrees, and room for 80 pizzas, sodas, and other delivery service essentials. |
| Intuition-based         | Should a tablet be introduced?   | Apple (Isaacson, 2011)           | Steve Jobs, former Apple CEO, conceived a consumption ecosystem in which the tablet would complement their other devices in a multiscreen world. | Despite analysts' predictions that the computer would remain the dominant second screen, and that the tablet would only garner limited success (with some predicting outright failure), the CEO relied on his intuition to evaluate the tablet and determine the level of success that could be achieved with a market-driving strategy. | Apple opted to proceed with investments in R&D, and Steve Jobs eventually announced the introduction of the iPad in January 27, 2010.  |
| Joint cognitive systems | How can a firm streamline (i.e., save time and money) in its drug discovery process? | Merck (Boudreau & Lakhani, 2013) | An open competition was set up in which the firm released data on hundreds of thousands of chemical compounds that could possibly target certain | The open innovation contest attracted over 2,500 proposals. The management team evaluated the submissions utilizing their own "what-if" analysis taking into   | Managers identified the winning entry – an entry by a computer scientist (not a life-science expert) employing machine learning, a technique that was unknown to the                   |



|                 |   |   |  |  |   |
|-----------------|---|---|--|--|---|
| Algorithm-based | Given a product that consists of a large number of attributes (and several levels of each attribute), how can a manager learn buyer preferences toward possible product concepts? | Complex technology-based products (Huang & Luo, 2016) | <p>diseases, and participants were invited to submit proposals identifying the compounds holding the greatest potential for future products.</p> <p>Obtain data through primary research on: (1) buyer's configuration of a desirable product profile and price; (2) buyer's assessments of must-have and/or unacceptable features; (3) input on adaptive consideration questions (based on machine learning of prior responses); and (4) input on adaptive choice questions (based on machine learning of prior responses).</p> | <p>consideration the elements of their strategy (i.e., arenas in which they compete, differentiators, and so on) and marketplace conditions.</p> <p>Machine learning (i.e., fuzzy support vector machines) provides an automated method of preference elicitation for complex products with many attribute levels, as the method "learns" from previous respondent responses to understand the focal respondent's preferences. The answer requires going beyond conventional preference elicitation techniques (e.g., conjoint analysis) and compositional approaches to explore an adaptive decompositional framework suitable for high-dimensional problems.</p> | <p>firm – and proceeded to translate the ideas into product concepts.</p> <p>Fuzzy support vector machine learning reveals the product concept that is suitable for the respondent.</p> |
|-----------------|---|---|--|--|---|

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<sup>a</sup>Please refer to Fig. 2 to see sequencing of Stage 1, Stage 2, and Stage 3 in the Strategic Decision-making Process.

**Table 3.** Managerial Decision-making Approaches Exemplified during New Product Development.

| Decision-making Type | Managerial Issue   | Application                                    | Strategic Decision-making Process <sup>a</sup>  |   |   |
|----------------------|--|--|---|---|---|
|                      |  |  | Stage 1   | Stage 2   | Stage 3   |
| Traditional          | How can a firm improve upon its current product offering?                  | Domino's (Taylor, 2016)                        | Management knew from existing research and past experience that product taste is the main determinant of consumer choice in the pizza delivery business. They came to learn from focus groups that the product needed improvement (e.g., "worst pizza I ever had; the sauce tastes like ketchup; the crust tastes like cardboard"). | R&D generated better ingredients as that was the path to a better tasting pizza.<br><br>The marketing team (in conjunction with consumers) evaluated the taste of various combinations of ingredients, and rank-ordered the available options based on taste. | Domino's decided upon their portfolio of "new and improved" pizzas.   |
| Intuition-based      | How can an automaker signal quality construction to prospective consumers? | Luxury automobile manufacturer (Hendrix, 2013) | Designers – using embodied cognition theory – believed that the adjective "heavy" can be equated with importance. They therefore sought to design car doors with a satisfying, low-frequency "thunk" to assure consumers of mass.   | Designers began with the high pitch, tin-sounding "clank" of a door from a mainstream car model. The baseline cue was lightweight, which implied shoddiness. They then experimented with various latches to make heavier, low-frequency "thunk."              | The designers determined the latch that produced the "heaviest" sound when closing the door, to reinforce the greater importance that equaled the luxury brand image. |

|                         |   |   |  |   |  |
|-------------------------|---|---|--|---|--|
| Joint cognitive systems | How can a firm translate an idea to a physical mock-up more quickly and cheaply?                | Rapid prototyping of medical devices (Richards, 2015) | Engineers design a part within agreed upon tolerances (e.g., a rib cage replacement for a cancer patient) using CAD/CAM, which results in a variety of preliminary mock-ups that are 3D printed. | Managers evaluate whether the part meets form, function, and safety criteria and fits well with other parts. They also obtain customer feedback on a physical mock-up to understand whether the item meets buyer's (doctors) requirements and expectations, and is suitable for the end user. | The engineers determine which prototype holds the most merit, and work on areas that require further refinement before being green-lighted for development of the final product. |
| Algorithm-based         | How can an interactive, short film enhance a storyline to evoke the optimal emotional response? | A movie (Khatchadourian, 2017)                        | Obtain primary data from people viewing the film using advanced emotion detection techniques (e.g., eye tracking, fMRI).   | Carry out automated simulations, which permit a viewer's (moment-by-moment) emotional response to determine what scene appears next on the screen.  | The proprietors chose to invest in technology that permits the production of films which can branch in nearly infinite directions.   |

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<sup>a</sup>Please refer to Fig. 2 to see sequencing of Stage 1, Stage 2, and Stage 3 in the Strategic Decision-making Process.

**Table 4.** Managerial Decision-making Approaches Exemplified during Commercialization.

| Decision-making Type    | Managerial Issue  | Application  | Strategic Decision-making Process <sup>a</sup>  |  |   |
|-------------------------|---|--|---|--|---|
|                         |   |  | Stage 1   | Stage 2  | Stage 3   |
| Traditional             | What price should a firm charge for a new product bundle in order to optimize (topline) revenues?   | Atlantic Computer, Inc. (Bharadwaj & Gordon, 2007) | Management considered the firm's history, conducted primary research into their customers' requirements, and factored in technological advances. They identified four pricing options (i.e., status quo, cost-plus, value-in-use, and competition based). | The managers modeled the impact of each of the pricing options on the company's revenues. They also considered the total cost of ownership for customers for each option as well as the main rival's likely response.  | The firm chose the customer-centric pricing approach that permitted the firm to capture the greatest value.   |
| Intuition-based         | How can the brand message remain salient and fresh after product launch?                            | Online fashion retailer (Morrish, 2013)            | The CEO considers herself to be the "brand barometer" because of her deep understanding of the market, and ability to continually sense the mood toward the brand.  | When she detects a shift in the market (e.g., consumer sentiment or wear out with current messaging), she considers different emotional appeals in her brand executions.   | The CEO selects the appropriate messaging to implement.   |
| Joint cognitive systems | How can Netflix improve its recommender system to deepen relationships with its existing customers? | Netflix (Johnston, 2012)                           | An open competition was set up in which the firm released data on mailed DVDs, and participants were invited to submit proposals that aid the firm to put forth the "next best offer"?  | The management team evaluated the code submitted by the contestants using their own "what-if" analysis taking into consideration the elements of their strategy (i.e., arenas in which they compete, differentiators, and so on) and marketplace conditions. | Managers identified the winning entry, but opted to not implement the algorithm because they determined that: (1) the cost of the engineering effort outweighed the financial benefits and (2) consumer preference shifted from mailed DVDs to video streaming. |

|                 |   |                      |  |   |   |
|-----------------|---|----------------------|--|---|---|
| Algorithm-based | What is the optimal price to charge for a product being viewed at an online portal? | Amazon (Peltz, 2016) | Track real-time information on inventory levels and overall customer demand, and external macroenvironmental data (e.g., weather, economic conditions).<br><br>Individual-level data on site visitor (e.g., past purchases; social media). | Automated evaluation of pricing alternatives: simulate various what-if scenarios in real time to calculate probability of purchase at various levels and projected firm profitability at various levels.<br><br>Compare sales and profitability with/without dynamic pricing. | Tailor product prices (but remain cognizant of potential consumer sentiments regarding price discrimination). |
|-----------------|---|----------------------|--|---|---|

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<sup>a</sup>Please refer to Fig. 2 to see sequencing of Stage 1, Stage 2, and Stage 3 in the Strategic Decision-making Process.

e.g., Venkatraman et al., 2015). Additionally, the neurophysiological methods can be coupled with traditional assessments of decision making (e.g., surveys, observation) to better understand which type of decision-making approach depicted in Fig. 2 is optimal for different types of strategic issues (see, e.g., Russo & Schoemaker, 1989). Such research will offer a comparative, more nuanced understanding of unconscious (managerial) thought in strategic decision making, and contribute to the inter-disciplinary work on judgment and decision making (Payne, Samper, Bettman, & Luce, 2008).

Third, it is necessary to delve more deeply into each of the approaches to managerial decision making denoted in Fig. 1. Take, for example, what I have deemed intuition-based decision making. An instance may arise where a manager may opt for an intuition-based approach to reduce not only cognitive burden but also the amount of effort expended. One such simplifying strategy is the use of a heuristic. A manager charged with generating a forecast for a new product might, for instance, draw on results from other (successful and unsuccessful) product launches. This intellectually lazy approach, however, is susceptible to such well-known biases as confirmation bias (see, e.g., Bazerman & Moore, 2011). Empirical research has demonstrated that firms that favor decision making by HiPPOs (Highest Paid Person's Opinions) tend to underperform (i.e., lower productivity and less profitable) in relation to those employing data-driven decision making (Brynjolfsson, Hitt, & Kim, 2011). Such comparative investigations will contribute greatly to a deeper understanding of each of the managerial decision-making strategies.

Fourth, the innovation examples in Tables 2–4 span the spectrum from radical to incremental innovation (Crawford & Di Benedetto, 2008; Urban & Hauser, 1993) as business leaders recognize that all types of innovations are necessary for success (Kamen, 2007). It is necessary to recognize that the decision-making processes shown in Fig. 2 may differ across the spectrum of innovations as those which are new-to-the-world (radical) innovations tend to take longer to develop and involve greater risk (Chandy & Tellis, 1998). Managers involved in new product development will benefit greatly from an inquiry that can establish the nuances of decision making involving radical versus continuous innovations, and offer guidance on how to increase the likelihood of success along both paths.

Fifth, it will be important for managers to make sense of the “digital footprints” that consumers leave behind in today's digital world (Kosinski, Wang, Lakkaraju, & Leskovec, 2016). This will require being adept at harnessing the wealth of information that is now available to the marketer to get a more holistic view of the customer and their likes/dislikes, preferences, and purchase history, and going through data-driven decision-making training to unleash the full power of analytics (Shah et al., 2012). Doing so will permit firms to put forth the “next best offer” that consumers will deem a superior value proposition in relation to the existing alternatives. Such investigations will require coupling all of the required data sources and then drawing on deep learning –

machine learning on large datasets to recognize abstract patterns (LeCun, Bengio, & Hinton, 2015) – to mine the data to reveal previously unknown associations (Wedel & Kannan, 2016). This quest for deeper customer insights will, however, need to be balanced with privacy and other ethical concerns (Stucke & Ezrachi, 2016).

Sixth, the strategic management literature advances that when environments are in a rapid state of change, competitive advantage is temporary. D’aveni et al. (2010) explain that such conditions can come to exist because fast-paced competitive actions and counter responses among rivals create continual discontinuities. Perhaps, we can learn more from historical accounts as to how incumbents and rising rivals should compete without mutually assured destruction. An informed commentary exists in the *Thucydides’s Trap* (Allison, 2017), which details 16 accounts of a rising power taking on a ruling power over the past 500 years and war breaking out between the nations in 12 of those instances.

Seventh, some decision-making experts caution that while computing systems may represent a tool to make better decisions and save time, it is necessary to acknowledge their limitations relative to humans. In this regard, Dan Ariely explains that algorithms can be written to detect repeated patterns and make inferences relative to them; however, creativity in generating unique things is not a strong suit (Nadav, 2017). Thus, the creativity that is foundational for front-end innovation may, for the time being, not be amenable to being outsourced to an algorithm. The collaborative pursuit between IBM and musicians, however, suggests that machine learning can assist artists in coming up with ideas for a new song and aid in creating new songs (Marr, 2017b), and that it may be only a matter of time until such algorithms become available.

Finally, it will be important to explore some of the open questions regarding innovation in data-rich environments. As noted in Bharadwaj and Noble (2015, pp. 476–477), some of these include: What is the appropriate role of experimentation (in relation to the structured stage-gate process) in generating new product ideas?; What is the role of social media in generating new products ideas, and how can it be used to complement the traditional approaches?; How can companies improve their analytical capabilities to make better new product development decisions and implement them within teams?; What methods will permit firms to better utilize social media data to enhance front-end innovation and new product? What type of decision-making approaches and methodologies lend themselves to making decisions in real-time regarding innovation?

## CONCLUSION

In the era of Big Data, larger volumes of data arrive in various forms at an increasing pace but of questionable quality and value. Advances in technology

that permit managers to index and process the data to make them meaningful for making strategic decisions to a certain extent aid in addressing the challenges imposed by these 5Vs. Technological advances also represent a way for managers to harness automation to mitigate some of the challenge imposed on managers' bounded capacity. To this end, this chapter makes three important contributions. First, it delivers a taxonomy of approaches available for strategic decision making in an information-rich environment. Several of these approaches showcase that automation can help to augment (not supplant) managerial decision making. Second, it applies this taxonomy in an innovation context. Mapping a stylized version of the phases of the innovation process (i.e., front-end innovation, new product development, commercialization) onto the four decision-making approaches yields an organizing framework for understanding decision making in the realm of innovation, and identify exemplar that can fit into the 12 different cells. Third, it identifies promising areas for future research. These opportunities are fertile grounds for those scholars interested in exploring new boundaries at the interface of marketing strategy, innovation, managerial decision making, and beyond in information-rich environments.

## NOTES

1. Stucke and Ezrachi (2016) caution that ethical issues (e.g., price discrimination, race discrimination) can arise with algorithm-based decision making, and thus require a human decision maker to evaluate the machine intelligence recommendation.

2. AI refers to "IT systems that sense, comprehend, act and learn. AI consists of multiple technologies that enable computers to perceive the world (such as computer vision, audio processing and sensor processing), analyze and understand the information collected (for example, natural language processing or knowledge representation), make informed decisions or recommend action (for instance inference engines or expert systems) and learn from experience (including machine learning)" (Kolbjornsrud et al., 2016, p. 16).

## REFERENCES

- Allison, G. (2017). *Destined for war: Can America and China escape Thucydides's trap?* Boston, MA: Houghton Mifflin Harcourt.
- Barczak, G., & Kahn, K. B. (2012). Identifying new product development best practice. *Business Horizons*, 55, 293–305.
- Bazerman, M. H., & Moore, D. A. (2011). *Judgment in managerial decision making* (8th ed.). New York, NY: John Wiley & Sons.
- Bharadwaj, N., & Gordon, J. B. (2007). *Atlantic Computer, Inc.: A bundle of pricing options*. Harvard Business Publishing. HBP Product 2078.
- Bharadwaj, N., Nevin, J. R., & Wallman, J. P. (2012). Explicating hearing the voice of the customer as a manifestation of customer focus and assessing its consequences. *Journal of Product Innovation Management*, 29(6), 1012–1030.



- Bharadwaj, N., & Noble, C. H. (2015). Innovation in data-rich environments. *Journal of Product Innovation Management*, 32(30), 476–478.
- Bharadwaj, N., & Noble, C. H. (2017). Finding innovation in data-rich environments. *Journal of Product Innovation Management*, 34(5), 560–564.
- Bharadwaj, N., Noble, C. H., Tower, A., Smith, L. M., & Dong, Y. (2017). Predicting innovation success in the motion picture industry: The influence of multiple quality signals. *Journal of Product Innovation Management*, 34(5), 659–680.
- Biehn, N. (2013). The missing V's in Big Data: Viability and value. Retrieved from <https://www.wired.com/insights/2013/05/the-missing-vs-in-big-data-viability-and-value/>. Accessed on July 6, 2017
- Boudreau, K. J., & Lakhani, K. R. (2013). Using the crowd as an innovation partner. *Harvard Business Review*, 91(4), 60–69.
- Brynjolfsson, E., Hitt, L. M., & Kim, H. (2011). Strength in numbers: How does data-driven decisionmaking affect firm performance? *SSRN* (April 22).
- Chandy, R., & Tellis, G. J. (1998). Organizing for radical product innovation: The overlooked role of willingness to cannibalize. *Journal of Marketing Research*, 35(4), 474–487.
- Cooper, R. G. (2001). *Winning at new products: Accelerating the process from idea to launch* (3rd ed.). Cambridge, MA: Perseus Publishing.
- Crawford, C. M., & DiBenedetto, C. A. (2008). *New products management* (9th ed.). Boston, MA: McGraw-Hill Irwin.
- D'aveni, R. A., Dagnino, G. B., & Smith, K. G. (2010). The age of temporary advantage. *Strategic Management Journal*, 31(13), 1371–1385.
- Davenport, T. (2012). Analytics on big and small data. Presentation at the Marketing Science Institute's "Where is Big Data Taking Us?" Conference, Cambridge, MA (December 4–5).
- Den Bleyker, M. (2017). The path of profitability: Connected data is where the value lies for Hortonworks). Retrieved from <http://siliconangle.com/blog/2017/04/05/path-profitability-connected-data-value-lies-hortonworks-dws17/>. Accessed on April 8, 2017.
- Drucker, P. F. (1973). *Management tasks, responsibilities, and practices* (special edition prepared for The Presidents Association). New York, NY: Harper & Row.
- EMC. (2015). The digital universe. Retrieved from <http://www.emc.com/leadership/programs/digital-universe.htm>. Accessed on March 26, 2017.
- Ernst, H., Hoyer, W., & Rübsaamen, C. (2010). Sales, marketing, and research-and-development cooperation across new product development stages: Implications for success. *Journal of Marketing*, 74(5), 80–92.
- Fang, E., Palmatier, R. W., & Steenkamp, J.-B. E. M. (2008). The effect of firm transition strategies on firm value. *Journal of Marketing*, 72(5), 1–14.
- Fox, J. (2014). Instinct can beat analytical thinking. *Harvard Business Review*, June 20. Retrieved from <https://hbr.org/2014/06/instinct-can-beat-analytical-thinking>. Accessed on April 4, 2017.
- Fox, J. (2015). From "Economic Man" to behavioral economics. *Harvard Business Review*, 93(5), 78–85.
- Gavetti, G., & Rivkin, J. W. (2005). How strategists really think. *Harvard Business Review*, 83(4), 54–63.
- Gianatasio, D. (2015). *Domino's just unveiled a radical pizza delivery car that took 4 years to build*. Retrieved from <http://www.adweek.com/creativity/dominos-just-unveiled-radical-pizza-delivery-car-took-4-years-build-167707/>. Accessed on March 26, 2017.
- Griffin, A., & Hauser, J. R. (1993). The voice of the customer. *Marketing Science*, 12(3), 1–27.
- Hambrick, D. C., & Frederickson, J. W. (2001). Are you sure you have a strategy? *Academy of Management Executive*, 19(4), 51–62.
- Hendrix, M. (2013). *Intuition: Your best tool?*. Retrieved from <http://www.archdaily.com/431201/intuition-your-best-design-tool>. Accessed on April 4, 2017.
- Hodson, J. (2016). How to make your company machine learning ready. *Harvard Business Review*, November 7. Retrieved from <https://hbr.org/2016/11/how-to-make-your-company-machine-learning-ready>. Accessed on April 4, 2017.

- Huang, D., & Luo, L. (2016). Consumer preference elicitation of complex products using fuzzy support vector machine active learning. *Marketing Science*, 35(3), 445–464.
- Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organization Science*, 2(1), 88–115.
- IBM. (2013). *What is Big Data?*. Retrieved from [http://www.ibm.com/smarterplanet/us/en/business\\_analytics/article/it\\_business\\_intelligence.html](http://www.ibm.com/smarterplanet/us/en/business_analytics/article/it_business_intelligence.html). Accessed on April 4, 2017.
- Isaacson, W. (2011). *Steve jobs*. New York, NY: Simon & Schuster.
- Jaworski, B. J., Kohli, A., & Sahay, A. (2000). Market-driven versus driving markets. *Journal of the Academy of Marketing Science*, 28(1), 45–54.
- Johnston, C. (2012). *Netflix never used its \$1 million algorithm due to engineering costs*. Retrieved from <https://www.wired.com/2012/04/netflix-prize-costs/>. Accessed on April 2, 2017.
- Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Straus and Giroux.
- Kamen, D. (2007). 5 things I've learned. *CIO Magazine*, April 9. Retrieved from <http://www.cio.com/article/2439313/innovation/segway-inventor-dean-kamen-on-risk-taking-and-innovation.html>. Accessed on March 4, 2017.
- Kern, C. (2017). Walmart turns to data café analytics hub to make sense of data. Retrieved from <https://www.innovativeretailtechnologies.com/doc/walmart-turns-to-data-caf-analytics-hub-to-make-sense-of-data-0001>. Accessed on March 4, 2017.
- Khatchadourian, R. (2017). The movie with a thousand plot lines. *January 30 issue*. Retrieved from <http://www.newyorker.com/magazine/2017/01/30/alternate-endings>
- Koen, P., & Bertels, H. (2011). Front end of innovation. In Barry L. Bayus (Ed.), *Wiley international encyclopedia of marketing* (Vol. 5, pp. 57–65). Chichester, UK: Wiley.
- Kolbjornsrud, V., Amico, R., & Thomas, R. J. (2016). How artificial intelligence will redefine management. *Harvard Business Review*, November 2. Retrieved from <https://hbr.org/2016/11/how-artificial-intelligence-will-redefine-management>. Accessed on April 4, 2017.
- Kosinski, M., Wang, Y., Lakkaraju, H., & Leskovec, J. (2016). Mining big data to extract patterns and predict real-life outcomes. *Psychological Methods*, 21(4), 493–506.
- Kotler, P., & Armstrong, G. (2001). *Principles of marketing*. Upper Saddle River, NJ: Prentice Hall.
- Kumar, V. (2008). *Customer lifetime value: The path to profitability*. Hanover, MA: Now Publishers Inc.
- Lazer, W. (1962). The role of marketing models. *Journal of Marketing*, 26(2), 9–14.
- LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(May 28), 436–444.
- Lilien, G. L. (2011). Bridging the academic-practitioner divide in marketing decision models. *Journal of Marketing*, 75(4), 196–210.
- Lilien, G. L., Kotler, P., & Moorthy, K. S. (1992). *Marketing models*. Englewood Cliffs, NJ: Prentice Hall.
- Lilien, G. L., & Rangaswamy, A. (2004). *Marketing engineering: Computer-assisted marketing analysis and planning* (2nd ed.). Bloomington, IN: Trafford Publishing.
- Little, J. D. C. (1979). Decision support systems for marketing managers. *Journal of Marketing*, 43(3), 9–26.
- Manyika, J., Chui, M., & George, K. (2017). 25% of CEOs' time is spent on tasks machines could do. *Harvard Business Review*, February 6. Retrieved from <https://hbr.org/2017/02/25-percent-of-ceos-time-is-spent-on-tasks-machines-could-do>. Accessed on April 4, 2017.
- Markham, S. K., Kowolenko, M., & Michaelis, T. L. (2015). Unstructured text analytics to support new product development decisions. *Research-Technology Management*, 58(2), 30–38.
- Marr, B. (2017a). Really Big Data at Wal-Mart: Real-time Insights from their 40+ Petabyte data cloud. *Forbes*, January 23. Retrieved from <https://www.forbes.com/sites/bernardmarr/2017/01/23/really-big-data-at-walmart-real-time-insights-from-their-40-petabyte-data-cloud/>. Accessed on April 2, 2017.
- Marr, B. (2017b). Grammy-Nominee Alex Da Kid creates hit records using machine learning. *Forbes*, January 30. Retrieved from <https://www.forbes.com/sites/bernardmarr/2017/01/30/grammy-nominee-alex-da-kid-creates-hit-record-using-machine-learning/>. Accessed on April 2, 2017.

- McAfee, A., & Brynjolfsson, E. (2012). Big Data: The management revolution. *Harvard Business Review*, 90(10), 60–68.
- Moore, G. (1965). Cramming more components onto integrated circuits. *Electronics*, 38(8), 114–116.
- Morrish, J. (2013). Relying on intuition-should you always trust your gut feelings?. Retrieved from <http://www.managementtoday.co.uk/amp/relying-intuition-always-trust-gut-feelings/article/1155928>. Accessed on April 2, 2017.
- Mosendz, P. (2014). Microsoft's CEO sent a 3,187-word memo and we read it so you don't have to. Retrieved from <https://www.theatlantic.com/technology/archive/2014/07/microsofts-ceo-sent-a-3187-word-memo-and-we-read-it-so-you-dont-have-to/374230/>. Accessed on April 2, 2017.
- Nadav, S. (2017). Dan Ariely: People don't build lasting relationships with an algorithm. Retrieved from <https://www.linkedin.com/pulse/dan-ariely-people-dont-build-lasting-relationships-algorithm-nadav>. Accessed on July 8, 2017.
- Ng, A. (2016). What artificial intelligence can and can't do right now. *Harvard Business Review*, November 9. Retrieved from <https://hbr.org/2016/11/what-artificial-intelligence-can-and-cant-do-right-now>. Accessed on April 4, 2017.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. New York, NY: Oxford University Press.
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal*, 18(S1), 187–206.
- Payne, J. W., Samper, A., Bettman, J. R., & Luce, M. F. (2008). Boundary conditions on unconscious thought in complex decision-making. *Psychological Science*, 19(11), 1118–1123.
- Peltz, J. F. (2016). Why dynamic pricing based on supply and demand is rapidly spreading. *Los Angeles Times*, April 6. Retrieved from <http://www.latimes.com/business/la-fi-agenda-dynamic-pricing-20160314-story.html>. Accessed on April 2, 2017.
- Pugh, K., & Dixon, N. (2008). Don't just capture knowledge – Put it to work. *Harvard Business Review*, May. Retrieved from <https://hbr.org/2008/05/dont-just-capture-knowledge-put-it-to-work>. Accessed on March 4, 2017.
- Rao, R. K. S., & Bharadwaj, N. (2008). Marketing initiatives, expected cash flows, and shareholders' wealth. *Journal of Marketing*, 72(1), 16–26.
- Reinartz, W. J., & Venkatesan, R. (2008). Decision models for customer relationship management (CRM). In B. Wierenga (Ed.), *Handbook of marketing decision models* (pp. 291–326). New York, NY: Springer.
- Richards, S. (2015). Is 3D printing the future of rapid prototyping in medical device design? Retrieved from <http://www.kmcsystems.com/blog/is-3d-printing-the-future-of-rapid-prototyping-medical-device-design>. Accessed on April 2, 2017.
- Russo, J. E., & Schoemaker, P. J. H. (1989). *Decision traps*. New York, NY: Doubleday.
- Schrage, M. (2017). 4 models for using AI to make decisions. *Harvard Business Review*, January 27. Retrieved from <https://hbr.org/2017/01/4-models-for-using-ai-to-make-decisions>. Accessed on March 4, 2017.
- Scott, W. R. (1992). *Organizations: Rational, natural, and open systems* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Senge, P. M. (1990). The leader's new work: Building learning organizations. *Sloan Management Review*, 32(1), 7–23.
- Shah, S., Horne, A., & Capella, J. (2012). Good data won't guarantee good decisions. *Harvard Business Review*, 90(4), 23–25.
- Shih, C. (2016). Customer relationship automation is the new CRM. *Harvard Business Review*, October 28. Retrieved from <https://hbr.org/2016/10/customer-relationship-automation-is-the-new-crm>. Accessed on March 4, 2017.
- Simon, H. A. (1947). *Administrative behavior: A study of decision-making processes in administrative organizations*. Chicago, IL: Macmillan.
- Simon, H. A. (1971). Designing organizations for an information-rich world. In M. Greenberg (Ed.), *Computers, communications, and the public interest*. Baltimore, MD: John Hopkins Press.

- Simon, H. A. (1997). *Administrative behavior* (4th ed.). New York, NY: Simon and Schuster.
- Stucke, M. E., & Ezrachi, A. (2016). How pricing bots could form cartels and make things more expensive. *Harvard Business Review*, October 27. Retrieved from <https://hbr.org/2016/10/how-pricing-bots-could-form-cartels-and-make-things-more-expensive>. Accessed on March 4, 2017.
- Talke, K., & Hultink, E. J. (2011). The importance of an effective launch strategy. In B. L. Bayus (Ed.), *Wiley international encyclopedia of marketing* (Vol. 5, pp. 111–116). Wiley.
- Taylor, B. (2016). How Domino's pizza reinvented itself. *Harvard Business Review*, November 28. Retrieved from <https://hbr.org/2016/11/how-dominos-pizza-reinvented-itself>. Accessed on March 4, 2017.
- Treacy, M., & Wiersema, F. (1993). Customer intimacy and other value disciplines. *Harvard Business Review*, 71(1), 84–93.
- Urban, G. L., & Hauser, J. R. (1993). *Design and marketing of new products*. Englewood Cliffs, NJ: Prentice Hall.
- Van Bruggen, G. H., & Wierenga, B. (2009). Marketing decision making and decision support: Challenges and perspectives for successful marketing management support systems. *Foundations and Trends in Marketing*, 4(4), 209–332.
- Vance, A. (2015). *Elon Musk: Tesla, Space X, and the Quest for a fantastic future*. New York, NY: HarperCollins.
- Varadarajan, R. (2010). Strategic marketing and marketing strategy: Domain, definition, fundamental issues, and foundational premises. *Journal of the Academy of Marketing Science*, 38(2), 119–140.
- Venkatraman, V., Dimoka, A., Pavlou, P. A., Vo, K., Hampton, W., Bollinger, B., ... & Winer, R. S. (2015). Predicting advertising success beyond traditional measures: New insights from neurophysiological methods and market response modeling. *Journal of Marketing Research*, 52(4), 436–452.
- Walton, D. (2016). The Big Data gold rush: Will Wall Street be left behind. *World Economic Forum*, January 19. Retrieved from <https://www.weforum.org/agenda/2016/01/the-big-data-gold-rush-will-wall-street-be-left-behind/>. Accessed on March 10, 2017
- Wedel, M., & Kannan, P. K. (2016). Marketing analytics for data-rich environments. *Journal of Marketing*, 80(6), 97–121.
- Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: sustained performance in a complex world* (3rd ed.). New York, NY: Wiley.
- Woods, D. D., & Hollnagel, E. (2006). *Joint cognitive systems: Patterns in cognitive systems engineering*. Boca Raton, FL: CRC Press.
- Zilis, S., & Cham, J. (2016). The competitive landscape for machine intelligence. *Harvard Business Review*, November 2. Retrieved from <https://hbr.org/2016/11/the-competitive-landscape-for-machine-intelligence>. Accessed on March 4, 2017.