

“We Teach You the Future”

Production and Diffusion of Management Consulting Firms’ AI Discourses

Abstract

Recognized as creators and disseminators of management knowledge, management consulting firms make a significant impact on what managers see as critical issues and how they act in management practices. As catalysts endeavoring for the development and adoption of artificial intelligence (AI), management consulting firms have published a dramatically increasing number of articles on this topic in recent years. The purpose of this study is to probe the production and diffusion of the AI discourses manifested in the business articles of management consulting firms. Grounded in the literature on AI, institutions, discourses, and social networks, this study performed a discourse analysis of 81 AI-related articles from McKinsey, Boston Consulting Group (BCG), and Bain, facilitated by a quantitative word group analysis of 737 articles. The results suggest that as institutional agents in the uncertain and immature environments of AI, management consulting firms are producing AI discourses with their cohesive academic and corporate network and diffusing the discourses to the broad network to create homogeneous institutions with intrinsic irrationality.

Keywords: Management Consulting Firms, Artificial Intelligence, Discourses, Institutions, Networks

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1. Introduction

1.1 Practical Introduction

In March 2016, Google AlphaGo beat Lee Sedol, one of the best Go players with 4-1 (Hassabis, 2016). After only one year, its next-generation, AlphaGo Master, managed to defeat Ke Jie, the No.1 Go player ranked in the world (Dwyer, 2017). For the first time, machine intelligence overshadowed human intelligence in an area regarded as impossible for machines to ever understand. The success of AlphaGo frustrated some people, yet excited some others, sparking the popularity of artificial intelligence (AI) (Google Trends, 2019a).

In 1950, Alan Turing, the precursor of AI, devised the well-known “Turing Test” to evaluate whether a machine can behave indistinguishably from how a human being does (Kile, 2013). In subsequent decades, although the primary research of AI progressed substantially, machine intelligence still could not compete with human intelligence, and the applications of AI were relatively limited. Nevertheless, the trend has shifted recently. Breakthroughs of technologies such as machine learning, neural networks, robotic process automation, and blockchain have marked a new chapter for AI and human beings (Mendling et al., 2018; Ghoddusi et al., 2019; Wang et al., 2019).

Various applications of AI have already been launched or are going to be launched massively in our daily lives, ranging from Google Assistant and Translate and face-swapping software to autonomous machines, vehicles, and even weapons. Behind these specific products, AI is believed to create automation, informational, and transformational effects on business at large, and many organizations have already been in the journey of adopting AI (Mooney et al., 1996; Mendling et al., 2018). Beyond the business scope, AI will almost certainly have a far-reaching influence on and potentially challenge the existing order of society, yet there have been very few policies, regulations, and laws in place to govern or manage AI and its related issues, such as data privacy, technology misuse, and unemployment (Skoric, 2014; Kile, 2013; Thorsen, 2018; Cath et al., 2018).

The management consulting sector is one of the catalysts that endeavor for the AI transformation and has published a rapidly increasing number of business articles and reports

about AI in recent years. With clients across the private, public, and social sectors, management consulting firms are influencing nearly all aspects of organizational management across the world (Bäcklund & Werr, 2001; McKinsey, 2019a; BCG, 2019a). According to the public data, the top three management consulting firms, McKinsey, Boston Consulting Group (BCG), and Bain, also known as MBB, made a total revenue of over \$20 billion with 50,000 employees in 2017, and boast more than five million followers on LinkedIn, a professional networking platform (Forbes, 2019a; 2019b; 2019c; LinkedIn, 2019a; 2019b; 2019c).

Suggested by many academic researchers, management consulting firms are creators, disseminators, and entrepreneurs of management knowledge and fashions, making a great impact on what managers see as critical issues and how they act in management practices (Abrahamson, 1996a; Kieser, 1997; Abrahamson & Fairchild, 1999; Werr & Greiner, 2008). The growing AI-related articles and reports in which management consulting firms convey their management ideas and diffuse new concepts, such as “AI@scale” and “Responsible AI,” are an enabler for us to understand their roles in the field of AI (BCG, 2019b; McKinsey, 2019b). Our interest in studying management consulting firms through their articles has led us to focus on their discourses – what and how management consulting firms talk about management, AI, and the world (Jørgensen & Phillips, 2002; Phillips et al., 2004).

1.2 Research Purpose & Questions

In our study, we aim to contribute to the understanding of management consulting firms’ discourses on AI after identifying two major theoretical gaps. To begin with, previous researches on management discourses are narrow in its scope in three ways. Firstly, management researchers tend to conduct discourse analysis with a small sample of texts and talks. Secondly, the existing studies of management discourses usually investigate the processes of discourse production and diffusion at a general and theoretical level, lacking empirical depth. Thirdly, the broad social contexts that give rise to different management discourses are not captured in the existing literature. In addition to the first theoretical gap, there is a lack of theoretical and methodological diversity and depth in management researches on AI.

In order to close the research gaps, we blend studies of AI technology and its related issues, institutional theory, discourse analysis, and social network analysis into our thesis to seek answers for the research question:

The production and diffusion of management consulting firms' AI discourses

To research on the overarching research question, we have operationalized it into the following four sub-questions, including:

- **What are the environments that construct management consulting firms?**
- **What is the role of management consulting firms in the environments?**
- **How are management consulting firms' AI discourses produced and diffused?**
- **What constitutes management consulting firms' AI discourses?**

1.3 Delimitation

The discourses of management consulting firms can be manifested in different forms, such as articles and reports, case deliverables, interviews, and videos. Our study only examines the discourses demonstrated in the articles and reports that are publicly available on the websites of selected management consulting firms. Additionally, our thesis focuses on multinational management consulting firms, particularly the three top-tier ones – McKinsey, Boston Consulting Group (BCG), and Bain.

2. Literature Review & Theoretical Framework

This chapter reviews relevant literature on AI technology and its related issues, institutional theory, discourse analysis, and social network analysis as a theoretical foundation (2.1), identifies theoretical gaps (2.2), and presents a theoretical framework (2.3) subsequently.

2.1 Theoretical Foundation

Although the four research areas that we explore seem to be quite distinct from each other, they are all relevant for us to answer the four research questions that we propose earlier. The studies of AI technology and its related issues (2.1.1) map a big picture of the technological, business, and societal contexts of AI. Institutional theory (2.1.2) offers a theoretical foundation for understanding the general environments of management consulting firms and their roles and actions in the environments. Discourse analysis (2.1.3) provides us with both theories and methods to understand and analyze the discourses of management consulting firms. Social network analysis (2.1.4) gives us insights about by whom, with whom, and in what social order management consulting firms produce and diffuse their discourses, deepening our comprehension about the production and diffusion process.

2.1.1 AI Technology & Related Issues

Definition of AI

Several definitions of AI are spotted in the existing literature. The Turing Test defines AI as machines that are indistinguishable from humans in terms of behaviors, and this standard is still too ambitious for today (Kile, 2013). As the most accepted and adopted definition, AI is the theory and application of machines or systems that are capable of performing activities traditionally requiring human intelligence, ranging from understanding human languages and recognizing voices and images to automating routine manufactural processes and making medical diagnoses (Kile, 2013; Carter, 2019; Akerkar, 2019; Ghoddusi et al., 2019; Visvikis et al., 2019; Naidoo & Dulek, 2018). Some other researchers hold a different view. The computer scientist Larry Tesler, for example, maintains that “AI is whatever hasn’t been done yet” (Maloof, 2015). In other words, the standard of intelligence should advance with practical developments. Unlike the previous definitions that see AI as something that can be separate

from humans, Xu and Wang (2019) assert that AI is a stimulation, extension, and expansion of human intelligence.

The AI-related articles of management consulting firms usually do not provide a definition of AI. In articles where it is provided, the definition depends on the purpose of the articles (McKinsey, 2017a; 2017b; 2019c). For instance, in one report, AI is defined as “software algorithms that perform calculations and cognitive activities,” close to the most accepted definition introduced above, while another report takes a much narrower view of AI as deep learning techniques for the purpose of modeling (McKinsey, 2017a; 2019c).

Uncertainties of AI Development & Adoption

Although it is suggested by many researchers that AI has created numerous opportunities for businesses in cost-cutting and value-adding activities, there are also studies on the uncertainties of AI development and adoption (Spohrer, 2017; Russo, 2019; Weber & Schütte, 2019; Aryabarzan et al., 2018).

For one thing, AI’s technological development bears uncertainties. Firstly, humans are good at dealing with information with uncertainties in the real world, while it is challenging for machines to tackle something not predictable or calculable (Krasheninnikova et al., 2019; Saffiotti, 1987). Secondly, data acquisition and data quality are greatly influenced by external hardware, making the input of AI sometimes unstable and unreliable (Krasheninnikova et al., 2019; Dias et al., 2004). Thirdly, human biases might exist when the data is translated into computer languages (Osoba & Welser IV, 2017). However, Ashton and Stacey (1995) point out that with careful consideration of follow-up actions, these technical surprises could be lessened or even eliminated.

For another thing, Brynjolfsson (1993) and Ashton and Stacey (1995) recognize a paradox between productivity growth and AI adoption. The efficiency will not certainly increase after adopting AI due to factors such as time lag to payoff, mismanagement, and acceptance and involvement of human workers (Brynjolfsson, 1993; Ashton & Stacey, 1995; Fan et al., 2018; Puaschunder, 2019).

Ethical, Societal & Regulatory Issues

In addition to technical and management factors, the ethical and societal impact of AI should also be taken into consideration (Arthur, 2009; Russo-Spena et al., 2019). There have been a wide range of researches covering many aspects of potential issues, including but not limited to private data governance, intentional misuses, legal responsibilities, and unemployment, but the standpoints vary to a large extent, and little consensus have been reached (Skoric, 2014; Boyd & Crawford, 2012; Lazcano et al., 2018; Goddard, 2017; Zarsky, 2017; Scherer, 2016; Cath et al., 2018).

Employment is one of the main topics in the academic literature on AI's societal issues. A divide of opinions about AI's influence on employment has been noticed. Some researchers believe that the introduction of AI will lead to a dramatical decline of job opportunities, especially for low-skill workers, potentially triggering societal turbulence (Cath et al., 2018; Kile, 2013; Huang & Rust, 2018). Some others insist that AI will not make human labor obsolete; instead, humans will be freed from routine tasks and can still outperform AI when it comes to activities related to trust and intimate relationships (Schön, 1983; Mendling et al., 2018).

In terms of AI's long-term threats to humans, some researchers assert that AI is built by human intelligence and can thus be controlled by humans (Lazcano et al., 2018). Others fear that the advancement of AI is likely to blur the boundary between humans and machines, leading to countless ethical questions, and pose a danger to human civilizations as Elon Musk and Stephen Hawking warned (Schneier, 2018; Müller, 2014; Scherer, 2016; Sikdar, 2018).

2.1.2 Institutional Theory

Studies of AI technology and its related issues presented above give us a general picture of the environments around AI, while institution theory is relevant for us to understand the environments of management consulting firms and their roles in the environments to conceptualize the motivations and drives behind their production and diffusion of discourses.

Institutions can be defined as shared constraints that structure social actors and their interactions, including both formal constraints (e.g., constitutions and laws) and informal ones (e.g., customs and traditions) (North, 1991; Barley & Tolbert, 1997). Since the studies of

institutions vary to a large extent across different disciplines, we place our focus here on institutional theory in the context of organizational analysis (DiMaggio & Powell, 1991).

One of the major assumptions of institutional theory, or more specifically new institutionalism characterized by DiMaggio and Powell (1991), is that organizational forms and practices, less driven by competition and efficiency criteria, are more regularized by norms, beliefs, and values in an institutional context (Meyer & Rowan, 1977; DiMaggio & Powell, 1983; Greenwood & Hinings, 1996; Bresser & Millonig, 2003). Coercive, mimetic, and normative institutional mechanisms proposed by DiMaggio and Powell (1983) pose pressure on organizations to follow similar models or practices in order to gain legitimacy and necessary resources to secure their survival (Meyer & Rowan, 1977; Greenwood & Hinings, 1996).

Multiple scholars have applied institutional theory to study management consulting or knowledge-intensive firms in general. Among them, Alvesson (1993) and Glückler and Armbrüster (2003) underline the impact of institutional environments on management consultancies. In his widely-cited paper, Alvesson (1993) questions the functionalist way of explaining the development of knowledge-intensive firms, that is to say, knowledge becomes increasingly crucial; instead, he perceives knowledge as an institutionalized myth and argues that struggling with ambiguities of work results, knowledge-intensive firms deploy rhetorical strategies to persuade customers and create legitimacy. Glückler and Armbrüster (2003) categorize institutional and transactional quality uncertainties that management consultancies feature and suggest that their reputation and trust among clients are the keys to success.

Some other scholars pay attention to institutionalization. For instance, David et al. (2013) analyze how the founders of the earliest management consulting firms made use of the opportunities in emerging fields and legitimated the professional form of management consulting from the 1900s to the 1950s. Reihlen et al. (2010) outline the strategies that management consulting firms adopt (e.g., co-optation, lobbying, standardization) to manipulate their institutional contexts.

Technical & Institutional Environments of Management Consultancies

In the field of institutional theory, we are particularly interested in the study of technical and institutional environments. Identical to competitive markets in neoclassical economics in the purest sense, technical environments are the fields where exchanges and transactions take

place, and where organizations are evaluated by the control of their outputs (Scott & Meyer, 1983; Scott, W., 1991; Powell, 1991). In such environments, organizations are devoted to managing their technical processes efficiently and effectively to maximize their benefits, regardless of environmental influence (Scott & Meyer, 1983).

However, technical environments cannot explain why a well-established field still sees homogeneity of organizational forms and practices, and institutional environments are thus put forward (DiMaggio & Powell, 1983). Institutional environments are composed of norms and requirements posed by regulatory authorities, associations, and unions, and beliefs and value systems with which organizations in this field must comply to reduce uncertainty and achieve success (Scott & Meyer, 1983).

As for the management consulting sector, both its technical environments and institutional environments are significantly uncertain (Glückler & Armbrüster, 2003). Uncertainty of the technical environments results from confidentiality of client information, intangible nature of consulting work, and interdependence of consultants and clients in result production, and uncertainty of the institutional environments stems from the absence of formal institutional requirements, including professionalization, business boundaries, and service quality standards (Glückler & Armbrüster, 2003). The former type of uncertainty is a common feature of knowledge-intensive professions, while the latter is specific to the management consulting sector (Glückler & Armbrüster, 2003). Asserted by Scott and Meyer (1983), it is not plausible for organizations to develop and thrive in a field where both technical environments and institutional environments are poorly formed. The way for management consulting firms to escape from the dilemma is to devote their resources to shaping and maintaining the informal institutional elements, such as reputation, image, trust, and values (Alvesson, 1993; Glückler & Armbrüster, 2003; Reihlen et al., 2010). It leads to the following discussion of management consultancies as institutional agents.

Management Consultancies as Institutional Agents

What lies at the core of institutional agents as a concept is that institutions are not formed naturally and do not just impose one-way constraints to organizations; instead, institutions are driven and shaped by powerful organizations actively and intentionally (Meyer & Rowan, 1977; Strang & Sine, 2002; Scott, 2008). Such organizations or groups as institutional agents define and enact institutional environments by, for example, urging their close social networks

to adopt their schemes and configuring their objectives and practices into shared institutional standards in the society (Meyer & Rowan, 1977; Scott, 2008).

As a major advocate for the notion of institutional agents, Scott (1995; 2008) has provided plenty of accounts on professionals as institutional agents. According to his framework of three institutional pillars, professionals can be categorized as cultural-cognitive, normative, or regulative institutional agents (Scott, 2008). Since management consulting firms do not have a privileged right to use regulatory forces, only the first two categories are relevant for our study (Scott, 2008).

Cultural-cognitive agents are those that “create and warrant knowledge” in Knorr-Certina’s (1999) term. For them, ideas and knowledge are primary weapons (Scott, 2008). “They exercise control by defining reality – by ‘devising ontological frameworks, proposing distinctions, creating typifications, and fabricating principles’ and generalizations” (Scott & Backman, 1990; Scott, 2008).

As for normative agents, they are those that set norms and principles to guide the activities of different social actors (Scott, 2008). As Scott (2008) puts it, the primary forms of arguments used by normative agents to develop and promote standards are:

- (1) the proposals are objectively superior, backed by scientific evidence or based on ‘best practices’; (2) they are in the best interests of the adopters; or (3) they are broadly consistent with the long-term interests of humanity. (Scott, 2008)

According to previous studies, the management consulting sector shares the traits of both cultural-cognitive agents and normative agents. Management consulting firms not only “define management as an expert activity” and renew the beliefs of the most updated management techniques or “management fashions” continuously but also problematize the situations of clients in such a way that their services can be perceived as the best solutions (Bäcklund & Werr, 2001; Abrahamson & Fairchild, 1999). Since management knowledge and fashions to a large extent are formulated and diffused as language, discourse analysis as a package of theories and methods to study language is presented in the next section.

2.1.3 Discourse Analysis¹

Language has become a growing focus in social and organizational studies (Alvesson & Kärreman, 2000a; 2000b). Against the traditional view that language is a pure representation of reality, researchers in this field have turned to the vague, symbolic, contextual, and engaging characteristics of languages (Alvesson & Kärreman, 2000a). This academic trend has given rise to interest in discourses in recent years (Alvesson & Kärreman, 2000a; 2000b; Bäcklund & Werr, 2008). However, like many other concepts in social science, the term discourse has been used in a wide range of ways with no absolute definition (Alvesson & Kärreman, 2000b; Thomas, 2003). For our study, we put forward a working definition of discourse as a structured collection of talks and ways of talking about social reality (Jørgensen & Phillips, 2002; Phillips et al., 2004). For the investigation of the relationship between discourses and social reality, discourse analysis offers a systematic approach to analyzing texts, which constitute discourses, and their production, diffusion, and consumption (Phillips et al., 2004).

Key premises of social constructionism are believed to lay a philosophical foundation for most discourse analytical approaches (Jørgensen & Phillips, 2002). Four philosophical assumptions of social constructionism, which our study also shares, are presented by Jørgensen and Phillips (2002), including:

- **Critical approach to the knowledge of reality** (Jørgensen & Phillips, 2002)
Our knowledge about reality is far from objective; we approach reality not as how it is, but through our specific ways of categorizing and perceiving the world (Burr, 1995; Gergen, 1985; Jørgensen & Phillips, 2002).
- **Historical and cultural specificity** (Burr, 1995)
Our knowledge about reality is shaped by “historically situated interchanges among people”; how we approach reality could be disparate depending on the historical and cultural contexts where we are situated (Gergen, 1985; Jørgensen & Phillips, 2002).

¹ Discourse analysis is a combination of ontological position, theoretical standpoints, and research methodology. There are many different schools of discourse analysis, including but not limited to Foucauldian Discourse Analysis, Critical Discourse Analysis, and Discursive Psychology (Jørgensen & Phillips, 2002).

- **Link between knowledge and social processes** (Jørgensen & Phillips, 2002)
Our perspectives on understanding reality are shaped and sustained by social processes and interactions (Burr, 1995; Gergen, 1985; Jørgensen & Phillips, 2002).
- **Link between knowledge and social action** (Jørgensen & Phillips, 2002)
With a certain perspective on reality, some actions become taken-for-granted and unquestioned; the social construction of understanding reality leads to social actions as consequences (Burr, 1995; Gergen, 1985; Jørgensen & Phillips, 2002).

Management Discourses & Management Consultancy Discourses

It is not uncommon that the discourse analytical approach is adopted to examine general management texts or management consulting firms' texts. Although multiple researchers concentrate on studying the discursive practices (i.e., production and consumption processes) of management discourses, there are some differences found in the specific analytical approaches applied by them (Bäcklund & Werr, 2001; 2008; Meriläinen et al., 2004; Furusten, 1999; Thomas, 2003; Whittle, 2008). One major distinction is the level of analysis – some researchers tend to pay attention to a local context, typically the discursive practices of direct producers (e.g., management consultancies or individual consultants), while others investigate the discursive practices that involve multiple types of actors or agents in a larger social context.

Bäcklund and Werr (2001; 2008) and Meriläinen et al. (2004) are examples of the former category of researchers. Bäcklund and Werr (2001) review the web presentations of four global management consultancies based in five countries and maintain that rhetorical efforts of constructing service legitimacy and desirability marry well with the rationality, globalization, and universality myths of management. In another paper, Bäcklund and Werr (2008) emphasize that managerial regimes of “bureaucracy” and “post-bureaucracy” are important discursive resources upon which the rationalizing and normalizing discursive practices of management consultancies draw to construct the consultant-client relationship. Meriläinen et al. (2004), different from Bäcklund and Werr (2001; 2008), turn to the discourses of individual consultants and explore what constructs an “ideal” consultant.

Furusten (1999), Thomas (2003), and Whittle (2008) are examples of the latter category. Perceiving management discourses as a layer of organizations' institutional environments,

which are embedded in broad environments, Furusten (1999) investigates how popular management books are produced, diffused and supplied, and provides implications for organizations that consume the texts (Furusten, 1999). Thomas (2003) questions the approaches of studying management discourse as fashions and proposes a new framework that combines Critical Discourse Analysis (CDA) and Bernstein's concept of recontextualization to probe the complex processes of how management discourses are produced, diffused, and consumed by agents such as academic researchers, management consultants, and practitioners. Following the suggestion of Thomas (2003), Whittle (2008) discusses how management consultants diffuse fashionable discourses that are primarily produced by other social agents.

2.1.4 Social Network Analysis

Although it is a distinct research area from the other three, social network analysis sheds light on the social actors and relations among them and enables us to probe further behind the production and diffusion of discourses to see where power and influence lie.

A social network is a unit of socially connected nodes (Marin & Wellman, 2011; Castells, 2009). Social network analysis is a structural approach to studying the relationships and interactions among these nodes – different social actors, such as individuals, communities, organizations, and states (Freeman, 2004). Based on graph theory, interpersonal relations, and anthropology, social network analysis began to establish coherent theoretical frameworks in the 1960s (Scott, J., 1991; Liu et al., 2017).

According to Marin and Wellman (2011), there are two distinct approaches to theoretical development in social network analysis – the formalist approach and the structural approach. The former studies the pure mathematical form of social networks, while the latter focuses on how patterns and forms of relations are embodied in empirical situations (Scott, 2011b; Marin & Wellman, 2011). Due to broad generality and utility, there have been considerable applications of network analysis in a wide range of research disciplines and contexts covering global economy and politics, urbanization, markets and marketing, social movements, religion, criminality and terrorism, and health and illness (Freeman, 2000; 2004; Scott, 2011a; Liu et al., 2017). Nevertheless, social network analysis is not commonly used to examine the actors in the management consulting sector.

Cohesive Groups & Positions

The research on cohesive groups and positions of individual actors is one of the areas that inspire our study. The notion of cohesive groups was touched upon by early sociologists in an institutive manner and started to be described in structural terms with the advent of social network analysis (Freeman, 2011). According to Freeman and Webster (1994), a cohesive group can be described as a collection or cluster of social actors that are connected through frequent interactions. Moreover, the core and periphery positions of social actors in groups have been analyzed (Freeman, 2011). Core members are those individuals that interact with each other most often and intimately, while periphery members interact less frequently on a smaller scale (Davis et al., 1941). Such concepts have been extended to a corporate context in the studies of corporate power and interlocking directorates, especially in the banking industry (Scott, 2011a; Carroll & Sapinski, 2011). However, social networks and corporate power of the management consulting sector are rarely explored.

2.2 Theoretical Gaps

There are two theoretical gaps identified based on our literature review. For one thing, previous researches on management discourses are narrow in its scope in three ways. Firstly, management discourses are often analyzed based on a tiny sample. For example, Bäcklund and Werr (2001; 2008) study how the viability and desirability of consulting services are constructed by analyzing only a few web presentations of management consulting firms. Although covering many different aspects of the production and diffusion of management discourses, Furusten (1999) conducts a detailed discourse analysis of just two management books. Secondly, the existing studies of management discourses tend to investigate the processes of discourse production and diffusion at a general and theoretical level, lacking empirical depth. The management fashion theory of Abrahamson (1991; 1996a; 1996b) differentiates rational norms and progressive norms of management consulting firms' fashion-setting processes but fails to answer how these management fashions are produced by whom in everyday life of organizations. Thirdly, the broad social contexts that give rise to specific fashionable management ideas and discourses are barely studied, and the existing literature creates an impression the environments of management consulting firms are fixed. Since the study of Glückler and Armbrüster (2003) on the transactional and institutional uncertainties underlying the services of consulting services, little research has been conducted to deepen the

understanding of the environments where management consulting firms are embedded. In the age of AI, the uncertainties analyzed by Glückler and Armbrüster (2003) might be less relevant for management consulting firms, and new uncertainties need to be captured in research.

For another thing, management researchers rarely apply theories and methods of management studies to explore business and social questions related to AI. Although AI is not a new concept in scientific research, it is only in recent years that AI has been applied in practice and gained massive business, media, and academic attention outside of the community of scientists. Thus, it is not surprising that there have not been extensive management studies of AI and AI discourses in terms of theoretical and methodological diversity and depth.

2.3 Theoretical Framework

Drawn from studies of AI technology and its related issues, institutional theory, discourse analysis, and social network analysis, this section synthesizes the theoretical insights into a theoretical framework to investigate the production and diffusion of management consulting firms' AI discourses.

First and foremost, we maintain that management consulting firms are embedded in complex technical and institutional environments (Scott & Meyer, 1983; Scott, W., 1991; Powell, 1991). Traditionally, management consulting firms are faced with technical and institutional uncertainties proposed by Glückler and Armbrüster (2003). As mentioned earlier, uncertainties of the technical environments (transactional uncertainties) are consequent on client information confidentiality, intangibility of consulting deliverables, and reliance on the interactions with clients, while uncertainties of the institutional environments are caused by the deficiency of formal institutional requirements, such as professionalization, business division, and service standards (Glückler & Armbrüster, 2003). In the era of AI, management consulting firms not only have to deal with these traditional uncertainties but also need to confront transactional and institutional uncertainties associated with AI. In the technical environments, both AI technologies and business applications are still under development, leading to uncertainties for management consulting firms to provide AI-related consulting services for their clients. In the institutional environments, on the other hand, there is a lack of formal institutions, such as regulations and laws to regulate organizations in AI development and application, along with

unsettledness of informal institutions centered around employment, social orders, and ethics. According to Scott and Meyer (1983), such technical and institutional environments filled with traditional and emerging uncertainties pose great difficulty for management consulting firms to grow in the age of AI, making it necessary for the consulting sector to develop informal institutions to stabilize the environments in order to survive and succeed.

Subsequently, we conceptualize management consulting firms as institutional agents that define and enact institutional environments related to AI actively and intentionally (Meyer & Rowan, 1977; Strang & Sine, 2002; Scott, 2008). Based on Scott's (1995; 2008) definition of cultural-cognitive, normative, and regulative institutional agents, management consulting firms can be categorized as both cultural-cognitive agents and normative agents. As cultural-cognitive agents, they invent and authorize knowledge about AI and its related issues (Knorr-Certina, 1999; Scott, 2008). The notions of "AI@scale" and "Responsible AI" are some instances of the knowledge that they create and diffuse (BCG, 2019b; McKinsey, 2019b). As normative agents, they set principles and guidelines for what organizations should do about AI and its related issues. Such principles and guidelines are normalized through the consulting projects that these firms conduct for leading organizations, which also serve as models for other organizations across sectors, industries, and countries (DiMaggio & Powell, 1983).

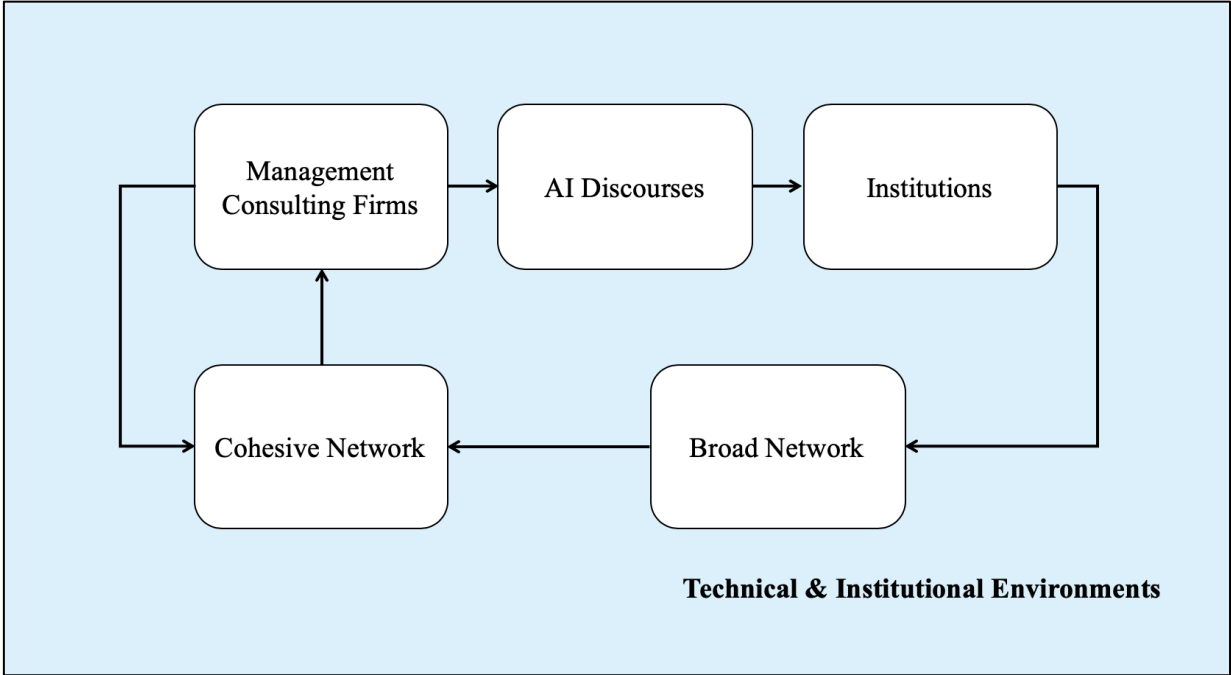
Next, we acknowledge the importance of discourses in our study. Applying the working definition of discourses presented earlier, we give the meaning of AI discourses as a structured collection of talks (texts) and ways of talking about AI technology and its related issues (Jørgensen & Phillips, 2002; Phillips et al., 2004). The focus of our study is the AI discourses manifested in management consulting firms' talks (texts) and ways of talking about AI. Following the philosophical premises of social constructionism summarized from the writings of Burr (1995), Gergen (1985), and Jørgensen and Phillips (2002), such AI discourses are constructed through social practices in which management consulting firms are involved. In other words, AI discourses constituted by AI-related talks or texts are constructed through related social activities of management consulting firms in the complex technical and institutional environments. Moreover, AI discourses can lead to certain social actions as consequences (Burr, 1995; Gergen, 1985; Jørgensen & Phillips, 2002). Based on the discursive model of institutionalization of Phillips et al. (2004), discourses and actions are linked by institutions. When AI discourses become (partly) institutionalized, the institutions into which

the AI discourses are transformed serve as constraints and guidelines for the actions of related social actors.

Finally, we introduce social network theory into our theoretical framework to understand related social actors (mostly organizations) of management consulting firms. We argue that the creation and institutionalization of AI discourses involve connected actors from academia, the business sector, and the public sector. It is noted that these organizations do not play the same role in the process. It is identified in our pre-study of management consulting firms' AI-related business press that a small number of organizations (or individuals) repeatedly participate in the interviews or are referred to as pioneers and models. Inspired by the concept of cohesive groups along with core and peripheral positions in social network analysis, we propose three analytical notions of networks in our study – cohesive network, peripheral network, and broad network (Freeman & Webster, 1994; Freeman, 2011; Davis et al., 1941). The cohesive network consists of core organizations that can participate directly and actively in the production of management consulting firms' AI discourses. The peripheral network is composed of organizations that have less frequent interactions with management consulting firms in the production of discourses. The broad network is a combination of the cohesive network and the peripheral network. As indicated in our theoretical framework, the cohesive network co-produces AI discourses with management consulting firms. When transformed into institutions, AI discourses expose constraints to the broad network, which includes the peripheral network with less power and influence in the AI discourse production process.

To synthesize, as illustrated in Exhibit 1, in the age of AI, situated in significantly uncertain technical and institutional environments, management consulting firms as cultural-cognitive and normative agents actively seek to devise informal institutions to set constraints and principles to the broad network by forming the cohesive network and producing AI discourses.

Exhibit 1: Theoretical Framework



3. Methodology

3.1 Research Design

3.1.1 Mixed Methods

The research strategy of mixed methods has been progressively applied and recognized in social science studies (Bryman & Bell, 2011). In our study, qualitative discourse analysis was the primary research method, facilitated by quantitative word group and cluster analysis.

Qualitative Research

There is a variety of approaches for conducting discourse analysis. To study the production of management consulting firms' AI discourses, we applied Furusten's (1999) pragmatic, step-by-step approach. Compared with other methods of discourse analysis, Furusten's (1999) approach combines theories and methods of many scholars, including but not limited to Latour (1987), Kets de Vries and Miller (1987), Czarniawska-Joerges (1988; 1993), and Cooper (1986), making it more detailed and accessible for us to follow as primary learners of discourse analysis.

Quantitative Research

Based on semantic network theory, cluster analysis has been widely used in business research to capture hidden messages in texts and contexts (Sheppard, 1996; Huberty et al., 2005; Yuan et al., 2013). To facilitate qualitative research of discourse analysis, we employed a quantitative method of word groups and clusters to analyze articles and reports of top-tier management consulting firms and to yield preliminary patterns of the texts for later analysis.

To discover the association and linkage among words, we applied Wordij 3.0 (WordLink), a software developed by James Danowski for semantic network analysis and text mining (Danowski, 2013; Yuan et al., 2013). It aimed at identifying the co-occurrence and linkage of words to illustrate underlying themes and relationships. Additionally, we employed another software Gephi to visualize the findings generated by the former program into graphs. Words identified with strong relationships are presented in thick clusters in a graph, and words with loose relationships are shown scattered instead (Yuan et al., 2013).

There were two preparatory steps required for conducting the quantitative analysis. For one thing, data cleaning work was needed to unite words in different forms (e.g., past, passive, comparative forms) and to remove function words, such as propositions, articles, and auxiliary words based on the Porter Stemming Algorithm (Porter, 2016). For another thing, we had to manually label categories of articles based on themes and topics in order to gain more insights.

3.1.2 Abductive Approach

Our study took an abductive approach with “a constant movement back and forth between theory and empirical data” (Wodak, 2001). To develop our initial theoretical framework, we conducted a literature review of proceeding theories and a pre-study of management consulting firms’ business press on an ongoing basis. Next, we embarked on the process of data collection and analysis based on the initial framework, which we continuously refined with emerging findings.

3.1.3 Constructionism Orientation

As an ontological position, constructionism or constructivism maintains that social phenomena and meanings are created and revised by social actors and their interactions (Bryman & Bell, 2011). With constructionism orientation, researchers not only perceive reality as socially constructed but also acknowledge that their accounts of reality are merely one perspective that presents reality (Bryman & Bell, 2011). With discourse analysis as the primary research method of our study, we recognized its social constructionist philosophical assumptions outlined earlier including a critical approach to knowledge, historical and cultural specificity, and dialectic relationships between knowledge and social processes and actions (Jørgensen & Phillips, 2002; Gergen, 1985; Burr, 1995). We took this ontological position of constructionism regarding both the discourses of management consulting firms and our interpretation of their discourses. In other words, we believed that both their discourses and our understanding are socially constructed.

3.2 Data Collection & Selection

3.2.1 Data Collection

The texts used in our study were AI-related articles and reports produced and released by three top-tier management consulting firms, including McKinsey, BCG, and Bain (MBB). Given MBB's leading market positions and significant influence on their followers and other sectors, we assert that the AI-related business press of MBB can be regarded as representatives of the management consulting sector.

In total, we retrieved 1,388 AI-related articles from the official websites of MBB on 29 October 2019, and 737 out of them were defined as valid ones. Below is an overview of the articles that we retrieved:

Exhibit 2: Overview of Data Collection

Company	# of Total Articles	# of Valid Articles	Source	Remarks
McKinsey	835	430	https://www.mckinsey.com/	By searching the keyword “Artificial Intelligence” and removing invalid results, such as broadcasts and “Our People” pages, we yielded 430 valid results.
BCG	363	257	https://www.bcg.com/	By searching the keyword “Artificial Intelligence”, applying the filtering function, and removing invalid results, which for some unknown reasons neither contain the keyword “Artificial Intelligence” nor are related to AI, we yielded 257 valid articles.
Bain	190	50	https://www.bain.com/	By searching the keyword “Artificial Intelligence”, applying the filtering function, and removing invalid results, which for some unknown reasons neither contain the keyword “Artificial Intelligence” nor are related to AI, we yielded 50 valid articles.
Total	1,388	737		

3.2.2 Data Categorization

To facilitate further data selection and analysis, we identified four themes of management consulting firms' articles. Then we manually divided the 737 valid articles into the four categories shown below:

Exhibit 3: Overview of Data Categorization

No.	Category	Description	# of Articles
1	World & Regional Economy	Macro trends of world and regional economies	191
2	Society & Humans	Ethical and societal issues related to technology adoption	74
3a	Technology Details	Specific technical descriptions of technologies	21
3b	Technology Adoption	Use cases of technologies in different sectors and functions	162
4	Corporate Strategy & Culture	Corporate strategies and cultural transformation	289
Total			737

3.2.3 Data Selection

All the 737 valid articles were used for the quantitative analysis. For discourse analysis, 81 articles across four categories of themes were selected (see Exhibit 4). The selection was advanced with the process of discourse analysis and was ceased when we reached “theoretical saturation,” a stage where new articles did not generate new insights to our analysis (Bryman & Bell, 2011).

Exhibit 4: Overview of Data Selection

Code	Company	Year	Category	Title
4056	Bain	2011	1	Macro Trends to Add Trillions of Dollars to Global GDP in 2020
4061	Bain	2012	1	Growth Trends To 2020
4068	Bain	2019	1	Future of Consumption in Fast-Growth Consumer Markets: India
4098	Bain	2017	1	Delivering China's 'New Retail' Future
4123	Bain	2018	1	Consumption in China: Ten Trends for The Next 10 Years
4287	BCG	2019	1	Next Frontier in Digital and AI Transformations, The
4321	BCG	2019	1	South Korea
4352	BCG	2018	1	Telco Digital Transformation – Made to Measure
4383	BCG	2019	1	Ascent to The Cloud - Main Report
4460	BCG	2016	1	Why the Technology Economy Matters
4467	BCG	2019	1	Five Ways to Win in China's Changing Mobility Market
4475	BCG	2018	1	Why Multilatinas Hold the Key to Latin America's Economic Future
4492	BCG	2017	1	What China Reveals About the Future of Shopping
4495	BCG	2019	1	Indonesia
5428	McKinsey	2019	1	Artificial Intelligence in The United Kingdom: Prospects and Challenges
5429	McKinsey	2018	1	The Promise and Challenge of The Age of Artificial Intelligence
5433	McKinsey	2018	1	Artificial Intelligence: The Time to Act Is Now
5523	McKinsey	2017	1	Shaping the Future of Work in Europe's 9 Digital Front-Runner Countries
5560	McKinsey	2018	1	AI's Growing Impact
5677	McKinsey	2018	1	Industrial Revolution or Evolution?
5764	McKinsey	2017	1	How China Became A Digital Leader
5785	McKinsey	2018	1	China's Fast Climb Up the Value Chain
5994	McKinsey	2019	1	Digital India: Technology to Transform A Connected Nation
6013	McKinsey	2019	1	The Future of Work in Black America
6109	McKinsey	2018	1	Skill Shift: Automation and The Future of The Workforce
6113	McKinsey	2016	1	Organizing for The Future
6124	McKinsey	2019	1	China and The World: Inside the Dynamics of a Changing Relationship
6132	McKinsey	2018	1	What Can We Expect in China In 2019?
4027	Bain	2018	2	Tackling AI's Unintended Consequences
4266	BCG	2017	2	What's Holding Back Artificial Intelligence - Infographic
4268	BCG	2018	2	Myth Vs. Reality in Artificial Intelligence
4320	BCG	2017	2	Prediction in Uncertain Times: Lessons from Trump and Brexit
4346	BCG	2016	2	Promise and Responsibilities in Our Digital World: Our Take on The USI 2016 Conference
4367	BCG	2016	2	Why Technology Matters

4374	BCG	2015	2	Man and Machine in Industry 4.0: How Will Technology Transform the Industrial Workforce Through 2025?
4469	BCG	2017	2	New Digital World: Hegemony or Harmony?
4477	BCG	2018	2	The Humanization of The Corporation
4501	BCG	2019	2	Solving the Tech Industry's Purpose Problem
5435	McKinsey	2019	2	Can Artificial Intelligence Help Society as Much as It Helps Business?
5444	McKinsey	2019	2	Confronting the Risks of Artificial Intelligence
5457	McKinsey	2019	2	The Analytics Academy: Bridging the Gap Between Human and Artificial Intelligence
5497	McKinsey	2017	2	Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, And Wages
5505	McKinsey	2018	2	Why AI Isn't the Death of Jobs
5507	McKinsey	2019	2	AI for Human Development
5508	McKinsey	2018	2	The Promise and Pitfalls Of AI
5609	McKinsey	2019	2	The Future of Women at Work in The United Kingdom
5663	McKinsey	2018	2	Women and The Future of Work: A Window of Opportunity in Western Europe?
5887	McKinsey	2019	2	How Automation Could Affect Employment for Women in The United Kingdom and Minorities in The United States
5897	McKinsey	2017	2	What's Missing in Leadership Development?
5943	McKinsey	2017	2	Technology, Jobs, And the Future of Work
5967	McKinsey	2017	2	Competing in A World of Sectors Without Borders
6046	McKinsey	2019	2	Collaborating for The Common Good: Navigating Public-Private Data Partnerships
4025	Bain	2018	3a	Don't Forget About Existing Technologies
4311	BCG	2017	3a	Mining Value In AI
5456	McKinsey	2018	3a	Notes from The AI Frontier: Applications and Value of Deep Learning
5459	McKinsey	2018	3a	Deep Learning's Origins and Pioneers
4023	Bain	2019	3b	How AI Can Make Your Call-Center Experience Less Painful
4072	Bain	2018	3b	What Sales Teams Should Do to Prepare for The Next Recession
4270	BCG	2017	3b	Putting Artificial Intelligence to Work
4314	BCG	2019	3b	What Could Blockchain Do for Airlines?
4373	BCG	2018	3b	How IoT Data Ecosystems Will Transform B2B Competition
4462	BCG	2017	3b	How the Internet of Things Will Change the Pricing of Things
5438	McKinsey	2019	3b	Artificial Intelligence and The Circular Economy: AI as A Tool to Accelerate the Transition
5452	McKinsey	2018	3b	Artificial Intelligence: Why A Digital Base Is Critical
6049	McKinsey	2018	3b	Behind the Mining Productivity Upswing: Technology-Enabled Transformation
6118	McKinsey	2018	3b	Distraction or Disruption? Autonomous Trucks Gain Ground in US Logistics

4065	Bain	2017	4	You Know Where the Future Is Headed, So Why Aren't You There Already?
4267	BCG	2019	4	How to Win with Artificial Intelligence / Winning with AI
4271	BCG	2017	4	Is Your Business Ready for Artificial Intelligence? / Reshaping Business with Artificial Intelligence
4323	BCG	2019	4	A Great Digital Identity Solution Is One You Can't See
4343	BCG	2018	4	Winning The '20s: A Leadership Agenda for The Next Decade
4362	BCG	2019	4	Disruptions, Delusions, And Defenses in Digital Transformation
4415	BCG	2017	4	Twelve Forces That Will Radically Change How Organizations Work: The New Way of Working
4421	BCG	2017	4	Designing the Tech Function of The Future
4466	BCG	2019	4	Quality 4.0 Takes More Than Technology
5432	McKinsey	2019	4	What It Really Takes to Scale Artificial Intelligence
5440	McKinsey	2017	4	Smartening Up with Artificial Intelligence
5443	McKinsey	2018	4	Will Artificial Intelligence Make You A Better Leader?
5445	McKinsey	2018	4	AI Adoption Advances, But Foundational Barriers Remain
5522	McKinsey	2019	4	Leading Your Organization to Responsible AI
5992	McKinsey	2018	4	Powerful Pricing: The Next Frontier in Apparel and Fashion Advanced Analytics

3.3 Data Analysis

3.3.1 Context Analysis

In the first phase, we investigated the contexts of the text materials to study the motivations, concerns, and social forces tied to the production of AI discourses (Furusten, 1999). Since the articles and reports have been produced, we could not conduct real-time observations on the production process, as Latour (1987) suggests. Instead, we identified the trends in terms of article quantities, themes, and keywords across years, and compiled the background information (e.g., authors, profiles, purposes) of the articles to map out the production contexts.

3.3.2 Text Analysis

In the second phase, we examined the content of the texts in three steps – characterizing texts, deconstructing texts, and identifying ideologies represented in the texts based on Furusten's (1999) approach to studying management discourses (Kets de Vries & Miller, 1987). His

approach combines theories and methods from multiple researchers, making it very detailed and easy to follow for primary learners of discourse analysis (Furusten, 1999).

Characterizing Texts

In this step, we discovered the main topics and issues addressed by the texts and identified the patterns through both quantitative and qualitative research (Furusten, 1999). This step was further divided into three sub-steps. Firstly, we reviewed the titles of articles and identified four major themes, as discussed in section 3.2.2 *Data Categorization*. Secondly, we manually labeled the themes of all articles and generated insights from the quantitative cluster method. Lastly, we read the articles, identified topics under each theme, and regrouped the parts from different articles together based on the topic. For instance, we discovered that “global” and “globalization” are a common topic among articles in Category 1, and then we extracted the parts related to this topic from different articles and put them together for further analysis.

Deconstructing Texts

After characterizing the texts, we deconstructed the texts by moving beyond the surface and look for the “hidden agenda” – the underlying, unquestioned assumptions and arguments of the texts with the assistance of Gee’s (2011) discourse analysis tools (Furusten, 1999; Cooper, 1986; Latour, 1987). In this step, we continuously asked ourselves questions such as “what are the assumptions or contexts necessary for the texts to make sense?” “what are connections, especially conflicts among different texts?” and “what grammatical and rhetorical devices are used in the texts?” to identify the hidden agenda of each topic.

Identifying Values, Beliefs & Ideologies

After deconstructing the texts to look for the hidden agenda, we identified the general values, beliefs, and ideologies embedded in the discourses of management consulting firms. To do so, we connected the findings of the hidden agenda across different topics and themes and looked for the interrelations among them to determine the underlying values, beliefs, and ideologies of management consulting firms.

3.4 Study Quality

In this section, we reflect the quality of our study based on the trustworthiness criteria proposed by Lincoln and Guba (1985), which are used to evaluate the quality of qualitative researches. Although we adopted mixed methods, the qualitative research method of discourse analysis was the primary approach of our study, while the quantitative method was served as a supplement of the former. Thus, we apply the trustworthiness criteria for quality reflection instead of reliability and validity criteria, which are employed mainly in quantitative studies.

3.4.1 Credibility

Credibility refers to whether the findings provide fair representation and interpretation of the original data (Lincoln & Guba, 1985). We took two methods to mitigate the issues that might weaken the credibility of our study. For one thing, we applied the word group and cluster method to all the 737 valid articles and derived preliminary insights before conducting discourse analysis in detail. This approach gave us an overall understanding of the main topics and trends of management consulting firms' business press on AI to guide our discourse analysis. For another thing, when doing discourse analysis, we did not rely on any single article to obtain insights. Instead, we always investigated multiple articles from different companies to derive each finding, mitigating misrepresentation that might be caused by studying one single article or articles from one single company.

3.4.2 Transferability

Transferability refers to whether the results of our research could be transferred to other contexts and settings (Lincoln & Guba, 1985). On the one hand, the articles that we retrieved are produced by McKinsey, BCG, and Bain. Since the three are widely recognized as global leaders in the management consulting sector, it is reasonable to believe that their articles can be a representative of those produced by other international management consulting firms. On the other hand, we provided rich accounts on the production and diffusion contexts of MBB's business press so that readers can decide whether our findings and which findings are transferrable to their research contexts.

3.4.3 Dependability

Dependability suggests whether the findings are consistent and repeatable with the same data and research methods (Lincoln & Guba, 1985). We aimed to ensure dependability by keeping a complete record of different phases of our study including explaining how our data were collected and selected, enclosing the results of the quantitative cluster method, and adding the original texts and the codes of articles to each finding that we derived from discourse analysis (Bryman & Bell, 2011).

3.4.4 Confirmability

Confirmability refers to the neutrality of researchers (Lincoln & Guba, 1985). Although complete objectivity is not possible in business research, researchers should show that they have not intentionally allowed their personal values and motivations in the analysis of data (Bryman & Bell, 2011). In our study, we attempted to ensure conformability through method triangulation, combining both quantitative and qualitative research methods (Bryman & Bell, 2011).

4. Empirical Findings

This chapter presents our empirical findings based on our quantitative and qualitative analyses. Our findings are broken down into *4.1 Context Analysis* and *4.2 Content Analysis*. The first section introduces the production contexts of the discourses, while the second presents the findings of text analysis with both quantitative and qualitative approaches.

4.1 Context Analysis

The section analyzes the production contexts of management consulting firms' discourses on AI, including *4.1.1 Trends of production*, *4.1.2 Producers*, *4.1.3 Methods of Production*, and *4.1.4 Channels and Target Audience of Diffusion*.

4.1.1 Trends of Production

Overall Article Quantities

The number of AI-related articles produced by top-tier management consulting firms has experienced dramatic changes across the years. As displayed in Exhibit 5, artificial intelligence was never mentioned in the business press of MBB before 2011 and was rarely discussed from 2011 to 2016. From 2017, however, there has been a remarkable increase in the number of articles, accounting for 88% of the 737 articles of all time.

Such a change corresponds with the Google Trends result of the keyword “Artificial Intelligence” since 2011 (Google Trends, 2019a). As shown in Exhibit 6, the level of attention paid to AI was relatively low from the beginning of 2012 to the first half of 2016 despite an increase in 2011. Since the second half of 2016, there has been a strong growth of interest in AI, especially from June 2017, right after the contest between Ke Jie and Alpha Go at the end of May 2017.

Exhibit 5: Number of MBB’s AI Articles by Year

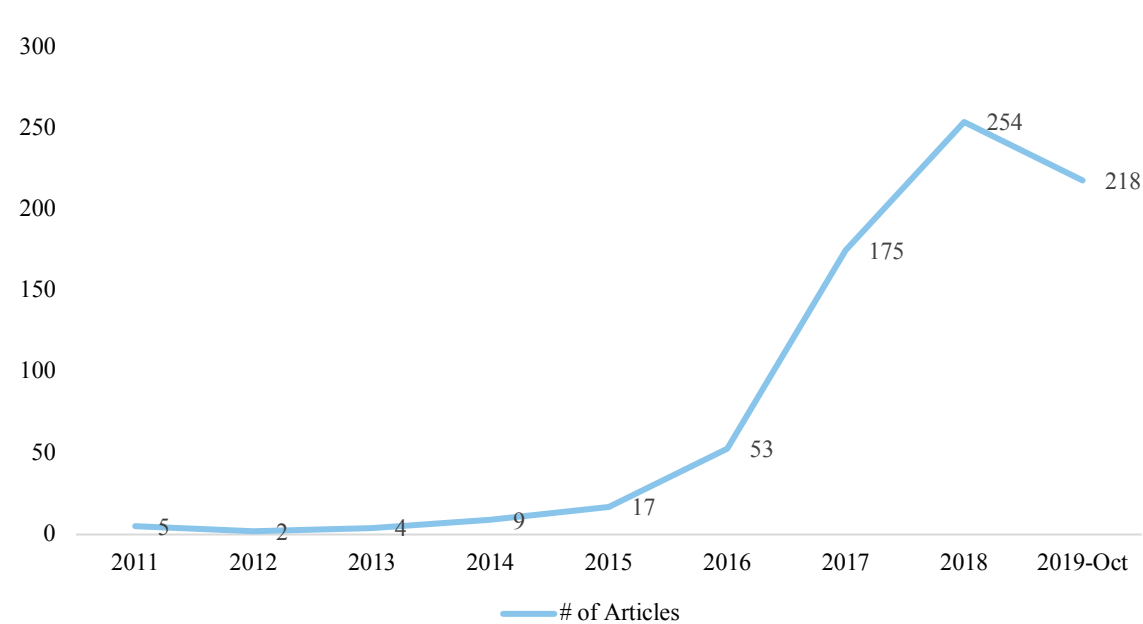
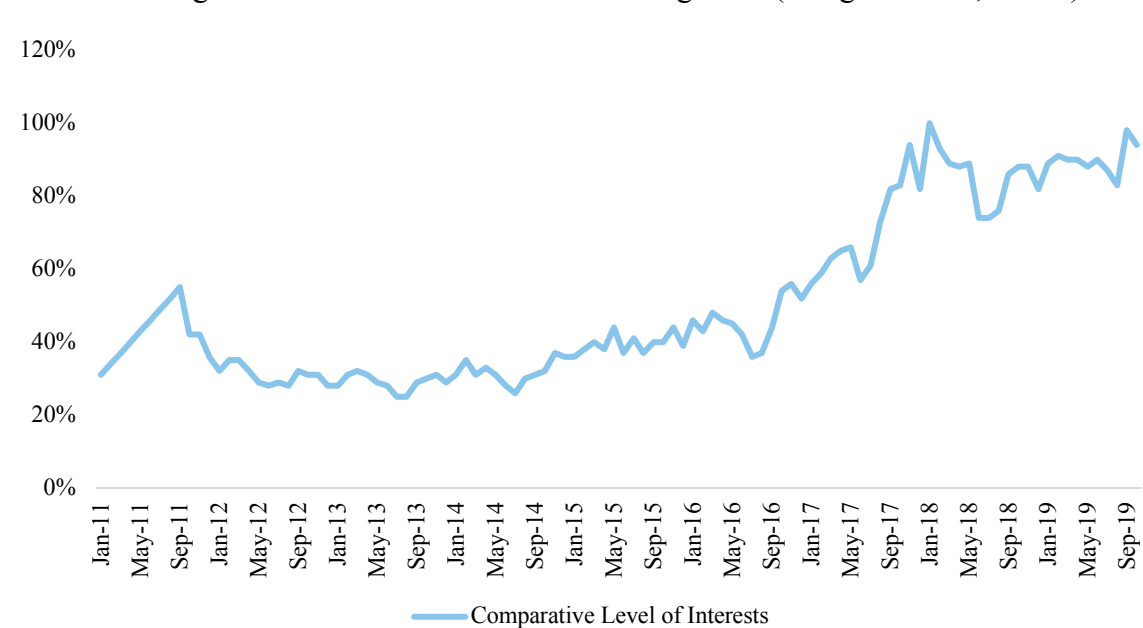


Exhibit 6: Google Trends Result of “Artificial Intelligence” (Google Trends, 2019a)

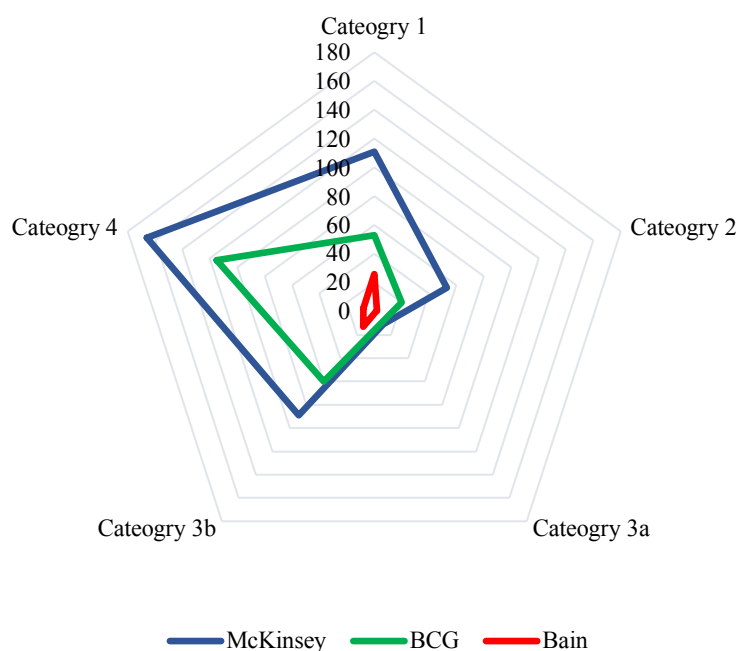


Comparisons among MBB

Comparing the number of articles of MBB (see Exhibit 7), we have generated three insights. Firstly, as the largest company in size among MBB, McKinsey has produced the most articles (430), accounting for 58% of the total articles on AI, followed by BCG (35%) and Bain (7%). Secondly, all of MBB have produced very few articles in Category 3a *Technology Details*, indicating that they do not have interests in the technology itself. Thirdly, excluding Bain

whose total articles are too few, both McKinsey and BCG have produced the most articles in Category 4 *Corporate Strategy & Culture*, which is believed to be the traditional core business focus of top-tier management consulting firms. They have also produced a considerable number of articles in Category 1 *World & Regional Economy*, Category 2 *Humans & Society*, and Category 3b *Technology Adoption*, indicating their wide interests in AI-related topics.

Exhibit 7: Number of MBB's AI Articles by Company and by Category



4.1.2 Producers

The production of management consulting firms' business press depends on both internal and external parties. In terms of internal parties, Partners from different offices are the main producers, and in-house research institutes and subsidiary companies are involved. As for external partners, scholars, universities, corporations, and non-governmental organizations (NGOs) participate in the production of articles and reports to a varying degree.

Internal Producers

Internally, Partners across global offices are the main content producers. It is further observed that there is an authorship concentration of a few Senior Partners or Partners from the United States, Western Europe, and to a lesser extent, China. Take McKinsey as an example: Moreover, over 75% of the authors have only participated in the writing of AI-related articles

once, while the three most productive ones, Jacques Bughin, James Manyika, and Michael Chui, have written 40, 39, and 24 articles, representing 11.6%, 11.3%, and 6.9% of McKinsey’s articles². In terms of geographical concentration, it is found, among top writers listed in Exhibit 8, that 82.5% of the authorships come from offices in Western Europe (41.6%) and the United States (40.9%), and 17.5% of the authorships are from offices in China (14.9%) and India (2.6%).

Exhibit 8: McKinsey’s Top Writers of AI Articles by Frequency

Name	# of Articles	Position	Country of Office
Jacques Bughin	40	MGI Director and Senior Partner	Belgium
James Manyika	39	MGI Chairman and Director, and Senior Partner	United States
Michael Chui	24	MGI Partner	United States
Jonathan Woetzel	21	MGI Director and Senior Partner	China
Andreas Tschiesner	12	Senior Partner	Germany
Jeongmin Seong	12	MGI Senior Fellow	China
Susan Lund	11	MGI Partner	United States
Eric Hazan	10	Senior Partner	France
Nicolaus Henke	10	Senior Partner	United Kingdom
Mehdi Miremadi	9	Partner	United States
Asutosh Padhi	8	Senior Partner	United States
Tanguy Catlin	8	Senior Partner	United States
Anu Madgavkar	7	MGI Partner	India
Jan Mischke	7	MGI Partner	Switzerland
Tera Allas	7	Research and Economics Director	United Kingdom
Matthias Kässer	6	Partner	Germany
Shubham Singhal	6	Senior Partner	United States
Johannes-Tobias Lorenz	5	Senior Partner	Germany
Mekala Krishnan	5	MGI Senior Fellow	United States
Paul Willmott	5	Director	United Kingdom
Timo Möller	5	Partner	Germany
Vivian Hunt	5	Managing Partner	United Kingdom

Within management consulting firms, the writing process also involves various divisions or subsidiary companies, among which in-house research centers play a critical role in producing

² “McKinsey’s articles” refer to the 342 articles that specify authorships among all the valid 430 articles collected by us from McKinsey.

knowledge. McKinsey, BCG, and Bain all have an internal think tank, to be specific, McKinsey Global Institute (MGI), BCG Henderson Institute (BHI), and Bain Macro Trends Group. Although there are some differences in their research focuses, common topics are found in the articles, such as trends of countries and regions, labor markets, and digital technology and innovation.

In addition to in-house research institutes, other divisions or subsidiary companies also participate in writing articles occasionally. For instance, QuantumBlack, McKinsey's data analytics company, BCG GAMMA, BCG's data analytics function, and BrightHouse, BCG's creative consultancy, have also contributed to the writing of AI-related articles.

External Producers

Externally, scholars and corporate experts participate in the production process through co-authorships and interviews, and universities, corporations, and occasionally non-governmental organizations (NGOs) collaborate in the form of co-researching. Indirectly, corporations are mentioned in the articles or reports as examples or case studies for illustration.

Firstly, co-authorship mostly involves scholars that are served as advisors of the research centers of the top-tier management consulting firms. Those scholars selected as academic advisors usually hold an academic or research position in North America or Western Europe (see Exhibit 9 and Exhibit 10) (McKinsey, 2019d; BCG, 2019c). It is noted, among MGI's academic advisors, that except for Sir Christopher Pissarides, a Nobel Laureate from LSE, and Martin Baily, Senior Fellow at Brookings Institution, all the others are professors at the most prestigious American universities, such as Harvard, Yale, and MIT.

Exhibit 9: MGI's External Advisors (McKinsey, 2019d)

Name	Institution	Country of Institution
Martin Baily	Brookings Institution	United States
Erik Brynjolfsson	MIT Sloan School of Management	United States
Richard Cooper	Harvard University	United States
Hans-Helmut Kotz	Harvard University / Goethe University	United States / Germany
Rakesh Mohan	Yale University	United States
Sir Christopher Pissarides	London School of Economics	United Kingdom
Matthew Slaughter	Tuck School of Business, Dartmouth College	United States
Michael Spence	NYU Stern School of Business	United States
Laura Tyson	Haas School of Business UC Berkeley	United States

Exhibit 10: BHI's External Advisors (BCG, 2019c)

Name	Institution	Country of Institution
Claus Dierksmeier	University of Tübingen	Germany
Robert Eccles	Harvard University	United States
Thomas Fink	London Institute for Mathematical Sciences	United Kingdom
Simon Levin	Princeton University	United States
Mihnea Moldveanu	University of Toronto	Canada
Luciano Pietonero	University of Rome Sapienza	Italy
Frida Polli	Pymetrics	United States
Kathleen Stephanson	BCG Henderson Institute	United States

Secondly, corporate experts, often executives at the world's most prestigious companies, and scholars from top universities are sometimes interviewed by management consulting firms for input in reports. Since it is too time-exhausting to count the total number of interviewees and record their organizations, the interviewee list of the report *Reshaping Business with Artificial Intelligence* co-produced by BCG (4271, 2017) and MIT Sloan Management Review is exhibited below to give a glimpse of the general backgrounds of interviewees.

Exhibit 11: List of Interviewees (Sample) (4271, BCG, 2017)

Name	Position	Organization	Country of Organization
Avi Goldfarb	Professor	University of Toronto	Canada
Amy Hoe	CTO & CEO	FWD Insurance	China
Jessica Tan	Group Executive VP & COO	Ping An	China
Jonathan Larsen	Chief Innovation Officer	Ping An	China
Matthew Evans	VP of Digital Transformation	Airbus	France
Marcus Winter	Head of Reinsurance Development	Munich Re Group	Germany
Vishal Sikka	CEO & MD	Infosys	India
Eldad Elnekave	MD	Zebra Medical Vision	Israel
Simon Smiles	Chief Investment Officer	UBS	Switzerland
Ahmed Hashmi	Global Head of Upstream Technology	BP plc	United Kingdom
Fabien Beckers	CEO	Arterys	United States
Steve Derbis	Director of Innovation Development	Anthem	United States
James Platt	COO	Aon Risk Solutions	United States
Bryce Meredig	Chief Science Officer	Citrine Informatics	United States
Missy Cummings	Director of Humans & Autonomy Lab	Duke University	United States
Beth Smith	General Manager of Watson Platform	IBM	United States
Eric Horvitz,	Director of Microsoft Research	Microsoft	United States
Jacob Spoelstra	Director of Data Science	Microsoft	United States
Julie Shah	Associate Professor	MIT	United States
Erik Brynjolfsson	Professor	MIT	United States
Steve Eglash	Director of Strategic Research Initiatives	Stanford University	United States
Eric Colson	Chief Algorithms Officer	Stitch Fix	United States
J.D. Elliott	Director of Enterprise Data Management	TIAA	United States
Alfred Spector	CTO	Two Sigma	United States
Michael Jordan	Professor	UC Berkeley	United States
Mirsad Hadzikadic	Director of Data Science	UNC Charlotte	United States

Thirdly, management consulting firms carry out researches together with leading academic institutions, corporations, and NGOs. For example, McKinsey (5560, 2018) has collaborated with MIT's Media Lab and conducted an experiment using their co-developed machine-learning models. McKinsey (5438, 2019) has also provided research and analytical support for Ellen MacArthur Foundation and Google on the report *Artificial Intelligence and the Circular Economy*. In partnership with MIT Sloan Management Review, BCG (4271, 2017; 4268, 2018; 4267, 2019) conducts Artificial Intelligence Global Executive Study and Research Project annually. Besides, BCG and Facebook (2017a; 2017b) have released two reports together, including *Fashion Forward 2020* and *Encashing on Digital: Financial Services in 2020*, although the reports themselves are not related to AI.

Fourthly, management consulting firms prefer to give examples and case studies of tech giants in the reports to illustrate their ideas or recommendations related to AI. Exhibit 12 shows how many times the Top 15 Fortune 500 companies are mentioned in the articles (Fortune, 2019). Except for Apple and Amazon, the other companies are mentioned fewer than 50 times, and some of them are not mentioned at all. Exhibit 13 displays non-exhaustively the frequencies of the most-mentioned companies and their ranks in the Fortune 500 list. What is found is that American and Chinese tech giants, such as Amazon, Google, and Alibaba are mentioned considerably more than companies in traditional industries, although the latter might generate much more revenue than the former.

Exhibit 12: Keyword Frequencies of Company Names – Top 15 Fortune 500 Companies (Fortune, 2019)

Rank	Name	Sector	Headquarter	Frequencies
1	Walmart	Retailing	United States	45
2	Sinopec Group	Energy	China	0
3	Royal Dutch Shell	Energy	Netherlands	10
4	China National Petroleum	Energy	China	0
5	State Grid	Energy	China	0
6	Saudi Aramco	Energy	Saudi Arabia	0
7	BP	Energy	United Kingdom	8
8	Exxon Mobil	Energy	United States	0
9	Volkswagen	Motor Vehicles & Parts	Germany	18
10	Toyota Motor	Motor Vehicles & Parts	Japan	35
11	Apple	Technology	United States	219
12	Berkshire Hathaway	Financials	United States	1
13	Amazon.com	Retailing	United States	537
14	UnitedHealth Group	Healthcare	United States	3
15	Samsung Electronics	Technology	South Korea	25

Exhibit 13: Keyword Frequencies of Company Names – Most Mentioned Companies (Non-Exhaustive) (Fortune, 2019)

Rank	Name	Sector	Headquarter	Frequencies
13	Amazon.com	Retailing	United States	537
37	Alphabet (Google)	Technology	United States	502
182	Alibaba Group Holding	Retailing	China	326
29	Ping An Insurance	Financials	China	293
11	Apple	Technology	United States	219
57	Facebook	Technology	United States	206
60	Microsoft	Technology	United States	180
114	IBM	Technology	United States	130
237	Tencent Holdings	Technology	China	102

4.1.3 Methods of Production

Management consulting firms usually combine quantitative and qualitative methods in their articles and reports. Quantitatively, they collect data through surveys and from secondary sources, such as government agencies, industry associations, and third-party data providers. Qualitatively, they conduct interviews with industry or academic experts and case studies based on past projects with clients.

Moreover, differences and similarities in writing styles are found between articles and reports. The former, mostly under ten pages, are usually less structured and less supported by data. Authors tend to make assertions without further arguments or justifications. The latter usually with 20 to 100 pages, are more rigorous and data-based when making a statement, and more structured by breaking down topics into different chapters and sections using the well-known MECE (mutually exclusive, collectively exhaustive) principle. Both articles and reports prefer the use of exhibits to present quantitative and qualitative data in an easy-to-understand way.

4.1.4 Channels & Target Audience of Diffusion

There are multiple channels through which the discourses of management consulting firms are diffused. In terms of internal channels, their articles and reports are issued not only on their websites and social media platforms, including LinkedIn, Facebook, and WeChat but also through their printed publications, such as *McKinsey Quarterly* and *BCG Perspectives*.

Externally, McKinsey, BCG, and Bain are all Strategic Partners of the World Economic Forum with the opportunity to set the agenda for Forum events, projects, and initiatives (World Economic Forum, 2019). Besides, their articles are often published on American media, such as Harvard Business Review, MIT Sloan Management Review, Forbes, and The New York Times.

The target audience of management consulting firms' articles and reports are executives and managers from their existing and potential clients, which are composed mainly of Fortune 500 corporations, leading private equity funds, and some organizations and institutions in the public and social sector (Bain, 2019; Werr & Greiner, 2008). Besides, their articles are also read by academics, students, and management practitioners from organizations of smaller size (Werr & Greiner, 2008).

4.2 Text Analysis

In this section, we present our empirical findings of the texts based on the quantitative analysis of 737 articles and the qualitative discourse analysis of the 81 articles listed in 3.2.3 *Data Selection*. Insights from the quantitative word group and cluster method give a general picture of the weight of different topics under each theme and provide guidance for the qualitative approach. Corresponding mostly with the insights from the quantitative method, findings from the qualitative approach offer a richer context and a deeper understanding of the discourses of management consulting firms. In total, we have identified 12 findings of the texts under four themes, including 4.2.1 *World & Regional Economy*, 4.2.2 *Society & Humans*, 4.2.3 *Technology & Adoption*, and 4.2.4 *Corporate Strategy & Culture*.

Before the discussion about the 12 empirical findings of the texts, a general presentation about the results of the quantitative method is given below:

Exhibit 14: Overview of Text Analysis Findings by Category

No.	Category	Empirical Findings
1	World & Regional Economy	Finding 1: AI as A Game for Minorities Finding 2: Hegemony of Americanism Finding 3: China as A Rising Star & Order Challenger
2	Society & Humans	Finding 4: Complex & Gloomy Societal Conditions Finding 5: Passive Position of Individuals in Transitions Finding 6: Optimism about Technology & Related Societal Issues
3	Technology & Adoption	Finding 7: AI as the Drive for the Capitalist Engine Finding 8: Data as Fuel & Weapon in the AI Game Finding 9: Ecosystems for Exclusion & Competition
4	Corporate Strategy & Culture	Finding 10: “First Move, First Win” amid Competition Finding 11: Significance & Uncertainty of AI Strategies Finding 12: Cultural Shift Towards Agility with Hierarchy in the Core

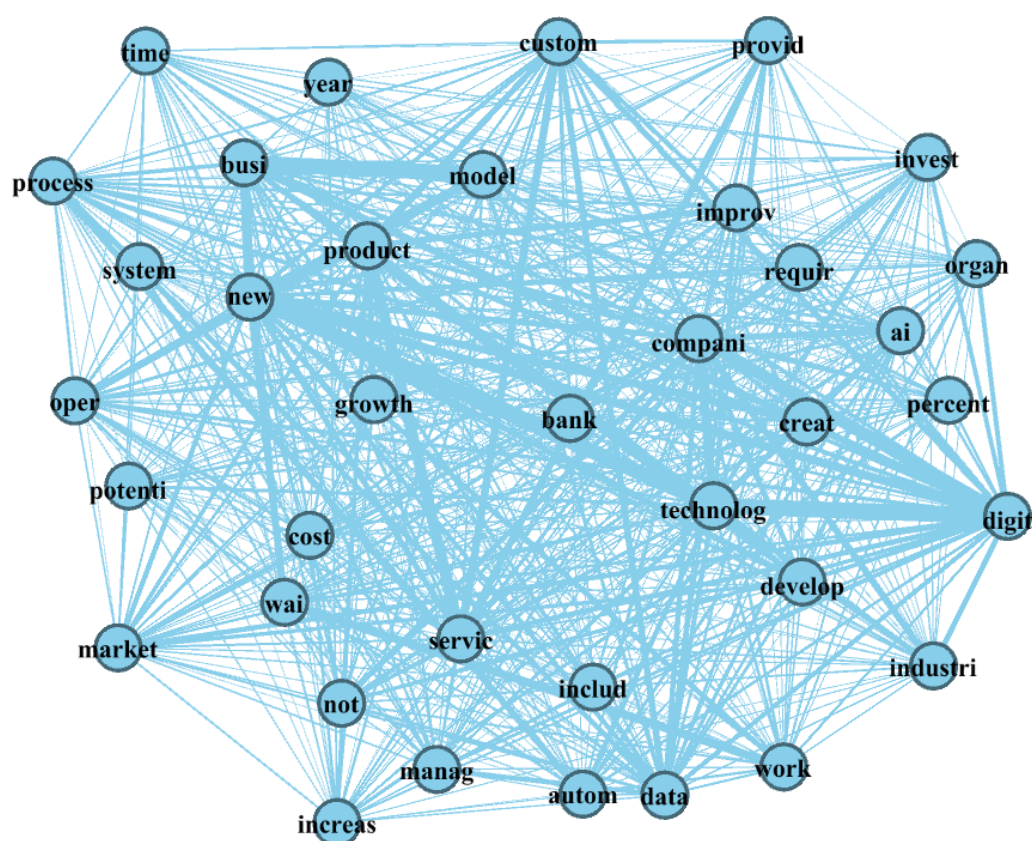
From the 737 AI-related articles, 1,717,351 total words and 9,624 unique words excluding 764 unique dropped words were retrieved (see Appendix). Exhibit 15³ lists the 30 most frequent words and word pairs of all time in descending order. Exhibit 16 shows the links among the 30 most frequent words in the texts. The insights from the quantitative analysis are described in detail under each theme.

Exhibit 15: Top 30 Most Frequent Words & Pairs – All Categories

Word	compani, digit, data, technolog, new, busi, custom, product, market, ai, not, industri, develop, servic, manag, process , work, oper, time, model, organ, percent, cost, improv, invest, autom, creat, provid, year, growth
Word Pairs	artifici intellig, busi model, digit technolog, advanc analyt, new technolog, machin learn, see exhibit, data analyt, digit transform, product servic, suppli chain, unit state, custom experi, compani digit, new busi, wai work, decis make, big data, public cloud, reduc cost, oper model, new model, new digit, creat new, new wai, busi unit, new product

³ The words and word pairs have been converted based on the Porter Stemming Algorithm (Porter, 2006).

Exhibit 16: Links of Most Frequent Words – All Categories



4.2.1 World & Regional Economy

Category 1 is about macro trends of the world and regional economies. Based on the quantitative word group and cluster method, two interesting insights can be derived from Exhibit 17 and Exhibit 18. Firstly, the “[U]nited [S]tate[s]” and “[C]hina” are the only two countries that appear on the list, suggesting the weight that management consulting firms attach to them in the world economic landscape. Secondly, “digit[al],” “artificial intelligence,” “cloud,” “machin[e] learn[ing]” have a high ranking on the list, indicating that the world and regional economies described in the discourses are closely related to digitalization and digital technologies.

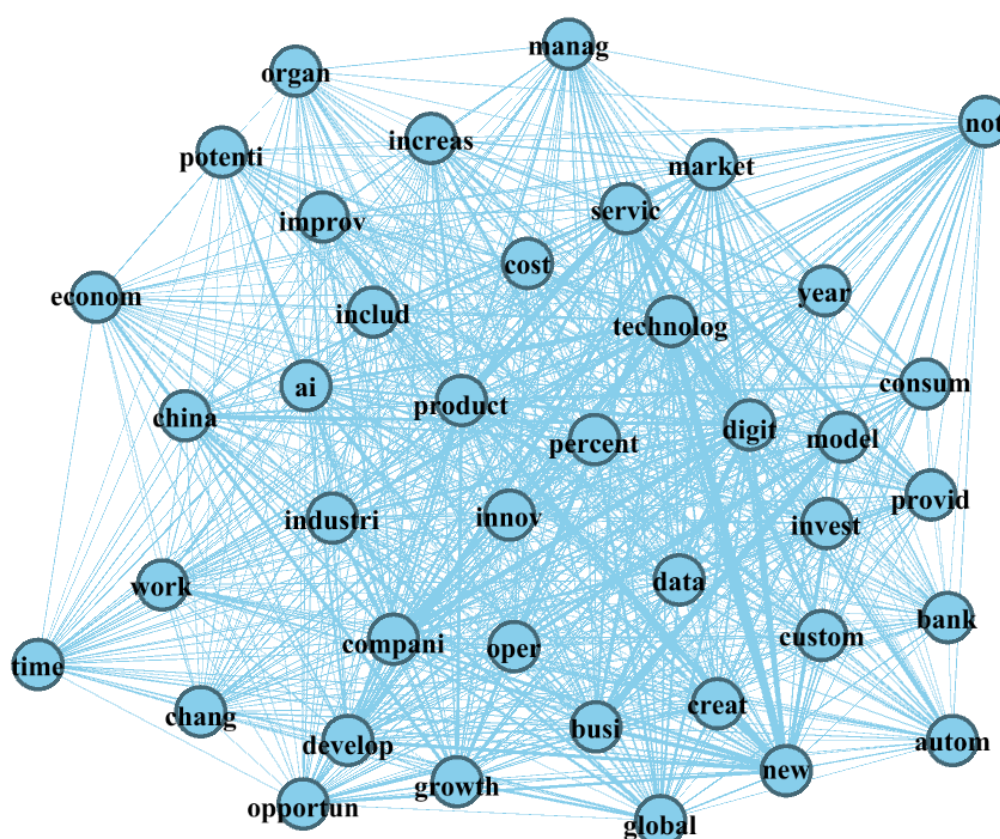
These two insights correspond to the findings acquired from the qualitative analytical approach. However, since the findings related to digitalization and technologies are similar to those in Category 4 *Technology & Adoption*, we only present here the following findings

related to countries and regions, including *AI as A Game for Minorities* (Finding 1), *Hegemony of Americanism* (Finding 2), and *China as A Rising Star & Order Challenger* (Finding 3).

Exhibit 17: Top 30 Most Frequent Words & Pairs – Category 1

Word	Compani, digit, new, technolog, market, product, busi, servic, data, growth, industri, ai, global, china, develop, not, year, custom, percent, invest, manag, consum, increas, innov, see, cost, time, provid, creat, work
Word Pairs	public cloud, artifici intellig, unit state, new technolog, digit technolog, busi model, see exhibit, suppli chain, product servic, see figur, emerg market, machin learn, digit transform, past year, african american, advanc economi, creat new, new product, data analyt, advanc analyt, new model, servic provid, compani digit, oper model, custom experi, big data, new busi, new digit, new servic, econom growth

Exhibit 18: Links of Most Frequent Words – Category 1



Finding 1: AI as A Game for Minorities

Although management consulting firms emphasize the globalization of AI, the picture of the world in the discourses of management consulting firms is narrow – it is only composed of a few regions or countries, indicating that AI is a game for minorities.

On the one hand, management consulting firms assert that AI goes hand in hand with globalization. Globalization is praised as one of the “major drivers of economic growth” along with technology (4477, BCG, 2018). Moreover, “global” is one of the most common terms used in the articles in Category 1 (see Exhibit 17). The arena of AI is depicted as a global game, and the benefits of AI should be realized globally (4477, BCG, 2018; 5507, McKinsey, 2019).

On the other hand, contradictory to the notion of “global AI,” only a few regions or countries carry weight in the discourses of management consulting firms, and the other countries are not “worth” considering and discussing.

The major players of the global AI game in the discourses are the United States, China, and Western Europe, and the former two have already been recognized as AI leaders (4025, Bain, 2018; 4352, BCG, 2018; 5428, McKinsey; 4123, Bain, 2018; 4320, BCG, 2017; 4323, BCG, 2019; 5444, McKinsey 2019; 4056, Bain, 2011; 4061, Bain, 2012; 6132, McKinsey, 2018). Among these regions or countries, Western Europe has been an established power since the Industrial Revolution; after the World War I and II, the United States has become the world’s superpower and weakened the power of the former; China is the new rising star today, challenging the order of the world (4469, BCG, 2017).

In addition to the United States, Western Europe, and China, which have been discussed most frequently and extensively, management consulting firms also pay attention to some other countries occasionally. For example, BCG (4383, 2019) has produced a series on digitalization and clouding application in six Asia-Pacific countries, including India, South Korea, Indonesia, Japan, Australia, and Singapore. Unlike the major players discussed above, these countries are not the standard-setters of AI, but potential markets targeted by corporations from the United States, Western Europe, and China.

Countries or regions that have neither the capability of leading the game nor enough potential to be the market of AI applications are neglected in the discourses of management consulting firms. Such regions typically include the Middle East, Eastern Europe, Western Asia, Africa, and South America. What is thought-provoking is that people from these regions could be equally vulnerable to the externalities (e.g., job loss) of AI, yet they do not receive as much attention as some particular groups of people (e.g., Black Americans, women) in the United States or Western Europe (6013, McKinsey, 2019; 5663, McKinsey, 2018; 5609, McKinsey, 2019; 5887, McKinsey, 2019).

Finding 2: Hegemony of Americanism

In the discourses of management consulting firms, the hegemony of Americanism is taken for granted and safeguarded. Americanism discussed here is not about lifestyles, for example, “the US way of online life” enabled by tech giants, but about the values of shielding the interests of the United States (4469, BCG, 2017).

For one thing, management consulting firms tend to prioritize the benefits and risks that AI will bring to American people more than the rest of the world (6132, McKinsey, 2018; 6013, McKinsey, 2019). For instance, when proposing the concept of “human companies,” BCG (4477, 2018) only uses data about disengagement, mistrust of business, and inequality among Americans, although the article discusses a broad topic, which potentially concerns companies and people globally.

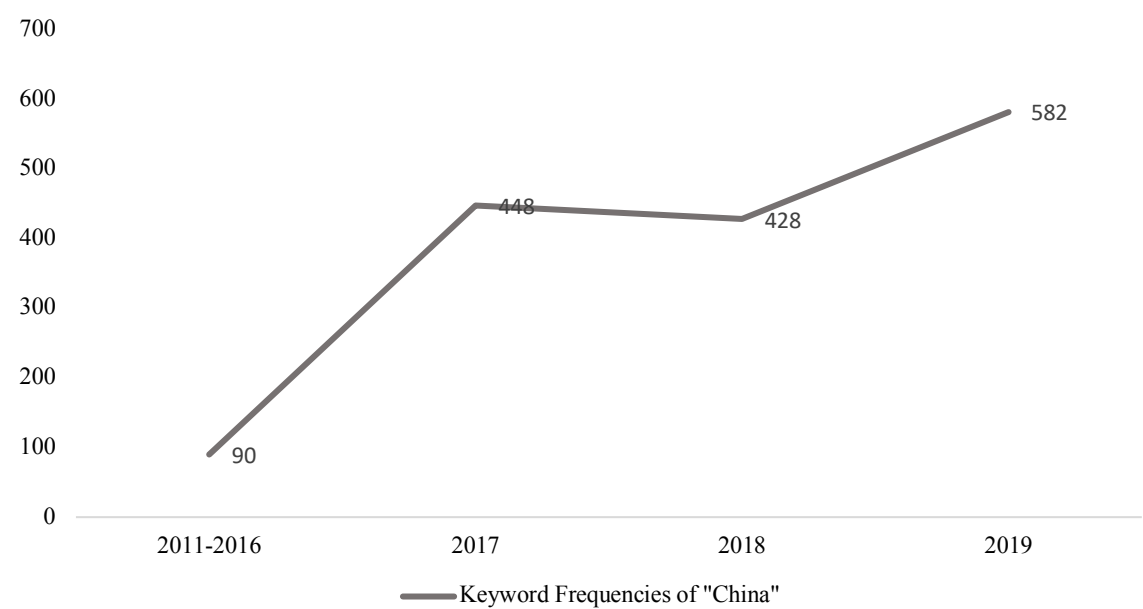
For another thing, management consulting firms exert double standards on countries other than the United States. They criticize that the policies of the European Union and China on foreign investments and data governance “can easily cross over into protectionism” in the name of security and privacy, but they tend to use more descriptive accounts and rarely make judgments in the discussions about the policies of the American government (6132, McKinsey, 2018; 5523, McKinsey, 2017; 4469, BCG, 2017).

Finding 3: China as A Rising Star & Order Challenger

In the discourses of management consulting firms, China has increasingly become an AI leader that other countries should follow economically and a challenger of the global order politically. It is quite interesting that China is one of the only two countries which appear as most-mentioned words or word pairs in Category 1 (see Exhibit 17), along with the United States.

Showcased in Exhibit 19, China has received a growing attention year by year from management consulting firms in the arena of AI.

Exhibit 19: Keyword Frequencies of “China”



Economically, management consulting firms recognize China as an AI leader and urge other countries to follow it and invest in AI. It is emphasized that China has become the second-largest origin of the world’s unicorns, second to the United States (5435, McKinsey, 2019; 4469, BCG, 2017; 4343, BCG, 2018). Chinese companies, such as Alibaba, Tencent, Baidu, and Ping An, which is an insurance company that has invested heavily on AI, are kept being mentioned as examples or discussed in case studies (5435, McKinsey, 2019; 4469, BCG, 2017; 4343, BCG, 2018; 4271, BCG, 2017). Besides, management consulting firms often praise China for its large size of AI investments by not only companies but also governments to convince other countries to invest in AI. For instance, the paragraph below compares the AI investment of the European Commission with the spending of an AI Technology park in Beijing to problematize Europe’s small size of AI investments and urge Europe to invest more.

Europe’s investment in, and its use of, AI already lag behind that of the world’s AI leaders. Nevertheless, AI initiatives remain fragmented in Europe, and investment in AI is nothing like the size of that in the United States or China. Consider, for instance, that the €2.6 billion investment in AI and robotics announced by the European Commission is only slightly larger

than the amount that China is spending (\$2.1 billion) on a single AI technology park in a western suburb of Beijing. (5435, McKinsey, 2019)

Politically, China is depicted as a challenger for global order. In one article, BCG states that “the rise of China, and growing US response, challenge the stability of multinational institutions that businesses rely on” (4343, BCG, 2018). In another article, the state of world affairs is compared to the European colonial era, and China is playing the role of the United States and is challenging the global order and “equilibrium” reached several decades after the European colonial era (4469, BCG, 2017).

However, as discussed in *4.1.2 Producers*, the role that Chinese partners, industry scholars, and industry experts play in the production of discourses on AI is quite limited, and the voices from the United States enjoy dominance.

4.2.2 Society & Humans

Category 2 is about ethical and societal issues related to technology adoption. Two insights are derived from Exhibit 20 and Exhibit 21. Foremost, employment-related words including “job,” “work,” “skill,” “new skill,” “new job,” “job gain,” and “labor market” are found to appear on the list on a large scale. It is also noticed that employment-related words have become more diverse across the years. Thus, we believe that employment is one of the major societal issues presented in the discourses in the age of automation and AI, and management consulting firms have been giving richer and richer discussions over the last few years. Additionally, gender-related words, such as “women,” “women men,” and “men women” appear frequently on the list, especially from 2017. As discussed in *4.1.1 Trends of Production*, this trend over the years corresponds to the Google Trends result of “Me Too” (Google Trends, 2019b).

The findings of our discourse analysis are mostly related to employment issues, including *Complex & Gloomy Societal Conditions* (Finding 4), *Passive Position of Individuals in Transitions* (Finding 5), *Optimism about Technology & Related Societal Issues* (Finding 6).

Word	ai, technolog, compani, data, work, new, job, autom, digit, women, not, percent, industri, busi, risk, product, skill, economi, time, develop, potenti, manag, include, model, worker, global, peopl, growth, learn, creat
Word Pairs	artifici intellig, unit state, product growth, emerg economi, mckinsei global, global institut, mckinsei institut, digit technolog, advanc economi, women men, see exhibit, new job, machin learn, busi leader, autom technolog, digit risk, decis make, creat new, labor market, job gain, product servic, men women, data set, compani ai, technolog innov, new technolog, new skill, risk manag, ai technolog, oil ga

[illegible]

Management consulting firms unfold a complex and even gloomy picture of today's human societies with massive externalities and negative public opinions about technology, business, and globalization.

Multiple societal challenges are pointed out in the articles and reports, including but not limited to climate change, unemployment and underemployment, and inequality. Climate change as a negative externality is “increasingly visible” (4343, BCG, 2018; 4477, BCG, 2018). Around the world, unemployment and underemployment are significant – over 30 percent of the working-age population is currently “unemployed, inactive, or underemployed” (5943, McKinsey, 2017). Despite increasing productivity, there is an overall decline of wage share – the share of national income paid to workers, resulting from disproportional growth of corporate profits and capital returns to technology investments and so on (5943, McKinsey, 2017). In many countries, inequality “has risen markedly” with “a growing polarization of labor-market opportunities between high- and low-skill jobs” (4343, BCG, 2018; 5943, McKinsey, 2017).

Externalities described above set the scene for mostly negative and rapidly fermenting public opinions about technology, business, and globalization, “risking the sustainability of the current model of corporate capitalism” (4343, BCG, 2018). There is an “outpouring” of concerns and suspicions regarding the surveillance and military applications of AI and the plausibility of incorporating ethical judgments into AI systems (5522, McKinsey, 2019). Tech companies which are on the front line of adopting AI are going through a trust crisis – dark public narratives against them are popular and regulatory reactions towards them are skeptical (6046, McKinsey, 2019; 4501, BCG, 2019; 5444, McKinsey, 2019; 4343, BCG, 2018). What is more, the stagnation of income across advanced economies and the challenging conditions of the global labor market have contributed to “popular opposition” to international migration and globalization and “sparking fear about the future of work” (5943, McKinsey, 2017; 4343, BCG, 2018; 4477, BCG, 2018).

Finding 5: Passive Position of Individuals in Transitions

The future scenarios depicted by management consulting firms demonstrate a significantly passive position of individuals and societies are far from being ready for the changes that AI will bring, especially to the future of work. According to McKinsey Global Institute’s (5497, McKinsey, 2017) study, the influence of AI on the future of work will be tremendous:

Even if there is enough work to ensure full employment by 2030, major transitions lie ahead that could match or even exceed the scale of historical shifts out of agriculture and manufacturing. Our scenarios suggest that by 2030, 75 million to 375 million workers (3 to 14

percent of the global workforce) will need to switch occupational categories. Moreover, all workers will need to adapt, as their occupations evolve alongside increasingly capable machines. (5497, McKinsey, 2017)

Such a massive transition is imposed on individuals in the accounts of top-tier management consulting firms, and individuals have nothing to do but accept and adapt. Technological changes “oblige” individuals to “embrace career flexibility,” or in other words, embrace career uncertainty, and ceaselessly acquire or be “reeducated” to acquire “hard-to-automate” skills (5497, McKinsey, 2017; 4477, BCG, 2018; 4271, BCG, 2017). Apart from being pushed to shift attitudes towards job instability and learn new skills, individuals have to get “reemployed quickly” once they are “displaced” by machines, not only for themselves but also for the entire labor market – “if their transition to new jobs is slow, unemployment could rise and dampen wage growth” (5943, McKinsey, 2017).

Besides, societies are far from being ready to support individuals in the transition. As an instance, the current education systems “have not kept pace with the changing nature of work” to equip talents today with adequate technical skills and soft skills (5943, McKinsey, 2017). Despite examples of multiple educational initiatives, such as MOOCs (massive open online courses) and Udacity’s Nano Degrees, top-tier management consulting firms fail to answer directly and concretely if the current education and training systems are capable of evolving rapidly and dealing with the emerging employment challenges by 2030 (4477, BCG, 2018; 4271, BCG, 2017).

Finding 6: Optimism about Technology & Related Societal Issues

Management consulting firms showcase optimism and idealism about technology and its related societal issues in the following three aspects.

Firstly, although they acknowledge the negative consequences of AI, management consulting firms always place greater emphasis on the positive impact that technology creates on social well-being. In other words, the negative side of AI is not weighted equally as its positive side in the discourses. For instance, McKinsey (5435, 2019) states in one article that technology “has long had positive effects on well-being beyond GDP,” while “it can also have a negative impact, especially in the short term.” Three interesting details are noticed in this statement. Linguistically, on the positive impact of technology, the perfect tense of “have”, “has had” is

used to suggest that the creation of “positive effects” is an everlasting action extended from the past to the future. On the negative impact, however, “can have,” instead of the perfect tense of “have,” is employed, indicating a likelihood of the action’s occurrence – in other words, the action might occur or might not. Rhetorically, by means of “especially in the short term,” the negative impact of technology is labeled mostly short-term and temporal, with less significance than the positive impact. A similar linguistic and rhetorical pattern is found in BCG’s articles with the paragraph below as an illustration:

Technology and the innovation it fuels are major forces for good, and they hold out promise for so much more – from greater worldwide economic opportunity to solutions for otherwise insurmountable issues like climate change and chronic disease. Yet, as the industry’s current challenges so clearly highlight, technological innovation can sometimes bring – along with remarkable benefits – some unintended, negative consequences. (4501, BCG, 2019)

Secondly, management consulting firms demonstrate a belief that AI can bring long-term benefits to employment with some uneasiness. On the one hand, they assert job gain as if it is a fact that arises from “history” with an example as follows:

Technology adoption can and often does cause significant short-term labor displacement, but history shows that, in the longer run, it creates a multitude of new jobs and unleashes demand for the existing ones, more than offsetting the number of jobs it destroys even as it raises labor productivity. (5497, McKinsey, 2017)

In another example, grounded on Schumpeter’s creative destruction theory, BCG (4469, 2017) holds that job loss “will almost certainly occur” in the destruction phase of AI innovation, but “rejuvenation and job generation” will “eventually” arrive in the creation phase as long as governments are prepared.

Such accounts correspond with the views of the elite class. Two different surveys regarding AI’s effect on employment carried out among executives, managers, and analysts by McKinsey (5445, 2018) and BCG (4271, 2017) respectively lead to a similar result – respondents do not expect AI to cause severe job reductions in the coming years. The consonant voices of management consulting firms and corporate elites indicate that the former’s assertion of job gain not only represents their own beliefs but also reflects a wider class-based interest.

On the other hand, they also expose uneasiness when claiming job gain in some cases. For instance, a report on Industry 4.0 suggests that the ultimate job gain in the manufacturing industry will be conditional on the success that companies utilize technology to “develop new products, services, and business models” (4374, BCG, 2015). In another report, BCG (4271, 2017) maintains the difficulty of predicting how AI will impact employment as below:

Against a canvas of even broader social, demographic, environmental, and global political developments, predictions of aggregate employment levels based on AI alone are difficult; there are too many countervailing forces to discuss any one of them in isolation. (BCG, 4271, 2017)

Thirdly, management consulting firms display an idealist imagination about reaching a collective and universal consensus on AI and its related societal issues amid the discourses of complex social conditions and passive roles of individuals in transitions interpreted above. For example, one article from McKinsey (5438, 2019) indicates that AI can be developed and applied “in ways that are inclusive and fair to all.” Similarly, BCG (4477, 2018) proposes that business leaders can reach “collective understanding” about the contributions of technology and business to human ends through communicating positive narratives “in the face of popular backlash.”

Such idealist views tend to ignore the other side of the story – the intense conflicts of interests and ideologies from different parties (e.g., classes) underlying the today’s discourses on politics and technology, and the passivity and oppression that individuals will potentially bear in the transitions stirred up by AI.

4.2.3 Technology & Adoption

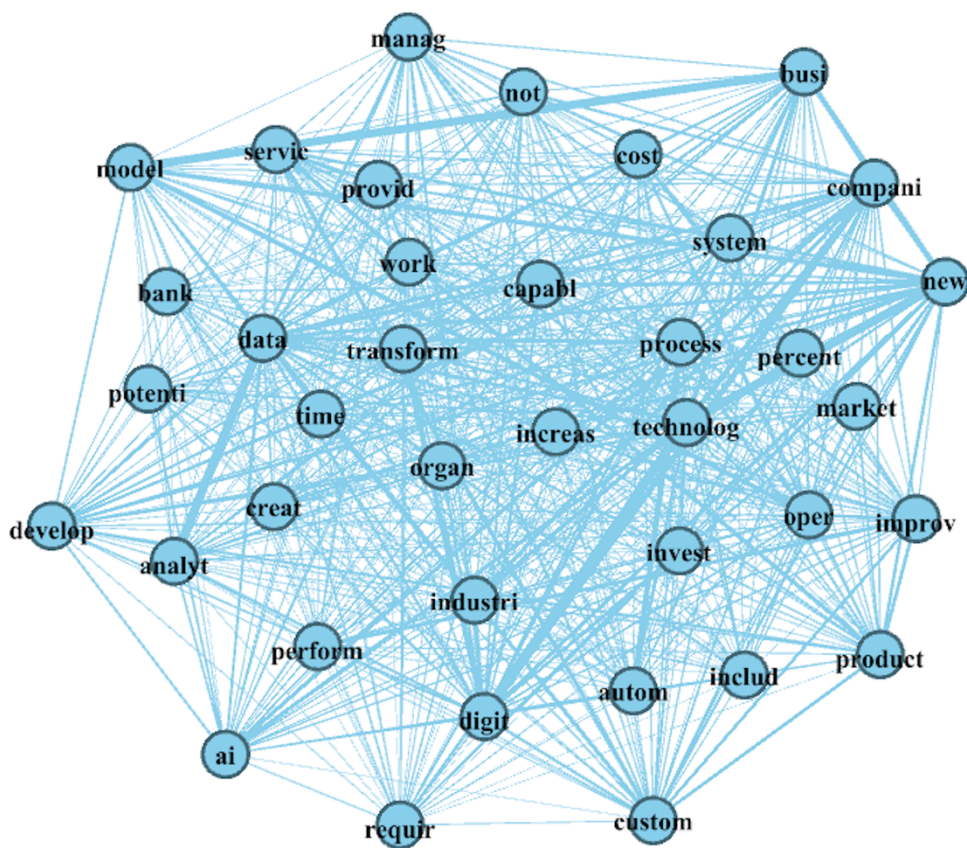
Category 3 is about specific technical descriptions and use cases of technologies in different sectors and functions. Suggested by Exhibit 22 and Exhibit 23, “data,” “machin[e] learn[ing],” “artifici[al] intellig[ence],” “advanc[ed] analyt[ics],” and “data analyt[ics],” along with “technolog[y]” and “digit[al]” are mentioned the most in the articles of Category 3. The findings of our discourse analysis are also closely related to AI and data, including *AI as the*

Drive for the Capitalist Engine (Finding 7), *Data as Fuel & Weapon in the AI Game* (Finding 8), and *Ecosystems for Exclusion & Competition* (Finding 9).

Exhibit 22: Top 30 Most Frequent Words & Pairs – Category 3

Word	Data, compani, technolog, digit, new, custom, process, busi, industri, oper, ai, develop, product, manag, not, servic, improv, cost, model, system, analyt, time, market, bank, provid, autom, work, requir, organ, percent
Word Pairs	machin learn, artifici intellig, advanc analyt, busi model, new technolog, data analyt, digit technolog, quantum comput, suppli chain, see exhibit, digit transform, reduc cost, oper model, custom experi, decis make, wai work, new busi, product servic, health care, compani digit, new model, lower cost, digit tool, support function, competit advantag, autom process, big data, data scientist, data set, busi unit

Exhibit 23: Links of Most Frequent Words – Category 3



Finding 7: AI as the Drive for the Capitalist Engine

To keep the capitalist engine running forward, management consulting firms perceive AI as a revolutionary force of economic growth and indicate that the progress of AI is unstoppable and inevitable.

The revolutionary power of AI is associated with its potential benefits to economies. According to BCG (4367, 2016), the global technology economy, if taken as the country by GDP, is already the third-largest power in the world, following the United States and China. On top of it, AI will enhance further the power of the technology economy, driving the Fourth Industrial Revolution (5438, McKinsey, 2019). Different from past technologies, AI technologies enable machines to “perform functions generally associated with human intelligence,” and will be significantly beneficial to consumers, companies, and economies, boosting economic growth and productivity (5438, McKinsey, 2019; 5497, McKinsey, 2017). Estimated by McKinsey (5456, 2018), the potential economic contribution of AI could reach \$5.8 trillion maximum annually.

Moreover, management consulting firms emphasize that the development of AI is unstoppable and inevitable based on models or theories, such as “S-curve” and Schumpeterian cycle of creative destruction (4469, BCG, 2017; 4065, Bain, 2017; 5452, McKinsey, 2018). What is lying behind these models or theories is the “capitalist engine” (Schumpeter, 1942). As Schumpeter (1942), the creator of the creative destruction model put it in his book *Capitalism, Socialism and Democracy*,

Capitalism [...] is by nature a form or method of economic change and not only never is but never can be stationary. [...] The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that [a] capitalist enterprise creates. (Schumpeter, 1942)

Thus, when advocating the benefits and progress of AI, what management consulting firms are doing is promoting something new to keep the capitalist engine running forward.

Finding 8: Data as Fuel & Weapon in the AI Game

Management consulting firms place enormous focus on data in their discourses on AI and assert that data is the competitive weapon of corporations and should not be restrained by localization policies and bureaucratic accessibility control. Data is not only an essential building block of AI but also an “increasingly critical corporate asset” (5440, McKinsey, 2017). It is even portrayed as the “raw material extracted from today’s digital colonies and converted elsewhere into value and wealth” (4469, BCG, 2017). Although experts in other professions or industries may hold a different view, advanced uses of data, from the perspectives of management consulting firms, are regarded as the most meaningful practice of AI (4311, BCG, 2017).

The importance of data to management consulting firms is further demonstrated by the fact that their discourses on other technologies or organizational processes, such as digitalization, cloud computing, and blockchain, are centered around data as well. Firstly, although it is a topic promoted by management consulting firms for many years, digitalization is still being stressed in recent articles on AI since it plays a critical role in collecting data as a basis of machine learning and deep learning (4415, BCG, 2017). Secondly, cloud computing is of great significance for data transference, storage, and processing (4383, BCG, 2019; 5476, McKinsey, 2019; 4495, BCG, 2019; 5994, McKinsey, 2019). Thirdly, to build an ecosystem enabling data transference and storage in an “open and secure manner,” blockchain is recommended by management consulting firms (4469, BCG, 2017; 4314, BCG, 2019).

Furthermore, it is maintained by management consulting firms that data is the basis of corporations’ competitive advantages and should be set free from localization policies and bureaucratic control of accessibility.

On the one hand, management consulting firms suggest that companies build competitive advantages based on data and hold a negative attitude towards policies detrimental to the exploitation of privately-owned data. Privately-owned data is the data held by corporations. Digital giants, such as Google and Facebook, typically build their revenue streams on “enormous quantities of data [that] their customers generate daily by using their services” (5440, McKinsey, 2017). Argued by management consulting firms, privately-owned data should be leveraged by corporations as their competitive advantages or “weapons” to increase revenue or hamper competition (4373, BCG, 2018; 4467, BCG, 2019; 5897, McKinsey, 2017).

In other words, they believe that privately-owned data must not be publicly shared since it will weaken the competitive advantages of enterprises. Besides, management consulting firms criticize the policies that regulate data storage and usage and maintain that data should not be restricted locally. In the following example, policies of data localization are discredited as hinder of economic growth:

The Information Technology Industry Council has identified at least 22 laws in 13 European countries that regulate the localization of data. [...] While these measures are often enacted in the name of privacy and security, they can also create digital borders that inhibit economic activity. (4469, BCG, 2017)

On the other hand, contradictory to privately-owned data, publicly-owned data is advised by management consulting firms to be shared with the private sector. Publicly-owned data is the data owned by the public sector consisting of government agencies and public institutions (e.g., hospitals). In the discourses of management consulting firms, the inaccessibility of publicly-owned data is the result of “bureaucratic inertia,” which should be wiped out so that such data can be leveraged by businesses (5507, McKinsey, 2019).

Finding 9: Ecosystems for Exclusion & Competition

Ecosystems are found to be a critical concept in the discourses of management consulting firms, and they are not only about inclusion and cooperation – among players within the ecosystems – but also about exclusion and competition.

Management consulting firms believe that a strong network of partners is conducive to the accelerating development and adoption of AI. The progress of AI and its subsets, such as IoT, digitalization, and cloud computing all require a well-established ecosystem consisting of partners cooperating across the value chain (4373, BCG, 2018; 4362, BCG, 2019; 4287, BCG, 2019; 4383, BCG, 2019).

However, ecosystems are not just about cooperation. A more integrated ecosystem also means a stronger defensive barrier or a greater competitive advantage in competition. For example, articles of management consulting firms present China’s digital ecosystem landscape in which all the major e-commerce, social media, entertainment, payment and finance, healthcare, and transportation platforms are held or funded by three digital giants, BAT (Baidu, Alibaba, and

Tencent) (4492, BCG, 2017; 5967, McKinsey, 2017). They have all built their all-around ecosystems or “leviathans” competing against each other, and the ecosystems continue to expand with their maasive investments on AI (4469, BCG, 2017; 5967, McKinsey, 2017). Such ecosystems impose not only an almost indestructible barrier to new entrants but also a threat to traditional industries. As estimated by McKinsey (5967, 2017), “12 large ecosystems will emerge in retail and institutional spaces,” replacing traditional industries by 2025.

4.2.4 Corporate Strategy & Culture

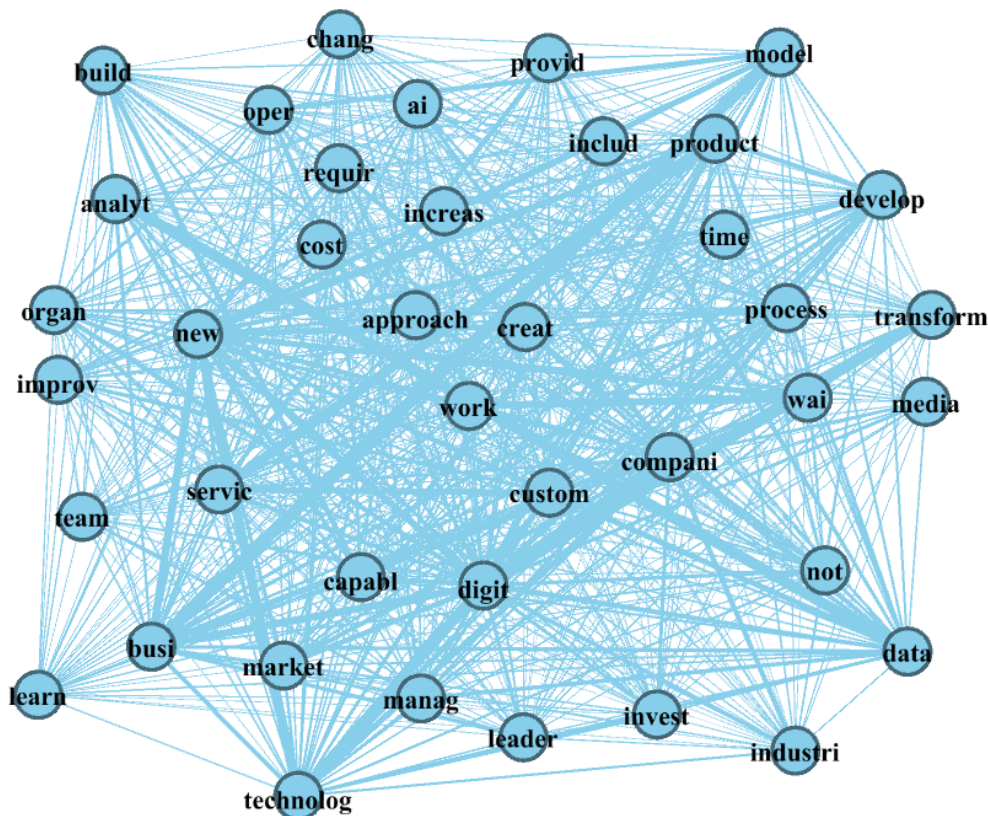
Category 4 is about corporate strategies and cultural transformation. As shown in Exhibit 24 and Exhibit 25, except for technology-related words, three main topics can be found among the top keywords in this category. Firstly, general organization- and strategy-related keywords including “busi[ness] model,” “digit[al] transform[ation],” “advance[d] analyt[ics],” “data analyt[ics],” “manag[e]” and “manag[ement],” “compan[y] digit[alization],” “process,” “busi[ness] unit,” “organ[ize]” and “organ[ization],” and “decis[ion] mak[ing].” Secondly, “custom[er]” and its related words, such as “custom[er] experi[ence]” and “custom[er] journe[y].” Lastly, “product” and its related words including “product servic[e]” and “servic[e].”

Corresponding to the insight that organization- and strategy-related keywords are most common in Category 4, the findings of our discourse analysis are focused on general corporate and organizational strategies. More specifically, three findings, including “*First Move, First Win*” amid Competition (Finding 10), *Significance & Uncertainty of AI Strategies* (Finding 11), and *Cultural Shift Towards Agility with Hierarchy in the Core* (Finding 12) are generated from the discourse analysis and are presented below.

Exhibit 24: Top 30 Most Frequent Words & Pairs – Category 4

Word	digit, compani, data, busi, new, custom, technolog, product, market, manag, not, develop, process,
	servic, organ, work, model, industri, analyt, time, operai, wai, creat, chang, requir, invest, transform, learn, cost
Word	artifici intellig, busi model, digit transform, advanc analyt, data analyt, digit technolog, product servic,
Pairs	new technolog, see exhibit, custom experi, compani digit, machin learn, busi unit, wai work, big data, new busi, custom journei, decis make, new wai, new digit, digit busi, digit tool, oper model, reduc cost, suppli chain, new product, new model, digit compani, build capabl, creat new

Exhibit 25: Links of Most Frequent Words – Category 4



Finding 10: “First Move, First Win” amid Competition

Management consulting firms depict a fierce competition landscape and urge companies to invest in AI. Business competition, inseparable from “technology race” today, is experiencing a “blazing pace of change” (5452, McKinsey, 2018; 5457, McKinsey, 2019; 4027, Bain, 2018). Incumbents must fight against both “attackers” in the same industry and “invaders” from other sectors, especially “digital leaders,” such as Amazon, Google, and Alibaba (4267, BCG, 2019; 5452, McKinsey, 2018; 4362, BCG, 2019).

Moreover, to urge AI investments, management consulting firms label early adopters of AI as “enthusiastic innovators” or “pioneers,” and those that do not invest in AI as “AI resisters,” which make up around 50% of the companies in the survey sample (5505, McKinsey, 2018; 4267, BCG, 2019). They further assert that early adopters, if invest in AI now, will be way ahead of the competition by 2030, while AI resisters will see their revenue shrink faster than average (5505, McKinsey, 2018). Thus, waiting is the last choice for companies:

Our research strongly suggests that waiting carries risks. Early movers appear to be racking up performance gains, and AI investments by first movers are also setting the stage for a second wave of gains. (5452, McKinsey, 2018)

Finding 11: Significance & Uncertainty of AI Strategies

Management consulting firms always emphasize the universal importance of strategic focus, yet the strategies for corporations to win in the AI games are not explained clearly. They define it as a big mistake that leaders fall into the so-called “technology centricity trap,” seeing AI as a “plug-and-play” machine with instant profit returns (4362, BCG, 2019; 5432, McKinsey, 2019). To achieve success with AI, what companies can truly rely on is “a sound digital vision and strategy,” which provides guidance to address customer needs and align “culture, structure, and ways of working” across the organization (Bain, 4065, 2017; 4267, BCG, 2019; 5432, McKinsey, 2019; 4362, BCG, 2019).

Such a view is not peculiar to the accounts of AI. Demonstrated by McKinsey’s (2019a) mission statement below, developing working processes and organizational capabilities and culture is the core business of management consulting firms and is considered as the most important and universal issue for organizations:

From the C-suite to the front line, we partner with our clients to transform their organizations in the ways that matter most to them. This means embedding digital, analytics, and design into core processes and mind-sets; building capabilities that help organizations and people to thrive in an ever-changing context; and developing excellence in execution to ensure that actions translate into outcomes, quickly and sustainably. (McKinsey, 2019a)

However, the strategies needed for organizations to compete in the age of AI are not explained clearly in the articles of management consulting firms. More often than not, management consulting firms emphasize the importance of devising business model strategies for AI and overcoming challenges and risks of AI but fail to point out the exact strategies to win the game (4065, Bain, 2017; 4271, BCG, 2017; 4362, BCG, 2019; 5432, McKinsey, 2019). There are potentially two reasons for it. On the one hand, the design of strategies depends on too many factors, and it not possible to state which strategies are good or bad. On the other hand, as what stressed by BCG (4271, 2017), although AI will create value for different industries, “it is far from clear exactly which organization will see their fortunes rise and which will see decline.”

In other words, it might be too early for management consulting firms to tell companies what strategies are the exact strategies to win.

Finding 12: Cultural Shift Towards Agility with Hierarchy in the Core

Management consulting firms promote a corporate cultural shift of diversity, agility, and autonomy on the surface with hierarchy in the core.

At first glance, management consulting firms advocate a cultural shift centered around diversity, agility, and autonomy in organizations when it comes to developing and adopting AI. Diversity typically refers to cross-functional or interdisciplinary collaboration among individuals and teams with business, operational, analytical, and technical backgrounds (5457, McKinsey, 2019; 5432, McKinsey, 2019; 4267, BCG, 2019; 4271, BCG, 2017). Agility suggests working in iterative cycles of testing and learning, which are crucial for enterprises to respond faster to the market (5432, McKinsey, 2019; 5438, McKinsey, 2019; 4271, BCG, 2017). Autonomy involves an autonomous process where employees can make decisions based on the recommendations of algorithms rather than the tacit knowledge of leaders (5432, McKinsey, 2019; 4343, BCG, 2018; 4362, BCG, 2019).

The above three key focuses give the impression that management consulting firms aim to truly empower and engage employees and free corporate culture and ways of working from traditional hierarchies. However, a close study on the accounts shows that it is not the case.

The discourses of management consulting firms do not depict employees to take an active and vital part of organizations. It is suggested in one article that a shared vision is needed to ensure that “teams run like well-oiled machines” able to launch minimum viable products of AI swiftly (5457, McKinsey, 2019). Comparing teams to “well-oiled machines” implies that employees are or should be deprived of thinking and feeling, simply functioning like a non-stop instrument for organizations. Another article states that in “too many” cases, data scientists unintendedly “waded into murky waters,” and their companies got “dragged into a riptide of negative press” (5522, McKinsey, 2019). Such an expression portrays organizations as victims, denies their responsibility for unintentional data uses, and puts the blame solely on data science teams.

Moreover, there are clues that management consulting firms safeguard hierarchical leadership and structures, even though they appear to belittle hierarchies when talking about cultural transformation. On the one hand, management consulting firms emphasize the value of getting “the hierarchy out of the way” and building “a new organizational model based on autonomous learning loops” as if hierarchies are hurdles for progress (4362, BCG, 2019). On the other hand, the CEO leadership styles that management consulting firms praise essentially contains the logic of hierarchies. The following paragraph is a vivid illustration:

The CEO at the industrial firm joins academy participants for lunch on the opening day of each training program to reinforce the importance of their mission, presents the awards to academy graduates at company events, and gives top performers first pick of plum assignments. Such support not only generates excitement around academy training but also elevates the visibility of graduates (and their skills) to ensure they have meaningful roles in the company’s transformation moving forward. (5457, McKinsey, 2019)

The role of the CEO manifested in the above example is thought-provoking. The CEO’s role within the capability-building program demonstrated in the paragraph has much more symbolic value than tangible value, and the symbolic value stems from the position of the CEO in corporate hierarchies. What the CEO does is attending the lunch, reinforcing the mission, and presenting awards, rather than, to name a few, sharing insights on AI and having discussions with employees to form a learning loop. Compared with the latter group of the “doing,” the former group of actions is only about the “being” of the CEO – it is of value to the program if the CEO is present there. The being of the CEO is valuable because of the legitimacy and power that the CEO position asserts in hierarchies. Besides, the CEO’s being designates “visibility” and “meaningful roles” of employees as the god created light. “God said, ‘Let there be light,’ and there was light.” It is the CEO’s presence that lifts the visibility of employees and ensures their meaningful roles in the organizational transformation. In other words, the employees’ visibility and meaningful roles do not derive from what the employees do and what other employees perceive but solely depend on the being of the CEO there.

5. Analysis

In this chapter, we apply the theoretical framework (2.3) conceptualized earlier to analyze our empirical findings. Our analysis is broken down into four sections, including *5.1 Environments*, *5.2 Institutional Agents*, *5.3 Discourses*, and *5.4 Networks*. Subsequently, a synthesis of the analysis (5.5) is presented.

5.1 Environments

According to our theoretical framework, in the era of AI, management consulting firms are situated in complex technical (transactional) and institutional environments with significant uncertainties (Scott & Meyer, 1983; Scott, W., 1991; Powell, 1991; Glückler & Armbrüster, 2003). Such uncertainties not only originate from the business and the industry of management consulting itself but also stem from the development of AI, making it necessary for the consulting sector to develop informal institutions to stabilize the environments to survive and succeed. Our empirical findings clearly illustrate the uncertain environments in which management consulting firms are located in the era of AI.

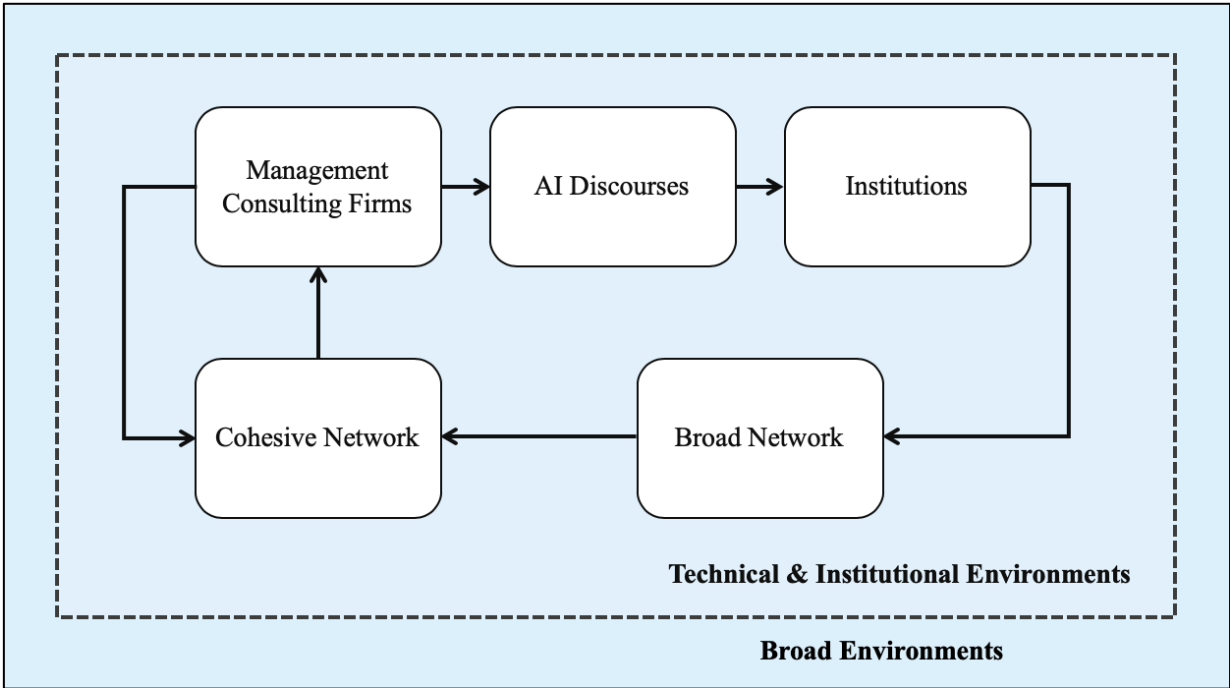
In the first place, demonstrated in our empirical findings, management consulting firms are influenced by the uncertainties of the technical environments. Indicated by Finding 11 (see *4.2.4 Corporate Strategy & Culture*), the corporate strategies to win the age of AI are not evident. Although management consulting firms assert that AI will create value for corporations across industries, they are not entirely sure about what strategies are the exact strategies to compete in the age of AI.

Furthermore, it is revealed in our empirical findings that the institutional environments of AI have not been established. Firstly, only a small percentage of organizations today are actively adopting and investing in AI, and half of the organizations have not made any investments and are reluctant to do so (see Finding 10 in *4.2.4 Corporate Strategy & Culture*). Secondly, concerns and suspicions about digital technologies and corporate uses of technologies are prevalent in public discourses, yet not so many formal institutions have been in place to settle the unrest (see Finding 4 in *4.2.2 Society & Humans*). Thirdly, regulatory issues of data accessibility and governance are a barrier for businesses to leverage AI technologies, which

rely on enormous and miscellaneous datasets (see Finding 8 in *4.2.3 Technology & Adoption*). Fourthly, national competition, especially between China and the United States, the two strongest AI leaders today, is creating instabilities to the institutional environments of international business (see Finding 2 in *4.2.1 World & Regional Economy*).

Finally, our empirical findings imply that management consulting firms’ discourses are influenced by the broad environments in which technical and institutional environments are embedded, corresponding to Furusten’s (1999) framework of the environments of organizations and management discourses. As explored in *4.1.1 Trends of Production*, nearly 90% of MBB’s articles on AI were produced from 2017, in line with the dramatic growth of public interests in the same period based on Google Trends result (Google Trends, 2019a). A similar finding is identified in the articles on gender (see *4.2.2 Society & Humans*). Additionally, it is also emphasized in the discourses of management consulting firms that today’s businesses are faced with negative public opinions about technology, business, and globalization due to a variety of environmental, economic, and societal externalities (see Finding 4 in *4.2.2 Society & Humans*). Such findings have implied the noteworthy influence of the broad environments on management consulting firms and their discourses, and have contributed to the refinement of our theoretical framework as below:

Exhibit 26: Theoretical Framework (Refined)



5.2 Institutional Agents

In our theoretical framework, we conceptualize management consulting firms as institutional agents that shape AI institutional environments actively and intentionally (Meyer & Rowan, 1977; Strang & Sine, 2002; Scott, 2008). As cultural-cognitive and normative agents, they not only invent and authorize knowledge but also set principles and guidelines for how organizations should treat AI and its related issues (Knorr-Certina, 1999; Scott, 2008). Based on Phillips et al.'s (2004) discursive model of institutionalization, institutional agents shape the institutional environments through discourses. Our study focuses specifically on the discourses of management consulting firms' articles and reports on AI.

As described in the previous section, the technical and institutional environments related to AI are quite uncertain and immature, with many issues including unclearness of winning strategies, corporate reluctance to AI adoption and investment, regulatory restrictions of data governance, public suspicions and worries, instability of multinational institutions.

Amid the uncertainty and immaturity of the environments, there has been a dramatic growth in the number of AI-related articles and reports produced by management consulting firms since 2017. These articles and reports can be understood as top-tier management consulting firms' initiatives to create AI discourses and to stabilize and shape the institutional environments of AI. As examined in *4.1.1 Trends of Production*, top-tier management consulting firms, especially McKinsey and BCG, have produced many articles in a variety of AI-related topics, including not only *Corporate Strategy & Culture* and *Technology Adoption* but also *World & Regional Economy* and *Humans & Society*. Such coverage of topics indicates their ambition to create institutions in different aspects of AI's business and management sphere.

Furthermore, the production and diffusion process of AI discourses can be understood at two levels – technical and institutional. Technically and more obviously, the articles and reports are produced in a combination of both quantitative and qualitative methods with certain writing and presentation styles (see *4.1.3 Production Methods*). Then, the articles and reports are diffused to their target audience through a range of platforms. The channels consist of not only their own websites, social media, and printed publications but also leading business media (e.g., Harvard Business Review, MIT Sloan Management Review, Forbes) and prestigious events, such as the World Economic Forum (*4.1.4 Channels & Target Audience of Diffusion*).

Institutionally, the production and diffusion of AI discourses are done in a specific structure or order (see *4.1.2 Producers & 4.1.4 Channels & Target Audience of Diffusion*). Internally, a concentration of a few (Senior) Partners from the United States, Western Europe, and to a lesser extent, China is found in the production of articles. Externally, American and Chinese digital giants (e.g., Amazon, Google, Alibaba) and top-ranked American universities (e.g., Harvard, MIT) and their professors play the most significant role in producing and shaping the discourses. Then, the discourses are diffused to Fortune 500 companies, organizations and institutions in the public sector, and management researchers and practitioners. Such an institutional structure of discourse production and diffusion is explained in detail in a later section with the concept of networks.

5.3 Discourses

As reviewed in the previous two sections, management consulting firms as cognitive-cultural and normative institutional agents produce and diffuse AI discourses to create institutions amid the uncertain and immature technical and institutional environments of AI today. Our empirical findings illustrate management consulting firms' AI discourses interpreted by us based on the quantitative and qualitative research methods (see *4.2 Text Analysis*). Categorized into four themes, our results consist of 12 findings as below:

Exhibit 14: Overview of Text Analysis Findings by Category

No.	Category	Empirical Findings
1	World & Regional Economy	Finding 1: AI as A Game for Minorities Finding 2: Hegemony of Americanism Finding 3: China as A Rising Star & Order Challenger
2	Society & Humans	Finding 4: Complex & Gloomy Societal Conditions Finding 5: Passive Position of Individuals in Transitions Finding 6: Optimism about Technology & Related Societal Issues
3	Technology & Adoption	Finding 7: AI as the Drive for the Capitalist Engine Finding 8: Data as Fuel & Weapon in the AI Game Finding 9: Ecosystems for Exclusion & Competition
4	Corporate Strategy & Culture	Finding 10: “First Move, First Win” amid Competition Finding 11: Significance & Uncertainty of AI Strategies Finding 12: Cultural Shift Towards Agility with Hierarchy in the Core

Category 1 *World & Regional Economy* unfold a global economic and technology game dominated by the United States and challenged by China with three specific findings. Firstly, despite the emphasis on AI globalization, management consulting firms’ picture of the world is narrow with the United States, China, and Western Europe as major players and a few other countries as followers. Secondly, management consulting firms are found to safeguard the hegemony of Americanism by prioritizing the discussions about AI’s influence on the United States and imposing double-standards on other countries’ AI policies and regulations. Thirdly, as the second-largest economic power, China is not only put under the spotlight in the AI game but also considered as a challenger of the global order.

Category 2 *Society & Humans* shows management consulting firms’ optimism and idealism towards AI technology and its related societal issues regardless of the complex and even somewhat gloomy societal conditions and passive positions of humans in transitions. Firstly, in the discourses of management consulting firms, today’s societies are faced with massive externalities, such as climate change and negative public narratives about technology, business, and globalization. Besides, individuals are taking a seriously passive position in the transitions of work imposed by automation, and societies are not ready yet. Despite the previous two points, management consulting firms demonstrate great optimism and idealism about AI and its related issues. The negative side of AI is not given the same weight as its positive side in the discourses. Management consulting firms also believe with some uneasiness that AI will be

conducive to employment in the long term and imagine reaching a collective and universal consensus on AI and its societal issues.

Category 3 *Technology & Adoption* manifests the capitalist engine to be pushed forward by AI technologies and data and a business world composed of various ecosystems not only for inclusion and cooperation but also for exclusion and competition. To begin with, AI is perceived as a revolutionary force of economic growth with unstoppable and inevitable progress by management consulting firms. Furthermore, revolved around by various digital technologies and organizational processes in the discourses, data is stressed as the competitive weapon of corporations and should be set free from localization policies and bureaucratic accessibility control. Finally, as a critical concept in the discourses, an ecosystem is not just about inclusion and cooperation as one commonly perceives, but essentially about exclusion and competition.

Category 4 *Corporate Strategy & Culture* reveals management consulting firms' relentless persuasion of AI investments and superficial calls for corporate strategies and cultural change. In the first place, management consulting firms picture an increasingly fierce competition landscape and persistently urge companies on AI investment. Moreover, they attach universal significance to corporate strategies, yet fail to shed light on the winning strategies in the AI game. Last but not least, they keep promoting a corporate cultural shift of diversity, agility, and autonomy but conceal hierarchies in the core.

5.4 Networks

Suggested in our theoretical framework, management consulting firms produce the AI discourses through collaboration with their cohesive network – a group of core organizations or individuals that are able to get actively involved in the discourse production, setting the values, agendas, and standards (Freeman & Webster, 1994; Freeman, 2011; Davis et al., 1941). The discourses co-produced by management consulting firms and the cohesive network are then diffused to organizations and institutions in the broad network consisting of the cohesive network and the peripheral network. The peripheral network is composed of organizations that have some interactions or connections with management consulting firms but do not participate in the production of discourses. Unlike those in the cohesive network, organizations in the

peripheral network take a much more passive position in the institutionalization of the discourses where their values and interests are not adequately represented.

As showcased in our empirical findings, the cohesive network of management consulting firms is composed mainly of American and Chinese digital giants (e.g., Amazon, Google, Alibaba), top-ranked American universities (e.g., Harvard, MIT) and their professors. After being produced by management consulting firms and their cohesive network, the discourses are diffused to organizations in the broad network consisting mostly of peripheral actors such as the majority of the Fortune 500 companies, organizations and institutions in the public sector, and management researchers and practitioners.

In academia, the scholars designated to be academic advisors or selected to participate in expert interviews usually hold a position in top-ranked universities in North America or Western Europe, especially in the United States. Additionally, both McKinsey and BCG are found to have intensive cooperation with MIT and its subsets, such as MIT Media Lab and MIT Sloan Management Review on co-researching on AI's technical and business topics. In the private sector, management consulting firms not only frequently provide examples and case studies of American and Chinese digital giants but also co-research and co-publish reports in collaboration with these tech companies. Less frequently, management consulting firms interview executives from prestigious companies as input for the production of reports.

5.5 Synthesis of Analysis

To sum up, our study provides four conclusions:

- **The environments of management consulting firms and their AI discourses**
Management consulting firms are faced with uncertainty and immaturity of both technical and institutional environments related to AI and are influenced by broad environments.
- **Management consulting firms as intuitional agents in the age of AI**
Situating in uncertain and immature environments, management consulting firms as institutional agents have increasingly produced and diffused AI discourses covering

economic, societal, and business topics to shape the institutional environments in a specific institutional order.

- **The institutional order of the AI discourses' production and diffusion**

Different actors in the networks of management consulting firms do not hold the same power in the production, diffusion, and institutionalization of discourses. The AI discourses are produced mostly by global Partners with a concentration of a few ones from Western Europe, the United States, and China in collaboration with the cohesive network composed mainly of American and Chinese tech giants and prestigious American universities. Then, the discourses are diffused to the broad network mostly made up of peripheral actors, such as the majority of the Fortune 500 companies, and some other organizations, institutions, and individuals.

- **The constitution of the AI discourses**

The AI discourses constitute four themes in *World & Regional Economy, Society & Humans, Technology & Adoption, Corporate Strategy & Culture*. In detail, the discourses demonstrate firstly a global economic and technology game dominated by the United States and challenged by China, secondly optimism and idealism towards AI and related societal issues despite complex societal conditions and passive positions of humans in transitions, thirdly the capitalist engine to be driven by AI and data and a business world of ecosystems for exclusion and competition, and lastly persuasion of AI investments and superficial calls for corporate strategies and cultural change.

6. Discussion

Our study has explored the production and diffusion of management consulting firms' AI discourses. We have developed a conceptual framework (see Exhibit 26) based on the existing literature on AI technology and its related issues, institutional theory, discourse analysis, and social network analysis along with our empirical findings. Below, we further elaborate on our analysis, especially regarding AI discourses, and discuss the advances and contexts of our framework.

Firstly, our analysis has shown that management consulting firms' and their AI discourses are shaped by the uncertain and immature AI-related technical and institutional environments embedded in the broad environments. It has manifested the conjunction of Glückler and Armbrüster's (2003) theory of transactional and institutional uncertainties and Furusten's (1999) model of the institutional and broad environments of management discourses. Besides, it has furthered their studies by providing rich empirical findings of the AI-related environments. For topics other than AI, the uncertainty and immaturity of the environments might not hold true. However, it is still applicable to perceive management consulting firms and their discourses to be constructed by the technical and institutional environments embedded in the broad environments.

Secondly, our study has indicated that management consulting firms act as institutional agents within the environments. They have increasingly produced and diffused AI-related articles and reports covering various themes to shape the institutional environments in a specific institutional order and structure. Reihlen et al. (2010) examine the strategies of which management consulting firms can take advantage to create and sustain their institutional capital. Our study contributes to their research, especially the strategy of "influencing societal value systems" with more solid empirical findings covering multiple aspects of the production and diffusion of AI articles (Reihlen et al., 2010; Bresser & Millonig, 2003). Nevertheless, since our study focuses on the emerging field of AI, as indicated by David et al. (2013), the actions of management consulting firms in other fields, especially more mature fields, might differ from what is presented in our analysis.

Thirdly, we have elaborated that the AI discourses of management consulting firms are produced and diffused in a specific institutional order – the discourses are produced with an internal concentration of writers in collaboration with the cohesive network and are diffused mostly to the peripheral network, which has very limited influence and power in the discourse production. Unlike Furusten’s (1999) study that only examines how the discourses are produced and diffused technically, we have identified the intuitional order of the processes. Different from the research of Werr and Greiner (2008) on the collaborative production of management knowledge in research, consulting, and practice, our study emphasizes that the power of actors among the three spheres is not equally distributed. What our study is not able to cover is the resistance, if any, of the peripheral network to the discourses and the competition among different AI-related discourses in a broader context to show the dynamics of power relations.

Lastly, we have presented management consulting firms’ AI discourses in our interpretation in four themes, including *World & Regional Economy*, *Society & Humans*, *Technology & Adoption*, *Corporate Strategy & Culture*. Our findings are mostly consistent with the three major rationalized managerial myths, including the rationality myth, the globalization myth, and, the universality myth, indicating that management consulting firms are creating and maintaining “the very same institutions” (Bäcklund & Werr, 2001; Meyer, 1994).

The rationality myth refers to the scientification of management knowledge, manifested well by the discourses on *Corporate Strategy & Culture* (Bäcklund & Werr, 2001). The globalization myth refers to not only a form of locality beyond national states but also a development force that heightens the “competitive pressures for efficiency and rationality” (Bäcklund & Werr, 2001). In line with the dual meaning of globalization, our findings of *World & Regional Economy* shed light on the national and regional locality in globalization, while findings of *Technology & Adoption* display technology progress and data and ecosystems as weapons in competition. The universality myth points to the belief that management models can be de-contextualized (Bäcklund & Werr, 2001; Meyer, 1994). Although it can be used to understand the discourses of *Corporate Strategy & Culture*, we find it most insightful to *Society & Humans* in the sense that management consulting firms presuppose the universal benefits of and agreements on technologies regardless of the complex social conditions and the passive roles of humans amid transitions. The three managerial myths underlying the AI discourses suggest that management consulting firms as institutional agents

are creating and strengthening “the very same institutions” in the emerging area of AI (Bäcklund & Werr, 2001).

Moreover, plenty of contradictions and inconsistencies among management consulting firms’ AI discourses – for instance, the global world for a few, ecosystems for exclusion, agility and autonomy versus hierarchy – illustrated in our analysis disclose the substantial “irrationality” of the rationalized managerial myths or institutions, although the concept of irrationality itself is not new (DiMaggio & Powell, 1991; Meyer, 1994; Bäcklund & Werr, 2011). Thus, we have complemented the previous researches of Meyer (1994) and Bäcklund and Werr (2011) by revealing the irrationality of the myths with rich empirical findings from discourse analysis. However, one must be aware that our interpretation of the discourses is not the only version of interpretation, and we wish that readers could examine our study critically.

In conclusion, advanced from our analysis, we contend that management consulting firms are facing uncertain and immature technical and institutional environments embedded in the broad environments in the emerging field of AI. As institutional agents, they are producing AI discourses together with the cohesive academic and corporate network that holds power and diffusing the discourses to the broad network to shape homogeneous institutions with intrinsic irrationality.

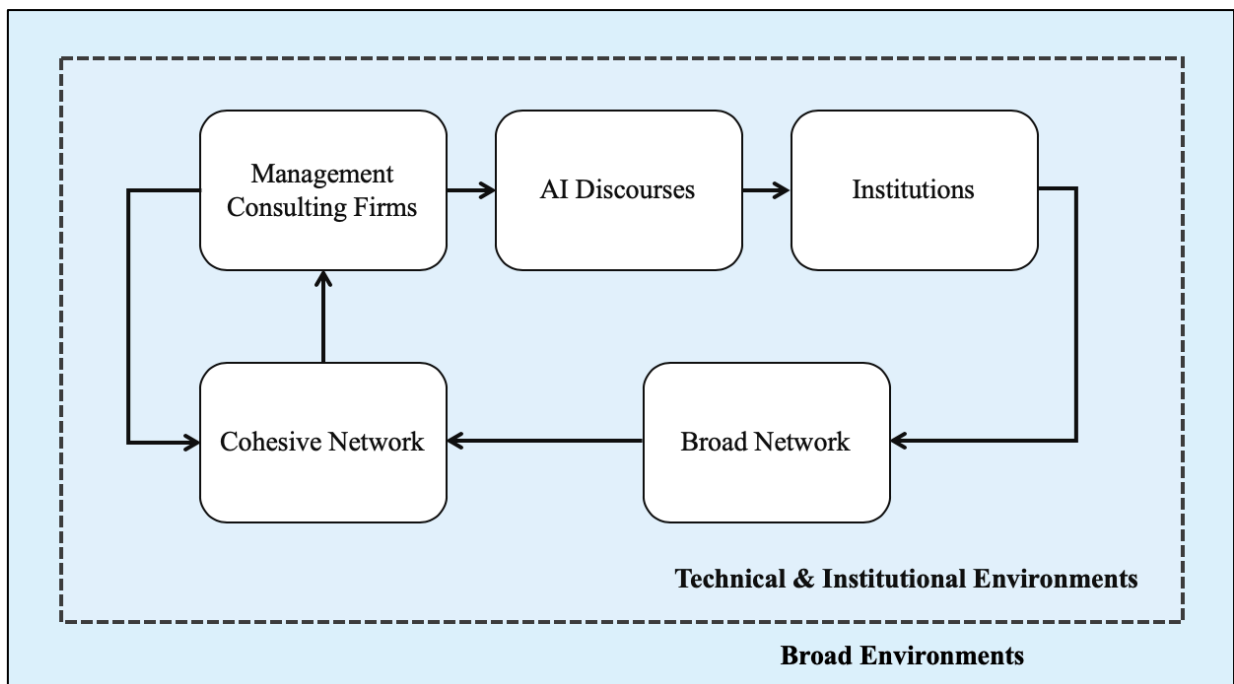
7. Conclusion

In this chapter, we present our answer to the main research question (7.1), and our contribution to academic research (7.2), implications in management practices (7.3), limitations (7.4), and lastly, interesting areas for future research (7.5).

7.1 Answer to Research Question

Our study has developed a conceptual framework (see Exhibit 26), combining researches on AI technology and its related issues, institutional theory, discourse analysis, and social network analysis. We conclude that faced with the uncertainty of the technical and institutional environments in the broad environments around AI, management consulting firms are acting as institutional agents. They are producing AI discourses covering *World & Regional Economy*, *Humans & Societies*, *Technology & Adoption*, and *Corporate Strategy & Culture* with the cohesive academic and corporate network that holds power and diffusing the discourses to the broad network to shape homogeneous institutions with intrinsic irrationality. Thus, we believe that we have addressed all of the sub-research questions associated with the production and diffusion of management consulting firms' AI discourses.

Exhibit 26: Theoretical Framework (Refined)



7.2 Theoretical Contribution

As discussed in the previous chapter, we have contributed theoretically to past researches, filling the theoretical gaps identified earlier. Our theoretical contributions can be summarized into four points as below:

Firstly, through our quantitative analysis of 737 articles and qualitative analysis of 81 articles, our study has discovered 12 findings across four major themes and unveiled the intrinsic irrationality of the institutions, strongly enriching the empirical understanding about management discourses and institutions that management consulting firms aim to create (DiMaggio & Powell, 1991; Meyer, 1994; Bäcklund & Werr, 2011; Reihlen et al., 2010).

Secondly, contrary to previous researchers such as Werr and Greiner (2008) and Furusten (1999) that only study the discourse production and diffusion processes technically, we have uncovered the institutional order that management consulting firms are following and identified the inequality of power and influence embedded in their social networks.

Thirdly, we have provided rich quantitative and qualitative empirical findings for the environments around AI. More specifically, we have contributed to the studies on the environments of management consulting firms and management discourses with unique findings of the new uncertainties of the technical and institutional environments in the age of AI (Glückler & Armbrüster, 2003; Furusten, 1999).

Lastly, we have contributed to the theoretical and methodological diversity of management studies on AI and AI discourses with theories and methods from a wide range of research areas, including AI technology, institutional theory, discourse analysis, and social network analysis through both quantitative and qualitative methods.

7.3 Managerial Implications

We have identified three managerial implications for organizations and individuals, including management consulting firms, other organizations, management practitioners, and technical experts.

Firstly, for management consulting firms, our study might enable them to be aware of and reflect on the irrationality of the discourses and institutions that they are creating and the inequality caused by their existing institutional order of discourse production and diffusion, opening a door for potential reforming and revolving of themselves.

Secondly, for other organizations and management practitioners, our study can deepen their understanding of the role of management consulting firms, specifically as institutional agents that create and maintain values, beliefs, and standards so that they can take a more critical approach when consuming management ideas and adopting AI in business.

For technical experts, we provide them with a different perspective to understand AI as they tend to immerse themselves in the technical area and neglect the business and societal implications of AI. Our presentation of and reflection on the management discourses of AI can potentially stimulate their thoughts about what kind of technologies are the technologies that they should develop.

7.4 Limitations

There are three limitations to our study. Firstly, our research only studied the AI discourses of McKinsey, BCG, and Bain, and the discourses of other management consulting firms were not discovered. Other international management consulting firms, such as Oliver Wyman, Roland Berger, A.T. Kearney, Deloitte Consulting, and Oliver Wyman, may show some differences in their AI discourses and the production and diffusion processes. The combination of data sources from more companies is likely to yield more comprehensive findings.

Secondly, we did not interview the producers of the articles for the production process. Although we gathered secondary data to map the production process, interviews with producers can potentially give us more insights about the producers' motivations and intentions underlying the production process.

Thirdly, we only studied the discourses represented by management consulting firms' AI discourses in the form of articles and reports and did not investigate other forms of discourses,

such as case deliverables, interviews, and videos, which might lead to some different analysis results.

7.5 Future Research

There are three areas that we believe are interesting for future research. In the first place, a comparative study of management consulting firms' discourses on AI or another emerging area and a mature field could reveal the similarities and differences of the environments, networks, discourses, and institutions to further conceptualize the role of management consulting firms as institutional agents.

Furthermore, AI discourses produced by other social actors, such as tech giants, companies in traditional industries, governments, non-profit organizations, and groups of individuals, could show the dynamics among different AI discourses.

Finally, research on companies or executives that use the services or read the articles of management consulting firms could give insights about how the discourses are consumed among organizations and what institutions are successfully created through the discourses.

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Appendix

Appendix 1: Overview of All Valid Articles

Code	Company	Year	Category	Title
4022	Bain	2018	4	The Cure for AI Fever
4023	Bain	2019	3b	How AI Can Make Your Call-Center Experience Less Painful
4024	Bain	2018	1	Trade Tech: A New Age for Trade and Supply Chain Finance
4025	Bain	2018	3a	Don't Forget About Existing Technologies
4026	Bain	2019	2	The Revenge of EQ
4027	Bain	2018	2	Tackling AI's Unintended Consequences
4028	Bain	2019	3b	Human Resources 4.0: Digitalization sweeping aside analog HR management
4029	Bain	2018	1	The Brave New World of Wireless Shopping
4030	Bain	2017	3b	Plotting a Path to Financial Excellence
4031	Bain	2017	1	Digitalization of the insurance industry: The multi-billion opportunity
4032	Bain	2019	3b	Solving the Advanced Analytics Talent Problem
4037	Bain	2017	4	How Leading Companies Build the Workforces They Need to Stay Ahead
4038	Bain	2018	3b	How Banks Can Excel in Financial Crimes Compliance
4039	Bain	2019	3b	Solving the Mystery of Disappearing Procurement Savings
4040	Bain	2017	1	Germany's Banks 2017
4041	Bain	2017	3b	How Insurers Can Get Their Customers To Love Them
4044	Bain	2017	3b	Losing Market Share? Time to Reinvent Product Management
4045	Bain	2017	4	Upgrading Zero-Based Redesign With Digital
4046	Bain	2017	4	What the New Silk Road Needs Is a Digital Revolution
4047	Bain	2015	1	In the US, Private Equity Investors Find Rich Opportunities and Fierce Competition
4050	Bain	2011	1	The trillion-dollar growth trends to 2020
4051	Bain	2016	4	Hackathons Aren't Just for Coders
4052	Bain	2016	1	Private Equity's Winners Pounce on Big Themes Early and Then Wait
4055	Bain	2019	1	Change Is Changing
4056	Bain	2011	1	Macro trends to add trillions of dollars to global GDP in 2020
4060	Bain	2018	4	How Local Companies Are Winning Over China's Consumers
4061	Bain	2012	1	Growth trends to 2020
4062	Bain	2018	3b	How CMOs Can Get—and Keep—their Marketing Mix Right
4065	Bain	2017	4	You Know Where the Future is Headed, So Why Aren't You There Already?
4068	Bain	2019	1	Future of Consumption in Fast-Growth Consumer Markets: India

4072	Bain	2018	3b	What Sales Teams Should Do to Prepare for the Next Recession
4074	Bain	2018	3b	Breakthrough Design for a Better Customer Experience and Better Economics
4075	Bain	2017	1	Holiday Recap and 10 Trends to Embrace in 2017
4076	Bain	2017	1	Countdown to Christmas: Tech the Halls
4081	Bain	2018	3b	Insurers Hold the Key to Healthcare's Digital Future
4082	Bain	2018	1	Wolf in Sheep's Clothing: Disruption Ahead for Transaction Banking
4087	Bain	2018	1	Embracing China's New Retail
4088	Bain	2011	1	The Great Eight: Trillion-Dollar Growth Trends to 2020
4095	Bain	2017	3b	Global In-house Centers in India
4096	Bain	2017	4	When the Finance Department Becomes a Company's Secret Weapon
4098	Bain	2017	1	Delivering China's 'New Retail' Future
4099	Bain	2012	1	A world awash in money
4104	Bain	2018	1	How Insurgent Brands Are Rewriting the Growth Playbook
4112	Bain	2018	1	Management Tools & Trends
4114	Bain	2013	1	The renaissance in mergers and acquisitions: What to do with all that cash?
4115	Bain	2016	1	Holiday Halftime and the Digital Innovation Show
4123	Bain	2018	1	Consumption in China: Ten Trends for the Next 10 Years
4126	Bain	2018	1	Labor 2030: The Collision of Demographics, Automation and Inequality
4127	Bain	2016	1	Spatial Economics: The Declining Cost of Distance
4132	Bain	2018	1	Asia-Pacific Private Equity Report 2018
4266	BCG	2017	2	What's Holding Back Artificial Intelligence - Infographic
4267	BCG	2019	4	How to Win with Artificial Intelligence
4268	BCG	2018	2	Myth vs. Reality in Artificial Intelligence
4269	BCG	2017	4	Building Blocks of Artificial Intelligence - Part of Putting AI to Work
4270	BCG	2017	3b	Putting Artificial Intelligence to Work
4271	BCG	2017	4	Is Your Business Ready for Artificial Intelligence?
4272	BCG	2017	1	Competing in the Age of Artificial Intelligence
4273	BCG	2017	4	Confessions of an AI Optimist An Interview with MIT's Andrew McAfee
4274	BCG	2017	4	Ten Things Every Manager Should Know About Artificial Intelligence
4275	BCG	2018	4	At Anheuser-Busch InBev, Artificial Intelligence Is Everywhere: An interview with Tassilo Festetics
4276	BCG	2018	2	Artificial Intelligence Is a Threat to Cybersecurity. It's Also a Solution.
4277	BCG	2017	1	Looking into the Future of Artificial Intelligence
4278	BCG	2018	2	The Power and Limits of AI An Interview with IBM's David Kenny
4279	BCG	2018	3b	Powering Up Smart Machines in Media
4281	BCG	2018	1	How AI Will Reshape Companies, Industries, and Nations: An Interview with Kai-fu Lee of Sinovation Ventures

4282	BCG	2019	2	Ready or Not, AI Is Coming to IT Operations
4284	BCG	2019	3b	Chasing Value as AI Transforms Health Care
4285	BCG	2016	4	AI Is the Talk of Tech Leaders at Code Conference 2016
4286	BCG	2017	1	TeBIT 2017 Executive Report: Time to Double Down on AI and Robotics
4287	BCG	2019	1	Next Frontier in Digital and AI Transformations, The
4288	BCG	2019	4	Thriving in the Augmented Age: A Conversation with Moonshot Thinker Maurice Conti
4289	BCG	2016	3b	Killer Apps and the Game-Changing Potential of AI: A Conversation with Technology Strategist Irving Wladawsky-Berger
4290	BCG	2017	3b	How Digital Can Turbocharge Shared Services
4291	BCG	2017	3b	Getting Bank Automation Beyond the Pilot Phase
4292	BCG	2016	3b	How Asset Managers Can Succeed with Advanced Analytics
4294	BCG	2016	3a	Integrated Strategy Machine: Using AI to Create Advantage
4298	BCG	2019	4	MIC 2019 - Chapter 2: AI Powers a New Innovation Machine
4300	BCG	2019	3b	In Travel, It's Time to Push AI Beyond the Pilot Phase
4302	BCG	2018	4	The Big Leap Toward AI at Scale
4303	BCG	2019	1	MIC 2019 - Chapter 1: Innovation in 2019
4304	BCG	2019	2	The Citizen's Perspective on the Use of AI in Government
4305	BCG	2017	3b	Powering the Service Economy with RPA and AI
4306	BCG	2018	3b	AI in the Factory of the Future
4307	BCG	2018	2	Build-or-Buy Dilemma in AI
4308	BCG	2018	4	Building Resilient and Adaptive Companies in a Global and Digital Age
4309	BCG	2019	1	2019 TMT Value Creators - Chapter 1: Value Creation Amid Turbulence
4310	BCG	2019	3a	Early-Stage Investments Could Use the AI Touch
4311	BCG	2017	3a	Mining Value in AI
4312	BCG	2019	2	How AI Could Help—or Hinder—Women in the Workforce
4313	BCG	2017	4	Navigating New Realities in Business, Geopolitics, and Technology
4314	BCG	2019	3b	What Could Blockchain Do for Airlines?
4316	BCG	2016	3b	Unleashing Technology, Media, and Telecom with Digital Transformation
4317	BCG	2018	3b	How AI and Robotics Will Disrupt the Defense Industry
4318	BCG	2018	1	Why Carmakers Are Racing to Go Digital
4319	BCG	2018	3b	Unlocking Growth in CPG with AI and Advanced Analytics
4320	BCG	2017	2	Prediction in Uncertain Times: Lessons from Trump and Brexit
4321	BCG	2019	1	South Korea
4322	BCG	2018	4	Transforming Value Chains in Process Industries with Digital and AI
4323	BCG	2019	4	A Great Digital Identity Solution Is One You Can't See
4324	BCG	2018	4	Digital Maturity Is Paying Off
4325	BCG	2018	4	How Digital Transforms Innovation Strategy

4326	BCG	2019	1	Singapore's Market Report
4327	BCG	2018	4	What's Holding Back Digital Shared Services?
4328	BCG	2018	3b	Feeding the Algorithm: How Restaurants Use Data to Capture Competitive Advantage
4329	BCG	2019	3b	With ERP and Digital Support Functions, It's Not Either-Or—It's Both
4330	BCG	2017	4	Finding Growth in the Face of Disruption
4331	BCG	2018	4	TMT VC Report 2018 - Digital Natives Lead the Battle for Value Creation
4332	BCG	2018	3b	Opportunities Knock for Legal Information Providers
4333	BCG	2018	3b	How Utilities Can Boost Workforce Productivity with Digital
4334	BCG	2016	3b	Double Game of Digital Management: Managing in Times of Big Data and Analytics
4335	BCG	2016	4	Rebirth of Nokia: An Interview with Chairman Risto Siilasmaa
4336	BCG	2018	1	Mapping the Smart-Home Market
4337	BCG	2016	2	Navigating the New Renaissance: An Interview with the University of Oxford's Ian Goldin
4338	BCG	2018	1	Life in the Cloud: An Interview with Veolia CIO Jean-Christophe Laissy
4339	BCG	2018	1	Why Chinese Insurers Lead the Way in Digital Innovation
4340	BCG	2018	1	Beauty of Disruption
4341	BCG	2017	1	Global Asset Management 2017: The Innovator's Advantage
4343	BCG	2018	4	Winning the '20s: A Leadership Agenda for the Next Decade
4344	BCG	2019	3b	Banks Can Outsmart the Competition with Intelligent Operations
4345	BCG	2019	1	New Logic of Competition, The
4346	BCG	2016	2	Promise and Responsibilities in Our Digital World: Our Take on the USI 2016 Conference
4347	BCG	2018	4	The Corporate Center of the Future
4348	BCG	2018	4	Global Challengers 2018: Digital Leadership in Emerging Markets
4349	BCG	2019	1	India
4352	BCG	2018	1	Telco Digital Transformation—Made to Measure
4353	BCG	2017	4	New Globalization: New Business Models for a New Global Landscape
4354	BCG	2019	4	Growing Urgency for Change in the Life Insurance Industry, A
4355	BCG	2018	1	Global Landscape of Corporate Vitality
4356	BCG	2018	1	A Blueprint for the Government of the Future
4357	BCG	2018	3b	Delivering on Digital Procurement's Promise
4358	BCG	2018	4	The Demand Management Opportunity for OEMs
4359	BCG	2018	1	Decoding Global Talent 2018
4360	BCG	2017	1	Global Payments 2017: Deepening the Customer Relationship
4361	BCG	2016	3b	Digital Revolution in Trade Finance
4362	BCG	2019	4	Disruptions, Delusions, and Defenses in Digital Transformation
4363	BCG	2018	1	Global Challengers 2018: Meet the 2018 Global Challengers
4364	BCG	2018	4	Competing on the Rate of Learning
4365	BCG	2018	3b	Why Cement Producers Need to Embrace Industry 4.0

4366	BCG	2018	3b	Is the Digital Revolution in Aerospace and Defense in Crisis?
4367	BCG	2016	2	Why Technology Matters
4368	BCG	2017	4	2017 Consumer Value Creators Series Why Consumer Goods Companies Need to Build, Buy, and Broker
4369	BCG	2019	4	US Midstream Companies Need a New Playbook
4370	BCG	2018	2	Avoiding the Hidden Hazards of Industry 4.0
4371	BCG	2018	4	Governing in the Age of Disruption
4372	BCG	2018	4	RBC's Dave McKay on Reinventing Banking for the Digital Age
4373	BCG	2018	3b	How IoT Data Ecosystems Will Transform B2B Competition
4374	BCG	2015	2	Man and Machine in Industry 4.0: How Will Technology Transform the Industrial Workforce Through 2025?
4375	BCG	2019	3b	How Digital Operations Put The World's Oldest Airline In The Lead
4376	BCG	2019	1	Are China's Digital Companies Ready to Go Global?
4377	BCG	2019	4	Innovation in Travel Must Put the Traveler First
4378	BCG	2019	4	The Science of Organizational Change
4379	BCG	2018	4	Digital Common Sense and Why Speed Is the New Scale
4380	BCG	2019	4	Six Ways to Help Drugs for Rare Diseases Take Off
4381	BCG	2019	4	Decoding Digital Talent
4382	BCG	2016	4	Producing Digital Gains at Davos
4383	BCG	2019	1	Ascent to the Cloud - Main Report
4384	BCG	2018	1	The Race Toward Engineering 4.0
4385	BCG	2017	1	Embracing HR Disruption: A Leadership Discussion
4386	BCG	2019	3b	Advancing Cyberresilience in the Electricity Ecosystem: An Interview with Iberdrola's Rosa Kariger
4387	BCG	2018	4	036 Bylined Article - How Governments Can Boost Labor Productivity
4388	BCG	2018	4	A CEO's Guide to Talent Management Today
4389	BCG	2019	4	Why Progressive Pricing Is Becoming a Competitive Necessity
4390	BCG	2019	4	The Next Level of Personalization in Retail
4392	BCG	2017	4	The Cybersecurity Assistance Local Governments Need
4393	BCG	2018	4	Why the Future of Rail Operations Is Digital
4394	BCG	2018	1	Global Challengers 2018: Emerging Markets: A Driving Digital Force
4395	BCG	2017	4	Measuring and Managing Corporate Vitality
4397	BCG	2017	1	M&A 2017 Report - The Technology Takeover
4398	BCG	2019	4	Cracking the Code of Digital M&A
4399	BCG	2019	1	Company of the Future, The
4400	BCG	2017	4	CEO's Guide to Digital Transformation
4401	BCG	2018	4	Powering Returns from Energy Network Deals
4402	BCG	2017	4	How to Regain the Lost Art of Reflection
4403	BCG	2018	3b	A Guide to the Revolution in Smart Buildings
4404	BCG	2018	4	Four Ways Banks Can Radically Reduce Costs

4405	BCG	2019	3b	Decoding the Slowdown in Blockchain Startups
4406	BCG	2017	4	How Digital CFOs Are Transforming Finance
4407	BCG	2018	4	Boosting Health Care Payer Performance with Advanced Analytics
4408	BCG	2019	1	The US Mobility Industry's Great Talent Hunt
4409	BCG	2019	3b	The Dividends of Digital Marketing Maturity
4410	BCG	2019	3b	Taming Tail Spend
4411	BCG	2018	4	Reinventing the Enterprise—Digitally
4412	BCG	2018	4	New IP Strategy: Make Love, Not War
4413	BCG	2017	4	Seven Rules of Cost Excellence in Banking
4414	BCG	2017	2	Digitally-Driven Gender Diversity
4415	BCG	2017	4	Twelve Forces That Will Radically Change How Organizations Work: The New New Way of Working
4416	BCG	2018	4	The 2018 Insurance Value Creators: A New Boldness Pays Off
4417	BCG	2019	4	Seven Forces Reshaping Enterprise Software
4418	BCG	2019	4	The Bionic Company
4419	BCG	2018	3b	The \$1 Trillion Opportunity in Digital Support Functions
4420	BCG	2019	4	How North American Banks Can Revive Shareholder Value
4421	BCG	2017	4	Designing the Tech Function of the Future
4422	BCG	2018	4	Meeting the Need for Procurement Speed
4423	BCG	2018	4	Facing Disruption? The Need to Reinvent? Better Move Fast.
4424	BCG	2017	4	Media Companies Must Reimagine Their Data for a Digital World
4425	BCG	2019	4	Getting Quality Right with Digital Procurement
4426	BCG	2019	3b	Radical Redesign for Support Functions in the Digital Age, A
4427	BCG	2018	3b	Growing on Data: The New Go-to-Market Reality in Agriculture
4428	BCG	2019	4	Achieving Vitality in Turbulent Times
4429	BCG	2018	4	Redefining Corporate Banking Relationships in a Digital World
4430	BCG	2019	4	Capturing the Offline Impact of Online Marketing in B2B
4431	BCG	2017	4	How to Gain and Develop Digital Talent and Skills
4432	BCG	2018	3b	The Digital Imperative in Container Shipping
4433	BCG	2016	4	Creating the Diverse Organization: How to Thrive in a Complex World
4434	BCG	2016	4	Building a Digital Technology Foundation in Insurance
4435	BCG	2018	1	Power Grid of the Future, The
4436	BCG	2019	4	Global Risk 2019: Creating a More Digital, Resilient Bank
4437	BCG	2017	3b	Global Retail Banking 2017: Accelerating Bionic Transformation
4438	BCG	2019	4	What Does a Successful Digital Ecosystem Look Like?
4439	BCG	2019	4	Reinventing Life Insurance Agency Distribution Globally
4441	BCG	2019	3b	Digital Redesign for Clinical Trials, A
4442	BCG	2018	4	Strategy, Games, and the Mind
4443	BCG	2018	3b	A Prescription for Blockchain in Health Care
4444	BCG	2018	4	How Learning Contracts Can Drive an Industrious Revolution

4445	BCG	2016	1	Riding the Waves of Innovation in the Technology Industry
4446	BCG	2018	4	Building the New Global Enterprise
4447	BCG	2018	3b	The New Technology Frontier in Mining
4448	BCG	2019	3b	For Many Enterprise Applications, the Cloud Is Ready for Prime Time
4449	BCG	2018	4	TMT VC Report 2018 - Unlock Value Creation Through Digital Enablers
4450	BCG	2018	4	Testing, Inspection, and Certification Go Digital
4451	BCG	2019	3a	Raising Procurement's Game in PMI
4452	BCG	2019	4	Banks Brace for a New Wave of Digital Disruption
4453	BCG	2016	3b	Forks in the Road: Navigating Industry Disruption
4454	BCG	2017	4	Organizing for a Digital Future
4455	BCG	2014	4	McCabe, Lee - An Interview with Lee McCabe, Global Head of Travel Strategy for Facebook
4456	BCG	2017	3b	Medtech Manufacturing's Inflection Point
4457	BCG	2017	3b	Becoming a Digital Frontrunner in Aerospace and Defense
4458	BCG	2018	1	Local Dynamos 2018 - Emerging-Market Companies Up Their Game
4459	BCG	2018	4	CEO's Guide to Leading and Learning in the Digital Age
4460	BCG	2016	1	Why the Technology Economy Matters
4461	BCG	2018	4	Rolling Out Augmented Reality in the Field
4462	BCG	2017	3b	How the Internet of Things Will Change the Pricing of Things
4463	BCG	2019	1	Retail Banking Distribution 2025: Up Close and Personal
4464	BCG	2019	4	Surviving Disruption in Additive Manufacturing
4465	BCG	2019	3b	Creating a Digital Treasury in Banking
4466	BCG	2019	4	Quality 4.0 Takes More Than Technology
4467	BCG	2019	1	Five Ways to Win in China's Changing Mobility Market
4468	BCG	2018	4	Future of Marketing Is Here. Don't Blink. The
4469	BCG	2017	2	New Digital World: Hegemony or Harmony?
4470	BCG	2018	3a	The First All-Blockchain Insurer
4471	BCG	2017	4	New Digital Reality for Restaurants
4473	BCG	2018	3b	Building New Data Engines for Insurers
4474	BCG	2018	4	Building an Integrated Marketing and Sales Engine for B2B
4475	BCG	2018	1	Why Multilatinas Hold the Key to Latin America's Economic Future
4476	BCG	2018	3b	Jump-Starting the Digital Procurement Journey
4477	BCG	2018	2	The Humanization of the Corporation
4478	BCG	2018	4	Local Dynamos 2018 - How the Local Dynamos Win at Home
4479	BCG	2018	3b	Global Corporate Banking 2018: Unlocking Success Through Digital
4480	BCG	2019	3a	Dawn of the Deep Tech Ecosystem, The
4481	BCG	2018	3a	Coming Quantum Leap in Computing
4482	BCG	2018	4	It Takes More Than Technology to Be Like a Tech Company

4483	BCG	2018	4	How Governments Are Sparking Growth in Creative Industries
4485	BCG	2018	4	Using Agile to Help Fix Big Data's Big Problem
4486	BCG	2017	3b	From Cutting Costs to Building Resilience in Upstream Oil and Gas
4487	BCG	2018	4	Organizing for Digital Innovation
4488	BCG	2017	1	Chinese Consumer's Online Journey from Discovery to Purchase
4489	BCG	2018	4	What to Do When Support Functions Aren't Ready for Digital
4490	BCG	2019	4	Creating the Critical-Care Service of the Future
4491	BCG	2016	4	An Asset Manager's Guide to Data and Digital Disruption (Part of Global Asset Management 2016)
4492	BCG	2017	1	What China Reveals About the Future of Shopping
4493	BCG	2019	4	Putting Value First in Digital Operations
4494	BCG	2018	4	What Do Corporate Banking Customers Really Want?
4495	BCG	2019	1	Indonesia
4496	BCG	2018	4	Agile as the Next Government Revolution
4498	BCG	2019	4	Six Simple Steps Pave the Way to the Cloud
4499	BCG	2019	1	Get Ready for the Chinese Internet's Next Chapter
4501	BCG	2019	2	Solving the Tech Industry's Purpose Problem
4502	BCG	2017	1	Agenda for the Future of Global Business
4503	BCG	2017	4	How Big Consumer Companies Can Fight Back
4504	BCG	2017	3b	Evolving Digital Offerings for Off-Highway OEMs
4506	BCG	2019	1	Building the Housing of the Future
4507	BCG	2017	3b	Profiting from Personalization
4508	BCG	2017	4	Moving Beyond the Milkman Model in Medtech
4509	BCG	2017	4	Adapting to a New Trade Order
4510	BCG	2017	3b	Five Lessons from the Frontlines of Industry 4.0
4511	BCG	2019	1	What's Trending in Jobs and Skills
4512	BCG	2017	2	Why Contact Centers Still Need People in the Digital Age
4513	BCG	2018	1	Trimming the Sails: Insights from BCG's Treasury Benchmarking Survey 2018
4514	BCG	2017	2	Untapped Reserves
4515	BCG	2018	3a	Next Decade in Quantum Computing—and How to Play, The
4516	BCG	2016	4	How Hardware Makers Can Win in the Software World
4517	BCG	2019	1	Unpacking the US-China Tech Trade War
4518	BCG	2015	3b	The Self-Tuning Enterprise
4519	BCG	2019	4	Going Digital Is Hard for Oil and Gas Companies—but the Payoff Is Worth It
4520	BCG	2017	4	How Digital Leaders Are Transforming B2B Marketing
4521	BCG	2019	4	How Asset Managers Can Win in a Winner-Takes-All World
4522	BCG	2017	4	A CEO's Guide to Building Value: The 2017 Insurance Value Creators Report
4523	BCG	2019	1	Is There a Future for Service Stations?

4524	BCG	2018	4	How the Digital Revolution Is Integrating Southeast Asia's Consumers
4525	BCG	2016	3b	Fintech in Capital Markets: A Land of Opportunity
4526	BCG	2016	1	Tapping into the Transformative Power of Service 4.0
4529	BCG	2017	4	Beyond the Hype: The Real Champions of Building the Digital Future
4530	BCG	2016	1	Global Asset Management 2016: Doubling Down on Data
4531	BCG	2018	1	Stars Aligning: How Southern California Could Be the Next Great Tech Ecosystem
4532	BCG	2016	3b	Double Game of Digital Action: Structuring the Program
4533	BCG	2019	4	Your Capabilities Need a Strategy
4534	BCG	2019	3b	Resolving the Blockchain Paradox in Transportation and Logistics
4536	BCG	2019	3b	As Tech Transforms Auto, Deals Are Booming
4537	BCG	2018	3b	Doubling Pharma Value with Data Science A
4538	BCG	2019	4	How Private Equity Can Capture the Upside in a Downturn
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4543	BCG	2017	3b	Making Autonomous Vehicles a Reality: Mobility in 21st-Century Boston
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4546	BCG	2017	4	Cracking the Code in Private Equity Software Deals
4547	BCG	2018	1	Global Risk 2018: Future-Proofing the Bank Risk Agenda
4548	BCG	2015	1	Borges' Map: Navigating a World of Digital Disruption
5425	McKinsey	2018	1	AI looks North: Bridging Canada's corporate artificial intelligence gap
5426	McKinsey	2019	2	Tackling bias in artificial intelligence (and in humans)
5427	McKinsey	2017	1	What Southeast Asia needs to become a major player in artificial intelligence
5428	McKinsey	2019	1	Artificial intelligence in the United Kingdom: Prospects and challenges
5429	McKinsey	2018	1	The promise and challenge of the age of artificial intelligence
5430	McKinsey	2019	1	How artificial intelligence will transform Nordic businesses
5431	McKinsey	2018	2	Applying artificial intelligence for social good
5432	McKinsey	2019	4	What it really takes to scale artificial intelligence
5433	McKinsey	2018	1	Artificial intelligence: The time to act is now
5434	McKinsey	2019	4	Harnessing the opportunity of artificial intelligence in Denmark
5435	McKinsey	2019	2	Can artificial intelligence help society as much as it helps business?
5437	McKinsey	2018	1	Artificial intelligence: Construction technology's next frontier
5438	McKinsey	2019	3b	Artificial intelligence and the circular economy: AI as a tool to accelerate the transition
5439	McKinsey	2017	3b	Artificial intelligence in health insurance: Smart claims management with self-learning software
5440	McKinsey	2017	4	Smartening up with artificial intelligence
5441	McKinsey	2018	1	The economics of artificial intelligence
5442	McKinsey	2017	1	The new spring of artificial intelligence: A few early economies

5443	McKinsey	2018	4	Will artificial intelligence make you a better leader?
5444	McKinsey	2019	2	Confronting the risks of artificial intelligence
5445	McKinsey	2018	4	AI adoption advances, but foundational barriers remain
5447	McKinsey	2014	3b	Artificial intelligence meets the C-suite
5448	McKinsey	2017	1	Artificial intelligence: Implications for China
5449	McKinsey	2017	3b	How artificial intelligence can deliver real value to companies
5450	McKinsey	2019	4	Derisking machine learning and artificial intelligence
5451	McKinsey	2018	3b	Artificial intelligence as auto companies' new engine of value
5452	McKinsey	2018	3b	Artificial intelligence: Why a digital base is critical
5453	McKinsey	2017	3b	The road to artificial intelligence in mobility--smart moves required
5454	McKinsey	2019	3b	Winning tomorrow's car buyers using artificial intelligence in marketing and sales
5455	McKinsey	2019	1	Tackling Europe's gap in digital and AI
5456	McKinsey	2018	3a	Notes from the AI frontier: Applications and value of deep learning
5457	McKinsey	2019	2	The analytics academy: Bridging the gap between human and artificial intelligence
5458	McKinsey	2017	4	How advanced industrial companies should approach artificial-intelligence strategy
5459	McKinsey	2018	3a	Deep learning's origins and pioneers
5460	McKinsey	2018	2	Marrying artificial intelligence and the sustainable development goals: The global economic impact of AI
5461	McKinsey	2018	3b	Notes from the AI frontier: Modeling the impact of AI on the world economy
5462	McKinsey	2019	3b	Artificial-intelligence hardware: New opportunities for semiconductor companies
5463	McKinsey	2018	2	What AI can and can't do (yet) for your business
5466	McKinsey	2014	4	Manager and machine: The new leadership equation
5467	McKinsey	2017	4	10 imperatives for Europe in the age of AI and automation
5468	McKinsey	2019	2	From tracking poachers to boosting donations, AI works for social good
5469	McKinsey	2017	4	Getting ready for the future of work
5470	McKinsey	2018	1	Digitizing dairy in China
5471	McKinsey	2019	1	The coming of AI Spring
5474	McKinsey	2017	3a	Controlling machine-learning algorithms and their biases
5477	McKinsey	2015	3a	An executive's guide to machine learning
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5497	McKinsey	2017	2	Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages
5502	McKinsey	2018	4	Four experts show how AI solves real-world problems

5503	McKinsey	2019	3b	AI in production: A game changer for manufacturers with heavy assets
5505	McKinsey	2018	2	Why AI isn't the death of jobs
5507	McKinsey	2019	2	AI for human development
5508	McKinsey	2018	2	The promise and pitfalls of AI
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5510	McKinsey	2018	4	Mapping AI techniques to problem types
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5512	McKinsey	2018	3b	QuantumBlack opens in Montreal, a leading center of AI
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5518	McKinsey	2018	1	Technology convergence and AI divides: A simulation appraisal
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5543	McKinsey	2017	4	Five management strategies for getting the most from AI
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5559	McKinsey	2019	1	Most of AI's business uses will be in two areas
5560	McKinsey	2018	1	AI's growing impact
5561	McKinsey	2019	1	Bank of the future
5563	McKinsey	2019	3b	Derisking machine learning in banking
5578	McKinsey	2017	3b	McKinsey Quarterly 2017 Number 4: Overview and full issue
5584	McKinsey	2016	4	Why salespeople need to develop 'machine intelligence'
5585	McKinsey	2016	4	Winning the expectations game in customer care
5586	McKinsey	2019	3b	For better healthcare claims management, think "digital first"
5587	McKinsey	2018	3b	Public cloud in China: Big challenges, big upside
5588	McKinsey	2018	3b	Data sheet: Advanced analytics
5589	McKinsey	2014	4	McKinsey Quarterly 50th anniversary edition: Overview
5591	McKinsey	2018	3a	Machine learning and therapeutics 2.0: Avoiding hype, realizing potential
5594	McKinsey	2015	3b	Four fundamentals of workplace automation
5595	McKinsey	2018	2	How the future of work may unfold: A corporate demand-side perspective
5599	McKinsey	2017	3b	McKinsey Quarterly 2017 Number 3: Overview and full issue
5601	McKinsey	2018	4	Accelerating the diffusion of technology-enabled business practices
5602	McKinsey	2017	1	The future of HR in oil and gas
5603	McKinsey	2017	3b	Reimagining fabs: Advanced analytics in semiconductor manufacturing
5605	McKinsey	2017	4	Seizing the automation opportunity in the Philippines
5608	McKinsey	2017	1	Building Asia's cities of the future
5609	McKinsey	2019	2	The future of women at work in the United Kingdom

5610	McKinsey	2018	4	Resetting the cost base
5614	McKinsey	2018	1	How competition is driving AI's rapid adoption
5615	McKinsey	2019	1	The year of future transportation: An interview with Seoul Mayor Park Wonsoo
5616	McKinsey	2018	1	Insurance 2030--The impact of AI on the future of insurance
5622	McKinsey	2019	1	Australia's automation opportunity: Reigniting productivity and inclusive income growth
5623	McKinsey	2017	4	Making product development as digital as tomorrow's products
5624	McKinsey	2018	1	The next horizon for industrial manufacturing: Adopting disruptive digital technologies in making and delivering
5627	McKinsey	2011	1	IT growth and global change: A conversation with Ray Kurzweil
5628	McKinsey	2016	3b	Messaging apps are changing how companies talk with customers
5632	McKinsey	2018	3b	The five trends driving insurtech, live from DIA 2018
5633	McKinsey	2018	2	Solving the productivity puzzle
5647	McKinsey	2018	4	Setting the framework for car connectivity and user experience
5648	McKinsey	2018	3b	Seizing opportunity in today's construction technology ecosystem
5650	McKinsey	2017	1	Dispatches from Davos
5654	McKinsey	2017	3b	What does automation mean for G&A and the back office?
5657	McKinsey	2017	1	Where is technology taking the economy?
5658	McKinsey	2018	1	Automation and the future of work
5659	McKinsey	2018	4	Claims in the digital age: How insurers can get started
5662	McKinsey	2019	1	Twenty-five years of digitization: Ten insights into how to play it right
5663	McKinsey	2018	2	Women and the future of work: A window of opportunity in Western Europe?
5670	McKinsey	2017	4	Digital in R&D: The \$100 billion opportunity
5672	McKinsey	2017	3b	Ten trends redefining enterprise IT infrastructure
5674	McKinsey	2014	1	Automation, jobs, and the future of work
5677	McKinsey	2018	1	Industrial revolution or evolution?
5678	McKinsey	2018	4	Ops 4.0: The Human Factor--A year of lessons from learners and 'lighthouses'
5680	McKinsey	2017	4	Creating an innovation culture
5681	McKinsey	2019	4	Now or never: Immediacy and customer experience in fashion retail
5683	McKinsey	2019	4	The human side of digital supply chains
5684	McKinsey	2017	1	A future for mobile operators: The keys to successful reinvention
5685	McKinsey	2017	4	Ops 4.0: Analytics to value for a product-centered transformation
5686	McKinsey	2017	1	Emerging markets encouraged to defend globalization
5687	McKinsey	2018	3b	McKinsey Quarterly 2018 Number 4: Overview and full issue
5690	McKinsey	2017	4	Driving value in talent processes using analytics
5691	McKinsey	2018	4	Houston Astros: winning the World Series with advanced analytics
5692	McKinsey	2019	1	InsureTech Connect 2019 overview: Today's pivotal insurance topics
5697	McKinsey	2015	3b	Digital manufacturing: The revolution will be virtualized
5698	McKinsey	2016	4	Leading in the digital age

5700	McKinsey	2019	2	Competitive advantage with a human dimension: From lifelong learning to lifelong employability
5702	McKinsey	2019	4	From art to science: The future of underwriting in commercial P&C insurance
5704	McKinsey	2018	4	Ops 4.0: The Human Factor--Planning for tomorrow's roles
5705	McKinsey	2015	3b	McKinsey Quarterly 2015 Number 3: Overview and full issue
5706	McKinsey	2015	2	Robots and risk at the Business Book of the Year awards
5707	McKinsey	2018	4	Ops 4.0: The Human Factor--Building Ops 4.0 capabilities
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5710	McKinsey	2018	4	Scaling up organizational agility
5711	McKinsey	2019	1	The future of work in South Africa: Digitisation, productivity and job creation
5713	McKinsey	2019	4	Three burning questions for P&C insurers
5714	McKinsey	2018	3b	Construction in the cloud: An interview with Thomas Wolf, CEO of RIB Software
5715	McKinsey	2018	3b	Realigning global support-function footprints in a digital world
5716	McKinsey	2017	4	Putting lifelong learning on the CEO agenda
5717	McKinsey	2018	2	Retraining and reskilling workers in the age of automation
5728	McKinsey	2017	1	'Factory of the future' opens in Singapore
5738	McKinsey	2018	4	The risks and rewards of outsourcing
5739	McKinsey	2019	3b	Digital is reshaping US health insurance--winners are moving fast
5740	McKinsey	2018	2	Automation will make lifelong learning a necessary part of work
5742	McKinsey	2016	2	How work will change in the next economy
5743	McKinsey	2019	4	A new industry model for insurtech
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5745	McKinsey	2018	1	How Industry 4.0 can help India escape the Western labor-productivity paradox
5746	McKinsey	2019	1	Korean manufacturing's digital transformation must escape 'pilot purgatory'
5749	McKinsey	2019	1	Anger over tariffs obscures a shift in patterns of global trade
5750	McKinsey	2018	4	How to build a data-first culture for a digital transformation
5751	McKinsey	2015	2	The future of work: Five issues for the Next: Economy
5752	McKinsey	2017	2	The great remake: Manufacturing for modern times
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5756	McKinsey	2016	2	Rethinking work in the digital age
5757	McKinsey	2017	4	Analyzing start-up and investment trends in the mobility ecosystem
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5759	McKinsey	2019	4	Finding the future of care provision: the role of smart hospitals
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5761	McKinsey	2018	3b	How digital manufacturing can escape 'pilot purgatory'
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5764	McKinsey	2017	1	How China became a digital leader
5765	McKinsey	2015	4	How many of your daily tasks could be automated?
5766	McKinsey	2018	4	From understanding to action: Our top reads from 2018
5767	McKinsey	2016	4	Innovation is not enough
5768	McKinsey	2019	3b	New technology for an old industry: How digital can renew South African mining
5770	McKinsey	2017	1	China can be a more influential force in digital world
5771	McKinsey	2019	4	Inside dynamics of a changing relationship
5772	McKinsey	2019	1	Staying competitive in next round of globalization
5773	McKinsey	2017	3b	How technology is reshaping supply and demand for natural resources
5775	McKinsey	2019	1	Davos 2019: Four big themes
5776	McKinsey	2018	2	Responding to digital threats
5778	McKinsey	2018	2	A woman's place is in the digital revolution
5779	McKinsey	2018	2	The false choice between automation and jobs
5782	McKinsey	2017	4	Five things you may not know about Digital McKinsey
5783	McKinsey	2017	3b	Burned by the bots: Why robotic automation is stumbling
5785	McKinsey	2018	1	China's fast climb up the value chain
5786	McKinsey	2018	2	Are Middle East workers ready for the impact of automation?
5787	McKinsey	2019	2	What radical transparency could mean for the fashion industry
5791	McKinsey	2017	4	A road map for digitizing source-to-pay
5792	McKinsey	2018	4	The most perfect union: Unlocking the next wave of growth by unifying creativity and analytics
5793	McKinsey	2018	4	Charting the future of customer care through a core optimization philosophy
5794	McKinsey	2017	4	Capturing value from the core
5795	McKinsey	2018	3a	How machine learning can improve pricing performance
5796	McKinsey	2019	1	Resilience in TMT: Winning in downturns
5797	McKinsey	2018	4	Why digital strategies fail
5798	McKinsey	2019	1	Israel: Hot spot for future mobility technologies
5799	McKinsey	2019	1	Claims 2030: Dream or reality?
5801	McKinsey	2017	4	Digital machinery: How companies can win the changing manufacturing game
5802	McKinsey	2018	4	Ten red flags signaling your analytics program will fail
5804	McKinsey	2017	1	China gears up for leap into digitisation of industry
5805	McKinsey	2014	4	Lever five: IT enablement
5806	McKinsey	2013	4	Why isn't disruptive technology lifting us out of the recession?
5807	McKinsey	2017	1	China's digital economy: A leading global force
5808	McKinsey	2017	4	Harnessing automation for a future that works
5809	McKinsey	2017	1	Stimulating digital adoption in Germany
5812	McKinsey	2017	4	Reinventing equity research as a profit-making business
5813	McKinsey	2016	3a	The growing potential of quantum computing

5834	McKinsey	2014	4	Why every leader should care about digitization and disruptive innovation
5837	McKinsey	2017	4	Reinvention or regrets? Hong Kong faces a fork in the road
5838	McKinsey	2015	4	Closing France's €100 billion digital gap
5840	McKinsey	2018	4	Taking digital transformation to the limits at Koç Holding
5841	McKinsey	2017	4	Who's at the wheel? Changing culture and leadership to support innovation in autonomous vehicles
5842	McKinsey	2019	1	Five themes from InsureTech Connect 2019
5844	McKinsey	2018	4	The need for speed: Capturing today's fashion consumer
5845	McKinsey	2018	4	Building a tech-enabled ecosystem: An interview with Ping An's Jessica Tan
5846	McKinsey	2018	3b	Banks in the changing world of financial intermediation
5847	McKinsey	2019	4	Winning in a world of ecosystems
5848	McKinsey	2019	1	A vision for medical affairs in 2025
5849	McKinsey	2017	4	Ops 4.0: Fueling the next 20 percent productivity rise with digital analytics
5850	McKinsey	2014	4	A productivity perspective on the future of growth
5851	McKinsey	2018	1	Reserve a seat--the future of mobility is arriving early
5852	McKinsey	2018	3b	How the Houston Astros are winning through advanced analytics
5853	McKinsey	2019	4	Flow control: Sector at a crossroads?
5854	McKinsey	2016	4	Leadership and behavior: Mastering the mechanics of reason and emotion
5855	McKinsey	2017	3b	A smart home is where the bot is
5856	McKinsey	2019	1	Automation and the future of work in Indonesia
5860	McKinsey	2019	1	Digital reinvention can spur South Africa's economy
5861	McKinsey	2013	2	Charting technology's new directions: A conversation with MIT's Erik Brynjolfsson
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5863	McKinsey	2015	4	Empowering teachers and trainers through technology
5864	McKinsey	2018	4	Analytics translator: The new must-have role
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5866	McKinsey	2018	2	Is the Solow Paradox back?
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5870	McKinsey	2019	2	Banks and the changing face of risk
5872	McKinsey	2018	1	Building digital ecosystems in Japan
5873	McKinsey	2018	1	Leading change in the Japanese pharma market: Innovating for the future in an uncertain present
5874	McKinsey	2017	4	What successful digital transformations have in common
5876	McKinsey	2019	4	GDPR compliance since May 2018: A continuing challenge
5877	McKinsey	2019	4	Value creation in European building materials--where do the opportunities lie?
5878	McKinsey	2018	4	Advanced analytics: Poised to transform Asian companies
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5880	McKinsey	2017	1	Digital risk: Transforming risk management for the 2020s
5881	McKinsey	2017	3b	The new frontier in anti-money laundering
5883	McKinsey	2018	4	Preparing millennials for the age of automation
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5886	McKinsey	2016	4	How automakers can get the most value from Silicon Valley
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5889	McKinsey	2017	3b	Infrastructure for the evolution of urban mobility
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5897	McKinsey	2017	2	What's missing in leadership development?
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5901	McKinsey	2016	4	Ahead of the curve: The future of performance management
5902	McKinsey	2017	1	Digital China: Powering the economy to global competitiveness
5904	McKinsey	2017	3b	Digital transformation: Raising supply-chain performance to new levels
5905	McKinsey	2017	4	Capturing value from your customer data
5906	McKinsey	2017	4	Customers' lives are digital--but is your customer care still analog?
5907	McKinsey	2019	1	Ten trends shaping the Internet of Things business landscape
5909	McKinsey	2019	1	From back office to innovation's front lines with next-gen global business services
5910	McKinsey	2016	4	Being patient-centric in a digitizing world
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5915	McKinsey	2018	3b	Fintech decoded: The capital markets infrastructure opportunity
5933	McKinsey	2019	3b	The pursuit of excellence in new-drug development
5934	McKinsey	2019	3b	Shifting the dial in procurement
5935	McKinsey	2019	1	Reinforcing Switzerland's attractiveness to multinational companies
5936	McKinsey	2018	1	The future of work: Switzerland's digital opportunity
5937	McKinsey	2015	3a	Ten ways autonomous driving could redefine the automotive world
5939	McKinsey	2018	1	Digitizing healthcare--opportunities for Germany
5940	McKinsey	2019	1	A long-term vision for the European automotive industry
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5942	McKinsey	2019	4	Reimagining mobility: A CEO's guide
5943	McKinsey	2017	2	Technology, jobs, and the future of work
5944	McKinsey	2019	4	Speak softly, make tough decisions: An interview with Alibaba Group chairman and CEO Daniel Zhang
5945	McKinsey	2017	4	What talent management can do to shape next-generation pharma leaders
5946	McKinsey	2019	3b	The invisible hand: On the path to autonomous planning in food retail

5949	McKinsey	2017	4	Learning innovation in the digital age
5950	McKinsey	2017	3b	The transformative power of automation in banking
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5954	McKinsey	2011	4	Competing through data: Three experts offer their game plans
5956	McKinsey	2017	4	How Turkish companies can become global successes
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5958	McKinsey	2018	4	Debiasing the corporation: An interview with Nobel laureate Richard Thaler
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5963	McKinsey	2019	4	Managing data as an asset: An interview with the CEO of Informatica
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5976	McKinsey	2016	3b	From plastic to pixels: Digitizing the credit card
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5985	McKinsey	2017	3b	Hello, mobile operators? This is your age of disruption calling
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5991	McKinsey	2019	1	Paths to profitability in US unconventional
5992	McKinsey	2018	4	Powerful pricing: The next frontier in apparel and fashion advanced analytics
5993	McKinsey	2018	3b	Insurance beyond digital: The rise of ecosystems and platforms
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5995	McKinsey	2017	4	How can we recognize the real power of the Internet of Things?
5996	McKinsey	2018	2	New technology, new rules: Reimagining the modern finance workforce
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5998	McKinsey	2017	3b	Healthcare giant shares prescription for digital reinvention
5999	McKinsey	2017	4	Monetizing data: A new source of value in payments
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6006	McKinsey	2018	4	Winning the cost battle: Success factors in digital transformations for energy retailers
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6009	McKinsey	2018	4	Does your airline still cross seat belts? A ten-point lean checklist for leaders
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6043	McKinsey	2018	4	What beauty players can teach the consumer sector about digital disruption
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6051	McKinsey	2019	1	The era of exponential improvement in healthcare?
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6084	McKinsey	2019	1	Global banking annual review 2019: The last pit stop? Time for bold late-cycle moves
6085	McKinsey	2019	4	The productivity imperative in insurance
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6089	McKinsey	2017	1	What can we expect in China in 2018?
6090	McKinsey	2018	4	Unlocking success in digital transformations
6091	McKinsey	2018	1	The rise and rise of medtech in Asia
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6096	McKinsey	2016	4	The new tech talent you need to succeed in digital
6098	McKinsey	2018	4	Solving the United Kingdom's productivity puzzle in a digital age
6100	McKinsey	2019	1	The trends transforming mobility's future
6101	McKinsey	2017	3b	Navigating the digital future: The disruption of capital projects
6102	McKinsey	2017	1	The new age of engineering and construction technology
6103	McKinsey	2017	3a	Insurtech--the threat that inspires
6104	McKinsey	2018	4	Synergy and disruption: Ten trends shaping fintech
6105	McKinsey	2018	1	The future of healthcare: Finding the opportunities that lie beneath the uncertainty
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6107	McKinsey	2018	4	The business value of design
6108	McKinsey	2018	4	Developing tomorrow's leaders in life sciences
6109	McKinsey	2018	1	Skill shift: Automation and the future of the workforce
6110	McKinsey	2019	1	Bracing for consolidation in Asia-Pacific banking: The quest for scale
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6114	McKinsey	2018	4	Value and resilience through better risk management
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6120	McKinsey	2017	1	Global reinsurance: Fit for the future?
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6122	McKinsey	2018	3b	Assessing the Medicare Advantage Star Ratings
6123	McKinsey	2018	3b	The cornerstones of large-scale technology transformation
6124	McKinsey	2019	1	China and the world: Inside the dynamics of a changing relationship
6125	McKinsey	2019	2	The future of women at work: Transitions in the age of automation
6126	McKinsey	2019	1	Globalization in transition: The future of trade and value chains
6127	McKinsey	2019	2	Navigating a world of disruption
6128	McKinsey	2019	3b	Automation in logistics: Big opportunity, bigger uncertainty
6129	McKinsey	2013	3b	Ten IT-enabled business trends for the decade ahead
6130	McKinsey	2016	1	The next imperatives for US healthcare
6131	McKinsey	2017	4	The (ongoing) trouble with travel distribution: Customer experience
6132	McKinsey	2018	1	What can we expect in China in 2019?
6133	McKinsey	2019	4	Omnichannel consumer interactions--a payer perspective

Appendix 2: MySQL Database

Database Structure

#	Name	Type	Collation	Attributes	Null	Default	Extra
1	id 	int(11)			No	<i>None</i>	AUTO_INCREMENT
2	ar_title	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
3	ar_category	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
4	ar_author	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
5	ar_date	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
6	ar_content	text	utf8mb4_general_ci		Yes	<i>NULL</i>	
7	ar_type	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
8	ar_company	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	
9	ar_url	varchar(145)	utf8mb4_general_ci		Yes	<i>NULL</i>	

Sample Data

id	ar_title	ar_category	ar_author	ar_date	ar_content	ar_type	ar_company	ar_url
4022	The Cure for AI Fever	5	By Cesar Brea and Sanjin Bicanic	2018	Imagine this scenario: An ex...	Brief	Bain	https://www.bain.com/insights/the-cure-for-ai-feve...
4023	How AI Can Make Your Call-Center Experience Less P...	4	By James Allen	2019	This article originally appe...	WSJ's The Experts	Bain	https://www.bain.com/insights/how-ai-can-make-your...
4024	Trade Tech: A New Age for Trade and Supply Chain F...	1	By Wolfgang Lehmacher, Thomas Olsen, Gerry Mattios...	2018	Forward At the World Econom...	World Economic Forum	Bain	https://www.bain.com/insights/trade-tech-world-eco...
4025	Don' t Forget About Existing Technologies	3	By Michael Heric	2018	This article originally appe...	CFO.com	Bain	https://www.bain.com/insights/dont-forget-about-ex...
4026	The Revenge of EQ	2	By David Michels	2019	This article originally appe...	Forbes.com	Bain	https://www.bain.com/insights/the-revenge-of-eq-fo...
4027	Tackling AI's Unintended Consequences	2	By Chris Brahm	2018	Whether or not they know i...	Brief	Bain	https://www.bain.com/insights/tackling-ais-uninten...
4028	Human Resources 4.0:	4	By Dr. Jörg Gnam, Dr.	2019		Brief	Bain	https://www.bain.com/insights/personal-

Appendix 3: Drop List

newyorktimes, usatoday, reserved, limited, rights, company, usatoday, a, aa, about, across, all, allrightsreserved, also, am, an, and, appended, apr, April, are, article, arts, as, at, aug, August, b, bb, be, been, by, byline, c, caption, cc, chart, column, com, copyright, correction, correctiondate, crossword, d, date, dateline, dd, dec, December, desk, diary, digest, do, document, documents, drawing, e, ed, edition, editor, editorial, ee, english, etc, f, feb, February, ff, final, FM, for, Friday, from, g, get, gg, give, graph, graphic, guardiannewspaperslimited, h, he, he'll, he's, her, her's, hh, highlight, him, his, how, http, httpwwwnytimescom, i, i'd, i'll, i'm, i've, i've, if, ii, in, into, is, it, it's, its, j, jan, January, jj, jul, July, jun, June, k, kk, l, language, leisure, length, let's, letter, listings, ll, loaddate, m, magazine, map, mar, March, May, may, me, metro, metropolitan, mm, Monday, my, n, news, newspaper, newspapers, newyorktimes, nn, nov, November, nytimes, o, obit, obituaries, obituary, oct, October, of, on, one, oo, op, oped, or, our, over, p, page, pages, pg, photo, photograph, photographs, photos, picture, pp, publication, publicationtype, q, qq, r, review, reviews, rr, s, Saturday, section, sep, September, series, she'll, so, source, sources, sports, ss, staff, such, summary, Sunday, t, than, that, the, theater, their, them, there, there's, these, they, they're, this, those, through, Thursday, to, tt, Tuesday, type, u, under, url, us, uu, v, vv, w, was, washingtonpost, we, we'll, we're, we've, weather, Wednesday, were, what, when, which, will, with, won't, words, would, wouldn't, writer, ww, www, wwwnytimescom, x, xx, y, you, you'll, you're, you've, your, yy, z, zz, a, a's, able, about, above, according, accordingly, across, actually, after, afterwards, again, against, ain't, all, allow, allows, almost, alone, along, already, also, although, always, am, among, amongst, an, and, another, any, anybody, anyhow, anyone, anything, anyway, anyways, anywhere, apart, appear, appreciate, appropriate, are, aren't, around, as, aside, ask, asking, associated, at, available, away, awfully, b, be, became, because, become, becomes, becoming, been, before, beforehand, behind, being, believe, below, beside, besides, best, better, between, beyond, both, brief, but, by, c, c'mon, c's, came, can, can't, cannot, cant, cause, causes, certain, certainly, changes, clearly, co, com, come, comes, concerning, consequently, consider, considering, contain, containing, contains, corresponding, could, couldn't, course, currently, d, definitely, described, despite, did, didn't, different, do, does, doesn't, doing, don't, done, down, downwards, during, e, each, edu, eg, eight, either, else, elsewhere, enough, entirely, especially, et, etc, even, ever, every, everybody, everyone, everything, everywhere, ex, exactly, example, except, f, far, few, fifth, first, five, followed, following, follows, for, former, formerly, forth, four, from, further, furthermore, g, get, gets, getting, given, gives, go, goes, going, gone, got, gotten, greetings, h, had, hadn't, happens, hardly, has, hasn't, have, haven't, having, he, he's, hello, help, hence, her, here, here's, hereafter, hereby, herein, hereupon, hers, herself, hi, him, himself, his, hither, hopefully, how, howbeit, however, i, i'd, i'll, i'm, i've, ie, if, ignored, immediate, in, inasmuch, inc, indeed, indicate, indicated, indicates, inner, insofar, instead, into, inward, is, isn't, it, it'd, it'll, it's, its, itself, j, just, k, keep, keeps, kept, know, knows, known, l, last, lately, later, latter, latterly, least, less, lest, let, let's, like, liked, likely, little, look, looking, looks, ltd, m, mainly, many, may, maybe, me, mean, meanwhile, merely, might, more, moreover, most, mostly, much, must, my, myself, n, name, namely, nd, nevertheless, next, nine, nobody, noone, nor, novel, o, obviously, of, off, oh, ok, okay, old, on, once, one, ones, only, onto, or, other, others, otherwise, ought, our, ours, ourselves, out, over, overall, p, particular, particularly, per, perhaps, placed, plus, presumably, q, que, quite, qv, r, rather, rd, re, regarding, regards, relatively, respectively, s, said, same, saw, say, saying, says, secondly, seven, several, shall, she, since, six, so, some, somebody, somehow, someone, something, sometime, sometimes, somewhat, somewhere, specified, specify, specifying, still, sub, such, sup, sure, t, t's, tends, th, than, thanx, that, that's, thats, the, their, theirs, them, themselves, then, thence, there, there's, thereafter, thereby, therefore, therein, theres, thereupon, these, they, they'd, they'll, they're, they've, third, this, those, though, three, through, throughout, thru, thus, to, too, toward, towards, twice, two, u, un, unfortunately, unless, until, unto, up, upon, us, use, used, useful, uses, using, usually, uucp, v, value, various, very, via, viz, vs, w, we, we'd, we'll, we're, we've, well, went, were, weren't, what, what's, whatever, when, whence, whenever, where, where's, whereafter, whereas, whereby, wherein, whereupon, wherever, whether, which, while, whither, who, who's, whoever, whom, whose, within, x, y, yet, you, you'd, you'll, you're, you've, your, yours, yourself, yourselves, z, sunday, monday, tuesday, wednesday, thursday, friday, saturday, am, pm, est, cst, edt, cdt, gmt, should, need, make.

Appendix 4: Top 30 Most Frequent Words & Pairs

All Categories:

Word	Frequency	Proportion	Entropy Term
compani	9497	0.010856	0.049101
digit	9211	0.010529	0.047944
data	7805	0.008922	0.042104
technolog	7311	0.008357	0.039985
new	6962	0.007958	0.038466
busi	5994	0.006852	0.034143
custom	5424	0.0062	0.031516
product	5271	0.006025	0.030799
market	4486	0.005128	0.027039
ai	4436	0.005071	0.026795
not	4333	0.004953	0.026289
industri	4321	0.004939	0.02623
develop	4225	0.004829	0.025756
servic	4176	0.004773	0.025513
manag	4038	0.004616	0.024825
process	3799	0.004343	0.02362
work	3599	0.004114	0.022599
oper	3428	0.003918	0.021716
time	3298	0.00377	0.021038
model	3293	0.003764	0.021012
organ	3059	0.003497	0.019777
percent	3045	0.003481	0.019702
cost	3014	0.003445	0.019537
improv	2938	0.003358	0.01913
invest	2900	0.003315	0.018926
autom	2871	0.003282	0.01877
creat	2835	0.003241	0.018575
provid	2809	0.003211	0.018434
year	2767	0.003163	0.018206
growth	2744	0.003137	0.018081

Pair	Frequency	Proportion	Entropy Term
artifici intellig	1086	0.000948	0.006601
busi model	825	0.00072	0.005213
digit technolog	731	0.000638	0.004696
advanc analyt	709	0.000619	0.004574
new technolog	702	0.000613	0.004535
machin learn	700	0.000611	0.004523
see exhibit	644	0.000562	0.004208
data analyt	635	0.000555	0.004157
digit transform	609	0.000532	0.004009
product servic	565	0.000493	0.003757
suppli chain	483	0.000422	0.003278
unit state	473	0.000413	0.003218
custom experi	456	0.000398	0.003117
compani digit	445	0.000389	0.003052
new busi	406	0.000355	0.002817
wai work	405	0.000354	0.002811
decis make	399	0.000348	0.002774
big data	398	0.000348	0.002768

public cloud	387	0.000338	0.002701
reduc cost	384	0.000335	0.002683
oper model	373	0.000326	0.002615
new model	355	0.00031	0.002504
new digit	345	0.000301	0.002443
creat new	340	0.000297	0.002411
new wai	337	0.000294	0.002393
busi unit	325	0.000284	0.002318
new product	320	0.000279	0.002287
digit tool	320	0.000279	0.002287
past year	315	0.000275	0.002255
competit advantag	299	0.000261	0.002154

Category 1

Word	Frequency	Proportion	Entropy Term
compani	2321	0.009782	0.045263
digit	2210	0.009314	0.043554
new	1985	0.008366	0.040018
technolog	1936	0.008159	0.039234
market	1681	0.007085	0.035067
product	1552	0.006541	0.032898
busi	1499	0.006317	0.031994
servic	1377	0.005803	0.029883
data	1370	0.005774	0.029761
growth	1289	0.005432	0.028332
industri	1249	0.005264	0.027619
ai	1238	0.005218	0.027422
global	1152	0.004855	0.025866
china	1151	0.004851	0.025848
develop	1122	0.004729	0.025318
not	1100	0.004636	0.024913
year	1004	0.004231	0.023125
custom	1004	0.004231	0.023125
percent	941	0.003966	0.021931
invest	933	0.003932	0.021778
manag	910	0.003835	0.021337
consum	891	0.003755	0.020971
increas	862	0.003633	0.020408
innov	850	0.003582	0.020175
see	844	0.003557	0.020057
cost	830	0.003498	0.019783
time	820	0.003456	0.019587
provid	803	0.003384	0.019252
creat	795	0.003351	0.019093
work	771	0.003249	0.018617

Pair	Frequency	Proportion	Entropy Term
public cloud	362	0.001696	0.010819
artifici intellig	282	0.001321	0.008758
unit state	219	0.001026	0.007061
new technolog	206	0.000965	0.006701
digit technolog	202	0.000946	0.006589
busi model	202	0.000946	0.006589
see exhibit	190	0.00089	0.006252

suppli chain	158	0.00074	0.005336
product servic	145	0.000679	0.004955
see figur	144	0.000675	0.004926
emerg market	140	0.000656	0.004807
machin learn	127	0.000595	0.004419
digit transform	119	0.000557	0.004177
past year	111	0.00052	0.003932
african american	108	0.000506	0.00384
advanc economi	107	0.000501	0.003809
creat new	107	0.000501	0.003809
new product	105	0.000492	0.003747
data analyt	104	0.000487	0.003716
advanc analyt	96	0.00045	0.003466
new model	93	0.000436	0.003372
servic provid	93	0.000436	0.003372
compani digit	92	0.000431	0.00334
oper model	91	0.000426	0.003308
custom experi	90	0.000422	0.003277
big data	90	0.000422	0.003277
new busi	88	0.000412	0.003213
new digit	87	0.000408	0.003181
new servic	85	0.000398	0.003117
econom growth	83	0.000389	0.003053

Category 2

Word	Frequency	Proportion	Entropy Term
ai	828	0.010407	0.047511
technolog	789	0.009917	0.045751
compani	748	0.009401	0.043876
data	651	0.008182	0.039322
work	607	0.007629	0.037199
new	593	0.007453	0.036514
job	547	0.006875	0.034237
autom	533	0.006699	0.033535
digit	524	0.006586	0.03308
women	518	0.006511	0.032777
not	494	0.006209	0.031553
percent	479	0.00602	0.03078
industri	449	0.005643	0.029217
busi	426	0.005354	0.028002
risk	424	0.005329	0.027896
product	421	0.005291	0.027736
skill	410	0.005153	0.027148
economi	337	0.004236	0.023145
time	333	0.004185	0.02292
develop	322	0.004047	0.022299
potenti	322	0.004047	0.022299
manag	320	0.004022	0.022185
includ	308	0.003871	0.021501
model	296	0.00372	0.020811
worker	295	0.003708	0.020754
global	294	0.003695	0.020696
peopl	292	0.00367	0.02058
growth	287	0.003607	0.02029
learn	273	0.003431	0.019472

creat	261	0.00328	0.018763
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Pair	Frequency	Proportion	Entropy Term
artifici intellig	110	0.002319	0.014069
unit state	90	0.001897	0.011892
product growth	68	0.001434	0.009387
emerg economi	60	0.001265	0.008441
mckinsei global	57	0.001202	0.008081
global institut	56	0.001181	0.00796
mckinsei institut	55	0.00116	0.007838
digit technolog	54	0.001138	0.007717
advanc economi	50	0.001054	0.007226
women men	48	0.001012	0.006979
see exhibit	46	0.00097	0.006729
new job	45	0.000949	0.006604
machin learn	44	0.000928	0.006478
busi leader	43	0.000907	0.006351
autom technolog	43	0.000907	0.006351
digit risk	43	0.000907	0.006351
decis make	42	0.000885	0.006224
creat new	42	0.000885	0.006224
labor market	40	0.000843	0.005969
job gain	38	0.000801	0.005712
product servic	38	0.000801	0.005712
men women	38	0.000801	0.005712
data set	37	0.00078	0.005582
compani ai	37	0.00078	0.005582
technolog innov	37	0.00078	0.005582
new technolog	37	0.00078	0.005582
new skill	37	0.00078	0.005582
risk manag	37	0.00078	0.005582
ai technolog	36	0.000759	0.005452
oil ga	35	0.000738	0.005322

Category 3a

Word	Frequency	Proportion	Entropy Term
data	343	0.01278	0.05572
quantum	304	0.011327	0.050752
technolog	303	0.01129	0.050622
comput	280	0.010433	0.047603
machin	250	0.009315	0.043559
learn	234	0.008719	0.041348
algorithm	218	0.008123	0.039096
compani	203	0.007564	0.036945
busi	194	0.007229	0.035635
new	186	0.00693	0.034457
not	173	0.006446	0.032516
insur	168	0.00626	0.03176
model	156	0.005813	0.029922
av	155	0.005775	0.029767
develop	153	0.005701	0.029457
potenti	149	0.005552	0.028834
digit	149	0.005552	0.028834
oper	140	0.005216	0.027417

time	132	0.004918	0.02614
ai	123	0.004583	0.024682
cost	117	0.004359	0.023696
applic	116	0.004322	0.02353
industri	114	0.004248	0.023198
problem	108	0.004024	0.022195
custom	106	0.00395	0.021858
media	104	0.003875	0.021519
strategi	103	0.003838	0.021349
process	101	0.003763	0.021009
invest	100	0.003726	0.020838
blockchain	98	0.003652	0.020495

Pair	Frequency	Proportion	Entropy Term
quantum comput	178	0.018715	0.074457
machin learn	156	0.016402	0.067418
artifici intellig	43	0.004521	0.024409
strategi machin	43	0.004521	0.024409
machinelearn algorithm	42	0.004416	0.023946
deep tech	40	0.004206	0.023011
neural network	40	0.004206	0.023011
new technolog	30	0.003154	0.018165
data set	29	0.003049	0.017663
data scientist	27	0.002839	0.016648
see exhibit	25	0.002629	0.015617
busi model	24	0.002523	0.015095
deep learn	23	0.002418	0.014569
solv problem	21	0.002208	0.013503
quantum algorithm	20	0.002103	0.012963
digit technolog	19	0.001998	0.012417
train data	19	0.001998	0.012417
learn algorithm	18	0.001893	0.011866
ai techniqu	18	0.001893	0.011866
classic comput	18	0.001893	0.011866
machin algorithm	17	0.001787	0.011309
share av	17	0.001787	0.011309
advanc analyt	17	0.001787	0.011309
reduc cost	17	0.001787	0.011309
car share	17	0.001787	0.011309
av rail	17	0.001787	0.011309
new model	16	0.001682	0.010746
blockchain insur	16	0.001682	0.010746
technolog potenti	15	0.001577	0.010176
integr machin	15	0.001577	0.010176

Category 3b

Word	Frequency	Proportion	Entropy Term
data	2296	0.012024	0.053157
compani	2052	0.010746	0.048716
digit	1968	0.010307	0.047152
technolog	1848	0.009678	0.044886
new	1521	0.007966	0.038495
custom	1403	0.007348	0.036102

process	1273	0.006667	0.033405
industri	1179	0.006175	0.031412
busi	1139	0.005965	0.030552
oper	1064	0.005572	0.02892
product	1063	0.005567	0.028898
ai	1059	0.005546	0.02881
manag	1000	0.005237	0.027505
develop	989	0.005179	0.02726
servic	929	0.004865	0.025911
improv	907	0.00475	0.025411
not	862	0.004514	0.02438
system	843	0.004415	0.023941
analyt	842	0.00441	0.023918
cost	837	0.004383	0.023802
model	793	0.004153	0.022775
market	791	0.004143	0.022728
bank	776	0.004064	0.022375
time	760	0.00398	0.021996
autom	756	0.003959	0.021901
provid	716	0.00375	0.020946
work	691	0.003619	0.020344
requir	646	0.003383	0.019247
organ	625	0.003273	0.018729
percent	619	0.003242	0.018581

Pair	Frequency	Proportion	Entropy Term
artifici intellig	265	0.001688	0.010778
advanc analyt	246	0.001567	0.010122
data analyt	193	0.00123	0.008239
busi model	191	0.001217	0.008167
digit technolog	179	0.00114	0.007728
new technolog	175	0.001115	0.00758
machin learn	172	0.001096	0.007469
suppli chain	154	0.000981	0.006796
see exhibit	138	0.000879	0.006186
digit transform	129	0.000822	0.005838
reduc cost	120	0.000764	0.005486
custom experi	114	0.000726	0.005249
oper model	108	0.000688	0.00501
compani digit	103	0.000656	0.004809
decis make	103	0.000656	0.004809
health care	102	0.00065	0.004769
new busi	101	0.000643	0.004728
wai work	100	0.000637	0.004688
product servic	95	0.000605	0.004485
support function	92	0.000586	0.004362
new model	88	0.000561	0.004197
digit tool	87	0.000554	0.004156
autom process	85	0.000542	0.004073
competit advantag	85	0.000542	0.004073
big data	83	0.000529	0.00399
lower cost	83	0.000529	0.00399
busi unit	81	0.000516	0.003906
new wai	73	0.000465	0.003569
ai technolog	70	0.000446	0.003441
data engin	70	0.000446	0.003441

Category 4

Word	Frequency	Proportion	Entropy Term
digit	4360	0.013471	0.058022
compani	4173	0.012893	0.056098
data	3145	0.009717	0.045027
busi	2736	0.008453	0.040349
new	2677	0.008271	0.039659
custom	2663	0.008228	0.039495
technolog	2435	0.007523	0.036787
product	2160	0.006674	0.033432
market	1762	0.005444	0.028381
manag	1719	0.005311	0.027819
not	1704	0.005265	0.027623
develop	1639	0.005064	0.026766
process	1604	0.004956	0.026301
servic	1580	0.004882	0.025981
organ	1486	0.004591	0.024717
work	1449	0.004477	0.024215
model	1341	0.004143	0.022731
industri	1330	0.004109	0.022578
analyt	1298	0.00401	0.022133
time	1253	0.003871	0.021502
oper	1241	0.003834	0.021333
ai	1188	0.00367	0.020582
wai	1134	0.003504	0.019809
creat	1131	0.003494	0.019766
chang	1127	0.003482	0.019709
requir	1124	0.003473	0.019666
invest	1112	0.003436	0.019492
transform	1101	0.003402	0.019333
learn	1096	0.003386	0.019261
cost	1090	0.003368	0.019174

Pair	Frequency	Proportion	Entropy Term
artifici intellig	386	0.001201	0.008075
busi model	376	0.00117	0.007896
digit transform	320	0.000995	0.006881
advanc analyt	318	0.000989	0.006844
data analyt	297	0.000924	0.006455
digit technolog	277	0.000862	0.00608
product servic	275	0.000855	0.006043
new technolog	255	0.000793	0.005663
see exhibit	245	0.000762	0.005472
custom experi	229	0.000712	0.005162
compani digit	228	0.000709	0.005143
machin learn	201	0.000625	0.004613
busi unit	194	0.000603	0.004473
wai work	190	0.000591	0.004393
big data	186	0.000579	0.004313
new busi	183	0.000569	0.004253
custom journei	175	0.000544	0.004091
decis make	171	0.000532	0.00401
new wai	162	0.000504	0.003826
new digit	161	0.000501	0.003806
digit busi	150	0.000467	0.003579

digit tool	147	0.000457	0.003516
oper model	142	0.000442	0.003412
reduc cost	142	0.000442	0.003412
suppli chain	141	0.000439	0.003391
new product	138	0.000429	0.003328
new model	137	0.000426	0.003307
digit compani	136	0.000423	0.003286
build capabl	135	0.00042	0.003265
creat new	126	0.000392	0.003075