



# Leveraging big data for strategic marketing: A dynamic capabilities model for incumbent firms

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## ABSTRACT

Big data can improve the profitability and competitiveness of organisations by extending market knowledge and strategic marketing insight. However, there is a disconnect between the opportunities presented and the readiness of incumbent firms to engage with big data, with consequences for their ability to benefit from it. With many organisations overwhelmed by how to manage and use big data, the paper identifies the dynamic capabilities required to exploit big data for strategic marketing and to improve market responsiveness. Data gathered from in-depth, semi-structured interviews with senior managers from four case study organisations, reveals the five interconnected dynamic capabilities required to leverage value from big data. These capabilities are shown to be part of a sequential 'sensing-reconfiguring-seizing' process, in which the reconfiguring capabilities play a vital role. The findings contribute to dynamic capabilities theory by identifying and mapping the configuration of big data capabilities required to support strategic marketing initiatives. A new Big Data Capabilities Model is developed, which can be used by organisations to guide how they can leverage value from big data.

## 1. Introduction

The global uptake of new technologies, ranging from mobile computing devices to social media platforms and artificial intelligence, is digitally transforming organisations' operating environments. These technologies are underpinned by digitised big data (Verhoef et al., 2021), with the proliferation of data and big data analytics (BDA) bringing considerable opportunities to build market knowledge, identify target markets and gain strategic marketing insights (Quinn et al., 2016). The strategic use of big data has been shown to improve organisations' outputs, productivity levels (Brynjolfsson et al., 2011), performance (Wang et al., 2018) and earnings' growth (Boston Consulting Group, 2020). However, with fewer than half of UK and US firms treating data as a business asset (Whishworks, 2018; Bean and Davenport, 2019) and many incumbent firms<sup>1</sup> failing to exploit the benefits of this new resource (Mithas et al., 2013), there are costly implications for profitability and competitiveness (Stone and Woodcock, 2014). Low levels of engagement with big data are often due to the challenges organisations face in using and generating value from this resource. For

example, acquiring and embedding the necessary specialist expertise to process and analyse big data can be highly disruptive to organisations' existing internal systems and strategic choices (McAfee and Brynjolfsson, 2012; Xu et al., 2016). With a focus on the dynamic capabilities<sup>2</sup> required, this paper sheds light on how organisations can address these challenges to leverage big data's value for strategic marketing.

Several knowledge gaps have been identified concerning how the benefits of big data can be achieved and what incumbent firms need to do to adapt (Rialti et al., 2019). Prior studies have examined the benefits gained from using big data for business process efficiencies, such as through Customer Relationship Management (CRM) or Enterprise Resource Planning (ERP) systems (Matarazzo et al., 2021), and the value provided by BDA in protecting an organisation's market position and how it operates (Aker et al., 2016; Li et al., 2021; Weerasinghe et al., 2021). However, unanswered questions remain about big data's use in marketing (Wamba et al., 2015; Rialti et al., 2019), including: how strategic marketing opportunities are influenced (Quinn et al., 2016); how organisations digitally transform (Warner and Wäger, 2019); what digital marketing capabilities are needed to be successful (Herhausen

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<sup>1</sup> In this study 'incumbent' firms are those established prior to the 1990's when digitised big data became available. Firms set up after this time may be referred to as digitally-born.

<sup>2</sup> Dynamic capabilities are "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, 2007, p.516).

et al., 2020; Homburg and Wielgos, 2022) and how these capabilities can be applied to address strategic marketing problems (Phillips-Wren and Hoskisson, 2015). This paper addresses these gaps, using dynamic capabilities theory to identify the capabilities needed to leverage value from big data, and to improve organisations' market intelligence and responsiveness.

To reveal how big data can be leveraged for strategic marketing, the paper draws on four case studies of incumbent British organisations from fast-moving consumer goods (FMCG), education, automotive and the media sector, all of which have implemented big data initiatives in strategic marketing. Empirical evidence gathered from in-depth, semi-structured, elite interviews<sup>3</sup> leads to several contributions to theory and practice. First, the five dynamic capabilities needed to leverage value from big data used in strategic marketing are identified. Second, the vital role of reconfiguring capabilities in leveraging this value, as part of a sequential 'sensing-reconfiguring-seizing' process, is revealed. Third, a new Big Data Capabilities Model is presented, which provides theoretical insights into how dynamic capabilities categories are inter-related and can be used to guide how organisations can leverage value from big data. The findings contribute to dynamic capabilities theory by identifying and mapping out the configuration of big data capabilities required in strategic marketing. The capabilities that firms, business support organisations and policymakers need to fully engage with big data are also revealed.

The remainder of this paper is organised as follows: Section 2 provides a literature review of strategic marketing, digital transformation and dynamic capabilities in relation to big data. Section 3 explains the research methodology, while Section 4 describes the empirical findings. Section 5 discusses these findings, presents the new model, and highlights the contributions to theory and practice.

## 2. Literature review

Digitised big data underpins the functionality of all digital technologies (Verhoef et al., 2021), through its five 'Vs' of volume, variety, velocity, veracity and value. These characteristics can be managed and analysed to create insights to improve organisations' competitiveness (Wamba et al., 2015), productivity, earnings growth and enterprise value (Boston Consulting Group, 2020). However, the disconnect between big data's potential and organisations' readiness to engage with it (Stone and Woodcock, 2014), can constrain their market responsiveness, limiting potential growth and putting their competitive advantage at risk.

Information systems' scholars have highlighted the benefits of using BDA (e.g., Wang et al., 2018) and big data's ability to improve operational efficiency through enterprise resource planning (ERP) and customer relationship management (CRM) (Matarazzo et al., 2021). However, its role in marketing is less well understood (e.g., see Wamba et al., 2015; Rialti et al., 2019). While some contributions have focused on big data's use in operational marketing (Erevelles et al., 2016; Martin and Murphy, 2017), its application in strategic marketing has received much less attention (Quinn et al., 2016), although some studies have examined its contribution to marketing agility (Sultana et al., 2022) and marketing performance (Gupta et al., 2021).

This knowledge gap is significant and surprising given strategic marketing relies on market intelligence, which can be significantly enhanced through big data on the behaviours and attitudes of customers, competitors and other stakeholders. As shown by firms like Amazon (Napier et al., 2020), such intelligence provides important insights into potential opportunities, targeting priorities and routes to

competitive advantage (Day et al., 1990), and can result in improved strategic decision-making (Wamba et al., 2015) and the development of new offerings (Cheah and Wang, 2017).

### 2.1. Big data and digital transformation

Failure to fully engage with big data can limit organisations' market intelligence, reducing their ability to develop responsive marketing strategies. However, such engagement is not necessarily straightforward, with organisations that lack big data expertise often challenged by a deluge of data that is beyond their capabilities to comprehend and use (Day, 2011). Studies that focus on BDA as a crucial source of 'added value' show that it can protect an organisation's market position and transform the way in which it does business (e.g., Akter et al., 2016; Akhtar et al., 2019). Others have revealed the value of different BDA techniques, such as computational intelligence (Iqbal et al., 2020), vector autoregressive modelling (Liu et al., 2018) and artificial neural networks (Ashaari et al., 2021).

However, the techno-centric emphasis of this literature does not adequately reflect the range of activities required to create actionable insights from big data. These include the need to address managerial issues (McAfee and Brynjolfsson, 2012), organisational agility and creativity (Awan et al., 2021), and to orchestrate strategic choices and the configuration of resources (Xu et al., 2016) in ways that reflect the organisation's purpose and strategy (Blazquez and Domenech, 2018). Taking this broader perspective, BDA is better viewed as a sub-process within the overall process of insight extraction (Sivarajah et al., 2017). Accordingly, the capabilities needed to extract insights from big data to inform strategic marketing are likely to be wider than extant literature suggests.

As technology evolves, organisations encounter new ways to engage with and apply the resulting data (De Langhe and Puntoni, 2020), to improve their market responsiveness (Napier et al., 2020). To leverage this kind of value from big data, Verhoef et al. (2021) encourage incumbent firms to follow a three-stage process to transform how they use digital technologies to create business models of value. The first stage is the digitisation of data into big data, which can enhance market intelligence and stimulate changes to marketing strategy. The second involves digitalising organisational processes, including dismantling existing value chains and initiating more entrepreneurial behaviours (Autio et al., 2018). This digitalisation can lead to new initiatives that allow organisations to test the benefits of big data and their capability to use BDA to process and analyse this new resource. The third stage requires a comprehensive, organisation-wide transformation that drives innovation and develops new business logics to create and capture value (Pagani and Pardo, 2017). These changes involve adapting organisational capabilities, skills, processes and systems to manage complex big data during the digitalisation and digital transformation stages (Warner and Wäger, 2019).

### 2.2. Dynamic capabilities and big data

A dynamic capabilities lens can be used to identify the capabilities organisations need to generate value from big data when undertaking strategic marketing initiatives. This theoretical approach has been used to examine how organisations reconfigure their resource base, processes and structure to undergo strategic change, such as in response to environmental disruption (Eisenhardt and Martin, 2000; Schilke et al., 2018; Teece et al., 1997).

Dynamic capabilities theory provides useful analytical tools to unpack the capabilities and processes needed to leverage value from big data. Through these capabilities organisations can acquire and use resources which are valuable, rare, inimitable and organised (VRIO) (Barney, 2007), creating value by introducing novelty into their resource base (Ambrosini and Bowman, 2009). As a relatively new resource (Gupta and George, 2016), big data exhibits these VRIO

<sup>3</sup> Elite interviews involve those holding senior management or board level positions within organisations where they have "significant decision-making influence within and outside of the firm and therefore present a unique challenge to interview" (Harvey, 2011, p.433).

characteristics; for example, it can be considered ‘rare’ because it is not available to competitors. By bringing together their intangible and tangible resources, organisations can integrate and build the competences needed to address disruptive changes in their operating environment (Mikalef et al., 2020).

Incumbent firms that have strategically prioritised, allocated and ‘exploited’ existing resources to ensure current viability, need to ‘explore’ new digital resources to support their future viability (March, 1991; Gupta et al., 2006). Different ambidextrous strategies can be used to manage the tension between these two approaches (Tushman and O’Reilly, 1996), including: structural ambidexterity, where different parts of the organisation manage the conflicting demands of exploitation and exploration (O’Reilly and Tushman, 2004); temporal ambidexterity, where exploration and exploitation are dealt with at different times (Tushman and O’Reilly, 1996); and contextual ambidexterity, where established processes, systems and contexts enable employees to prioritise and divide their time between conflicting demands (Birkinshaw and Gibson, 2004).

The sensing, seizing and transforming/reconfiguring capabilities in Teece’s dynamic capabilities framework (2007)<sup>4</sup> have been widely applied to explain the sources of organisations’ competitiveness over time. Accordingly, organisations use sensing capabilities to learn about their environment through constant scanning to identify changes in market stability, development opportunities, and internal and external innovations (Katkalo et al., 2010). Big data can make a crucial contribution to this sensing process through providing accurate information on the needs of existing customers (Morgan et al., 2005), market segments (Slater and Narver, 2000) and competitors’ offers and performance (Brynjolfsson et al., 2011; Teece, 2018). This increased knowledge can be used to underpin enhanced business processes and higher performance levels (Brynjolfsson et al., 2011).

Seizing capabilities are important because they involve organisations in undertaking experimental activities in response to environmental changes. Having better market knowledge enables more customer-responsive marketing strategies through data-led changes, such as improved process efficiency, and the implementation of new practices and alliances (Eisenhardt and Martin, 2000; Teece, 2007). These capabilities can generate customer-focused outcomes, including the commercialisation of ideas and processes to develop new products and services (Adler and Shenhar, 1990). Through access to big data, organisations can therefore seize opportunities that might not otherwise be available to them. Examples include developing products in response to customer sentiments on social media or using artificial intelligence to improve service response times.

Reconfiguration, the third dynamic capabilities category (Teece, 2007), involves the continuous strategic renewal of assets and organisation structure, to ensure responsiveness in fast-changing environments (Agarwal and Helfat, 2009). These capabilities facilitate agility and entrepreneurialism, and can drive a more expansive approach to external network building (Day and Schoemaker, 2016). For example, to leverage value from big data, organisations may need to reconfigure their skills base to include the required data science expertise to deliver data analytics (Wamba et al., 2015) or to design more data-led new product development processes (Warner and Wäger, 2019).

Opinions differ about the relative importance of different categories of dynamic capabilities in transforming marketing strategy to improve competitiveness. Helfat and Winter (2011) suggest that a combination of seizing and reconfiguring capabilities make it difficult for competitors to

imitate similar outcomes, while Makadok (2001) views the externally-focused activities involved in sensing and seizing as enabling organisations to address emerging opportunities and threats. Chiu et al. (2006) argue that frequent engagement in sensing and reconfiguring activities can help organisations become more adaptive to their changing environment. However, Eisenhardt and Martin’s (2000) theory of equifinality takes a different view, suggesting that each organisation requires a unique combination of dynamic capabilities that aligns with its specific decisions and investments (see also Schilke et al., 2018).

Although Teece’s (2007) framework provides a useful overview of dynamic capability categories, each is presented separately, without considering the nature of the relationship between the categories. Many other recent studies continue to focus on categories of capabilities - such as sensing, seizing and reconfiguring - in isolation (e.g., Khan et al., 2021; Kump et al., 2019; Wagner et al., 2017). Research examining the inter-relationships between these categories has started to uncover how organisational actions need to work together to effect change (Eisenhardt and Martin, 2000; Di Stefano et al., 2014). Yeow et al. (2018) suggest that dynamic capabilities interact in a process of ‘sensing-reconfiguring-seizing’, where reconfiguration plays a central role in enabling organisations to respond to turbulence in their external environment. Rather than emphasizing the development of independent capabilities for digital transformation, Warner and Wäger (2019) indicate the need for a system of dynamic capabilities that embraces the challenges of engaging with digital technologies and complex big data. This is in line with the work of scholars such as Park and Mithas (2020), who argue a shift away from individual capabilities to configurations of capabilities is needed to understand the complexities of the digital world. If incumbent firms are to capitalise on market opportunities in the digital age, this suggests the development of dynamic capabilities for digital transformation is now a strategic imperative (Warner and Wäger, 2019).

Within the marketing literature, the importance of digital marketing capabilities to organisations has been raised (Verhoef and Bijmolt, 2019), with marketing scholars encouraged to design studies to examine this topic (Moorman and Day, 2016). However, very little research has been undertaken thus far. While highlighting the attention devoted to digital marketing within the marketing literature, Herhausen et al. (2020) identify a gap in understanding of the required competences to apply these approaches effectively. Homburg and Wielgos (2022, p.666) find this shortfall to be “surprising” and identify a similar gap in understanding the capabilities required to support digital transformation in sales research (e.g., Singh et al., 2019). In describing this knowledge gap, Homburg and Wielgos (2022, p.667) further explain that “most [existing] studies ... narrowly examine firm capabilities related to single digital marketing activities (e.g., Nguyen et al., 2015; Trainor et al., 2014; Wang and Kim, 2017) [such that] empirical evidence on whether developing firm capabilities across a broad set of digital marketing activities ... is limited”. Although these authors then explore the relationship between firm performance and a broader set of such activities, the scope of the digital marketing capabilities they consider are focused at an operational, rather than a strategic marketing level. Similar findings emerge from a literature review by Herhausen et al. (2020, p.276) that examined digitalization in industrial firms. Using a resource-based view, the review identified four different types of digital marketing capabilities,<sup>5</sup> which also emphasized operational marketing aspects.

The literature review has highlighted a gap in knowledge concerning the role of big data in strategic marketing and the capabilities organisations need to implement it in this context. Given the organisation-wide

<sup>4</sup> Teece uses the terms reconfiguring (2007) and transformation (2014) to describe the enhancing and combining of an organisation’s intangible and tangible assets. In this paper, the term *reconfiguring* is used rather than *transformation* to avoid confusion with *digital transformation*, which is regarded as how an organisation employs digital technologies to develop a digital business model to create and appropriate more value (Verhoef et al., 2021).

<sup>5</sup> Herhausen et al. (2020, p. 267) identify four capability themes: channels, social media, digital relationships, and digital technologies. Homburg and Wielgos (2022, p.677) identify seven digital marketing capabilities, namely: social media marketing, mobile marketing, content marketing, search engine marketing, web analytics, marketing automation and email marketing.

changes needed to systems and processes to leverage value from big data, the capabilities needed extend beyond BDA, which has been the primary focus in the information systems literature. The next section explains the methods used to identify the dynamic capabilities incumbent firms need to generate value from big data for strategic marketing.

### 3. Methodology

As big data is a contemporary and novel phenomenon (Wamba et al., 2015) and its application in strategic marketing is poorly understood

(Quinn et al., 2016), an exploratory, qualitative case study approach was chosen for this study. Four case studies were analysed, using in-depth, elite interviews to identify the capabilities developed by incumbent firms to use big data to improve their market responsiveness. The Gioia Methodology, which has been widely used to generate robust new theory, guided the data collection and analysis to explore the dynamic capabilities needed to leverage big data for strategic marketing. This methodology involves a five-step “systematic approach to new concept development and grounded theory articulation that is designed to bring ‘qualitative rigor’ to the conduct and presentation of inductive research”

**Table 1**  
An overview of the case study firms and data collection.

Firm	Origins, core purpose and scale	Environmental turbulence	Strategic aim of digital transformation	Big data-led strategic marketing activity	Interview data	Interviewee code and job title
FMCGCo	Established 1920s; 150,000 employees. FMCG company offering 400 branded products in 190 countries.	Unsuccessful hostile takeover in 2017 stimulated a strategy for change.	To increase business efficiency using big data/AI to improve customer experience, e.g., faster delivery of products-to-market.	Repository of global product ‘recipes’ using machine learning to speed up product time-to-market.	2 participants 2 interviews 3.25 h of data	FMCGCo01 02 Project Leader Digital Research and Development Head of Data (R&D)
AutoCo	Established 1940s; 7000 staff. UK-based physical and digital vehicle marketplace, operating across Europe.	UK stock exchange flotation led to greater emphasis on meeting stakeholder and customer expectations.	To support supply chain using app-based technology to share vehicle data, to improve vehicle sales and profitability.	Vehicle pricing app used across supply chain and commoditised as business-to-consumer product.	1 participant 2 interviews 3.5 h of data	AutoCo01 Head of Business Insight
EducationCo	Fast growing, modern university. 4000 staff, supporting 29,000 learners, across 4 campuses.	Intense competition from traditional institutions and providers of digital learning products.	To create single student data repository to improve internal efficiency and enhance services, e.g. increased student retention.	Student data repository to drive for data-led product developments.	14 participants 14 interviews 19 h of data	EducationCo01 02 03 04 05 06 07 08 09 10 11 12 13 14 Head of Strategy Manager Business Intelligence Project (BIP) Vice Chancellor (Director) Teaching and Learning Quality and Accreditation Manager Associate Dean Recruitment and Marketing (1) Dean PGR studies Associate Dean Recruitment and Marketing (2) Admissions Manager Academic Data Manager Data Insight and Compliance Manager Data Insight Manager Head of School Associate Dean Recruitment and Marketing (3) Associate Dean Recruitment and Marketing (4)
MediaCo	Top twenty British media company; 5000 employees. Expanded from newspaper origins into digital media in 2016.	Consumer shift to digital media channels and competition from digital platform providers supplying news free of charge.	To launch online local news, information and community platform using data from regional content, e.g., on health, crime, property.	Creation of online products, e.g., news sites, blogs, social networks, combined with open-source data.	4 participants 4 interviews 9.25 h of data	MediaCo01 02 03 04 Managing Director Chief Innovation Officer Director of Innovation Head of (digital) Product Development
					22 interviews 35 h of data	

(Gioia et al., 2012, p.15).

### 3.1. Case study method

Case study method can be used to develop theory, by enabling intensive, in-depth research of a phenomenon in context (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 2014). This approach has proven suitable in studies requiring rich insights into digital transformation (e.g., Hadjielias et al., 2021). In this instance, the method was deemed appropriate to explore the capabilities needed to leverage big data in real-time (Runfola et al., 2017) and in a real-world organisational context (Yin, 2018).

A collective case study approach was used (Stake, 2005), in which multiple cases were studied simultaneously, with a view to gaining a broad appreciation of how organisations developed capabilities to leverage value from big data to support their strategic marketing. Using multiple data sources allowed the drawing together of rich data (Eisenhardt and Graebner, 2007; Gillham, 2000), offering both methodological and source triangulation.

The case studies were used to capture a variety of managers' experiences of the phenomenon through "thorough descriptions of actual actions in real-life contexts" (Gephart, 2004, p.455). The comparison of similarities and differences across the cases provided explanations and linkages that informed inductive theory building (Eisenhardt and Graebner, 2007) and revealed the capabilities required to leverage value from big data. In-depth interviews were chosen as the primary data source because they are a powerful tool for capturing insiders' perspectives of the phenomenon (Moisander et al., 2009, p.333) and provided a "targeted, insightful and highly efficient means by which to collect rich, empirical data" (De Massis and Kotlar, 2014, p.19).

### 3.2. Participant recruitment

Data were collected from four large, British companies, each well established in its respective sector. All had recently implemented a big data initiative in strategic marketing. To maintain the focus on a common phenomenon (Stewart, 2012), these strategic marketing initiatives became the unit of analysis for the study, so that the organisations' different approaches to delivering them could be uncovered (see Table 1, column 5, big data-led strategic marketing activity).

A purposive sampling strategy was used to identify organisations that could provide rich perspectives on the phenomenon under investigation (Yin, 2018). Large organisations were considered more likely to invest in the human and physical capital needed for capability development. British organisations were chosen because they have been shown to lack engagement with big data (Whishworks, 2018). Organisations were identified through marketing conferences, social media coverage or were known to the researchers through their business networks. All shortlisted organisations exemplified the case phenomenon, having recently implemented a big data initiative for strategic marketing purposes. To strengthen the emergent theory by including variance and divergence in the data (Yin, 2018), the case study organisations were drawn from a range of B2B and B2C sectors: fast-moving consumer goods (FMCGCo), automotive retail (AutoCo), education (EducationCo) and news media (MediaCo).

Ten organisations were shortlisted, and senior managers in four of these organisations agreed to take part in initial interviews. These contacts then facilitated further access to other via a snowballing approach, generating twenty-two elite interviews with knowledgeable managers. This process of identifying initial senior manager interviewees and using snowballing to facilitate interview access, was valuable in helping overcome potential trust and ethical concerns (Bell et al., 2019). Table 1 provides an overview of the case study organisations and the data collection.

### 3.3. Elite interview data

As strategic marketing decisions are made at a senior level in organisations, elite interviews were deemed an appropriate method of data collection. The data were gathered through face-to-face interviews. Senior executives from each company were interviewed in locations convenient to them, generally at their workplace, at either end of the business day. Interviews were typically 90–120 min long (See Table 1 for interview and interviewee details).

A semi-structured format and a conversational style were adopted, using open-ended and supplementary questions to encourage interviewees to speak freely and generate rich descriptions of the phenomenon. The following issues were considered: the types, uses and analysis of big data; the competences, resources and capabilities involved in using the data in strategic marketing activities (see Appendix A). When the interviewee had no more information to add, the interviewer moved onto the next question to ensure the discussion flowed smoothly between topics. Interviews were recorded and later transcribed with the transcripts anonymised to protect personal and commercial sensitivity. These recordings were supplemented with contemporaneous interviewer notes, to capture points of emphasis. Thirty-five hours of interview data were generated,

Supplementary data sources were also used; these included notes taken from attending two project meetings at EducationCo and corporate documents, diagrams and weblinks provided by interviewees from all of the case study organisations. This additional material provided background information on the organisations and the big data initiative they were implementing, informed the questions asked, helped to contextualise the interview data, assisted in interpreting it and in drawing conclusions.

### 3.4. Data analysis

Data were analysed using the Gioia Methodology (Gioia et al., 2012) which uses "voices of experience" on a focal phenomenon to provide the grounding for new inductive theory. A seven-step approach was used, adding two steps to the original Gioia approach to enable a more thorough distillation of the categories within the data-to-theory process (the additional steps are denoted by asterisks in Fig. 1).

At each step of the analysis, the data were distilled and categorised, leading to a data structure that represented the aggregation of interviewee contributions. Following the Gioia Methodology, the interviewees' own terms and verbal expressions were retained throughout the analytical process, ensuring their choice of words was evident in the emergent data structure (see Table 2). Finally, the data structure was contextualised in relation to the information systems, management and marketing literatures, showing the data-to-theory connections and the inter-relational dynamics (see Discussion, Fig. 2). The result is a cross-case synthesis of the cases (Yin, 2018) rather than a comparison between the organisations' activities.

### 3.5. Ensuring methodological rigor and trustworthiness

An advantage of the case study theory-building process is that it aligns closely to empirical evidence, ensuring that the resulting theory is highly plausible (Eisenhardt, 1989). Using the Gioia Methodology also brings scientific rigor to the case study research (e.g., Crowe et al., 2011), through a systematic approach more commonly associated with quantitative, scientific research (Gioia et al., 2012).

Rather than starting the research with a formal, theoretical framework, the study drew on the interviewees' experiences of their organisations' big data initiatives (Yin, 2014). These knowledgeable agents all had experience of leveraging big data for use in strategic marketing. All were interviewed on the same topic, enabling validation of the findings through synchronic primary data triangulation (Pauwels and Matthyssens, 2004).

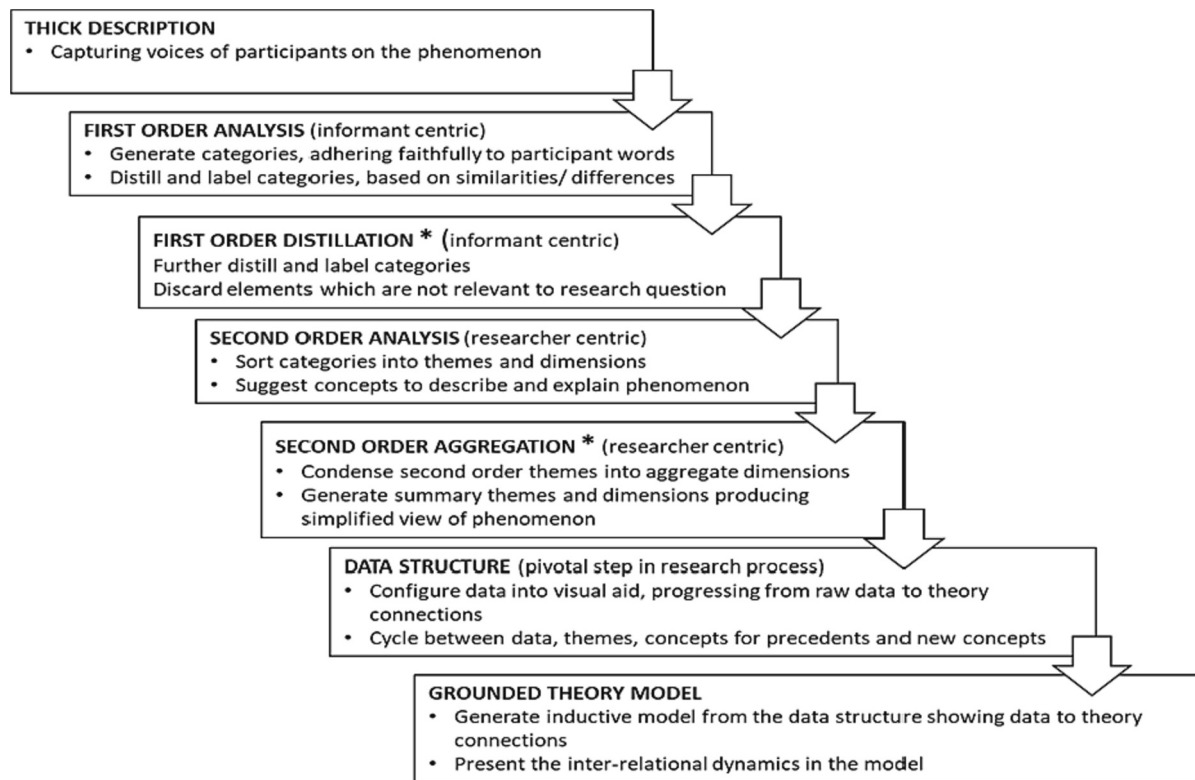


Fig. 1. The Gioia Methodology data-to-theory process.  
(Source: Adapted from Gioia et al., 2012)

In line with the research question, the analysis generated robust aggregate dimensions, in the form of five big data-driven dynamic capabilities. All five capabilities were identified by at least one interviewee from each of the case study organisations, indicating that data saturation had been achieved (O'Reilly and Parker, 2013<sup>6</sup>). Each interview then introduced new examples of how the organisations built their capabilities.

In the next section the findings are explained in relation to the dynamic capabilities the analysis revealed.

#### 4. Findings

The data analysis identified five dynamic capabilities used to leverage value from big data (see Table 2): engaging with a new resource; straddling legacy and tech; constructing an expert team; applied technological thinking; and data-driven decision-making. Illustrative verbatim interview quotes are used to reveal how each dynamic capability was constructed through lower order capabilities and to show that these capabilities are interconnected, rather than independent of each other.

##### 4.1. Engaging with a new resource

The case study organisations were engaging with the new, big data resource to deliver strategic marketing initiatives, with a view to maintaining their competitiveness in a technologically turbulent operating environment. The interviewees described the organisations as “under siege” (MediaCo01); with “product margins under fire”

<sup>6</sup> Saturation does not refer to the point at which no new ideas emerge, but rather means that categories are fully accounted for, the variability between them are explained and the relationships between them are tested and validated and thus a theory can emerge (O'Reilly and Parker, 2013).

(FMCGCo01) and “product income being dramatically eroded” (MediaCo01). Horizon scanning was highlighting threats, such as e-commerce, from new, unregulated, global players (FMCGCo01); digital supply of products and digital advertising (MediaCo01); and data-led competitors (EducationCo08). The interviewees described a sense of urgency in taking up the new resource; as FMCGCo's Product Leader for Digital R&D noted; “our ability to respond quickly is even more critical”. Two of the ways that the organisations engaged with the new resource were by ‘exploring big data-led market intelligence’ and ‘stimulating business transformation’, both of which were important to their strategic marketing.

##### 4.1.1. Exploring big data-led market intelligence

The organisations sought to increase their market responsiveness by improving their market intelligence. As AutoCo's Head of Business Insight commented: “One of the things that sets you aside is your level of knowledge of what is going on in the industry and keeping ahead of others”. Similarly, EducationCo's Associate Dean of Recruitment and Marketing described looking to see whether “an opportunity has arisen that we might be able to capitalise on”.

One interviewee described improving the organisation's knowledge through the increased level of detail available from big data-led, business intelligence projects:

We just didn't have this line of information at this level of granularity. Whereas we can look at, very easily look at, this particular course. Who are our main competitors? Are we low or high end? This has driven massive change ... (EducationCo08)

This improved market intelligence then stimulated different approaches to their strategic marketing planning as they used data, rather than intuition, to change their “portfolio to focus on where audience potential is, rather on the legacy footprint” (MediaCo01). Having proactively decided to engage with big data in this way, the interviewees acknowledged the value of the new resource: “big data is absolutely an asset - our project is

**Table 2**  
The data structure.

Examples of participant quotations	First order categories	Second order categories (Lower order capabilities)	Aggregate dimensions (Dynamic capabilities)
<i>One of the things that sets you aside is your level of knowledge of what is going on in the industry and keeping ahead of others.</i> (AutoCo01)	Market intelligence	Exploring big data-led marketing intelligence	Engaging with a new resource
<i>Friction which doesn't exist when the business is stable. It is difficult to achieve transformation with stability and without friction.</i> (MediaCo02)	Benefit of friction	Stimulating business transformation	
<i>The whole funding structure is completely different. It's entirely the opposite approach to the legacy business approach.</i> (MediaCo03)	Difference in funding structure	Accommodating opposing business models	Straddling legacy and tech
<i>It's a leadership issue, whether to optimise existing assets or create a future-driving business. How transformative the firm is willing to be, to replace one business with another.</i> (MediaCo02)	Strategic decision-making	Strategic leadership	
<i>Our external partners are more modernised and have more advanced skills and data scientist capability.</i> (FMCGCo01)	Partners advanced skills	Collaboration	Constructing an expert team
<i>They were targeted to launch a product in one month to users. They proved it could be done. Also it didn't have to be perfect – it had to be live.</i> (MediaCo02)	Product experimentation	Intrepreneurship and experimentation	
<i>You need Board-level interest in doing something with the data and systems. That's where strategists come in – What do we need to do? What do we need to know? How do we find out? You need organisations to prioritise asking those questions.</i> (AutoCo01)	Asking strategic questions of data	Connecting data and strategy	Applied technological thinking

**Table 2 (continued)**

Examples of participant quotations	First order categories	Second order categories (Lower order capabilities)	Aggregate dimensions (Dynamic capabilities)
<i>But one of the things with insights and the predictive analysis is that you start to find things that you weren't expecting to find, and you are looking then at patterns. Let's see what happens if you change this or how can I link these bits of data – is there anything I can link between these two areas? Is there a pattern. If I add information to it, does that create a new pattern?</i> (AutoCo01)	Looking for patterns in data	Innovative problem solving	
<i>Using different forms of big data, particularly social data for identifying consumer trends and behaviour, and anticipating product opportunities based on consumer behaviour.</i> (FMCGCo02)	Using consumer data behaviour	Responding to new customer knowledge	Data-driven decision-making
<i>Once you have defined the algorithm you simply switch it on, your growth is unbounded, scale is unbounded.</i> (MediaCo03)	Digital scale product development	Data-driven product development	

enabling us to exploit our asset” (EducationCo01).

4.1.2. Stimulating transformation

Interviewees explained the implications for their organisations of big data's five 'V' characteristics in relation to technology, software, investment, and skills gaps, such that big data “disrupt (ed) the entire business” (MediaCo04). One Head of Product Development spoke of their organisation's reluctance to accommodate the radical organisational changes needed to secure value from big data, which could render them less responsive to environmental turbulence and more vulnerable to data-led competitors. He went on to suggest that organisations could reduce the business impact and weather the disruption, if they really understood the comprehensive nature of big data:

If you understand that your data informs every angle, opportunity and user, and you understand the changes in your marketplace, you can reduce the impact of the paradigm shift on the business. (MediaC04)

EducationCo's Vice Chancellor also indicated that the kind of disruption resulting from big data was welcome:

I just have this picture of, you know, the King Canute sitting on the beach trying to push the tide back. It's like actually embrace the tide and let's see what power it can bring to us. (EducationCo03)

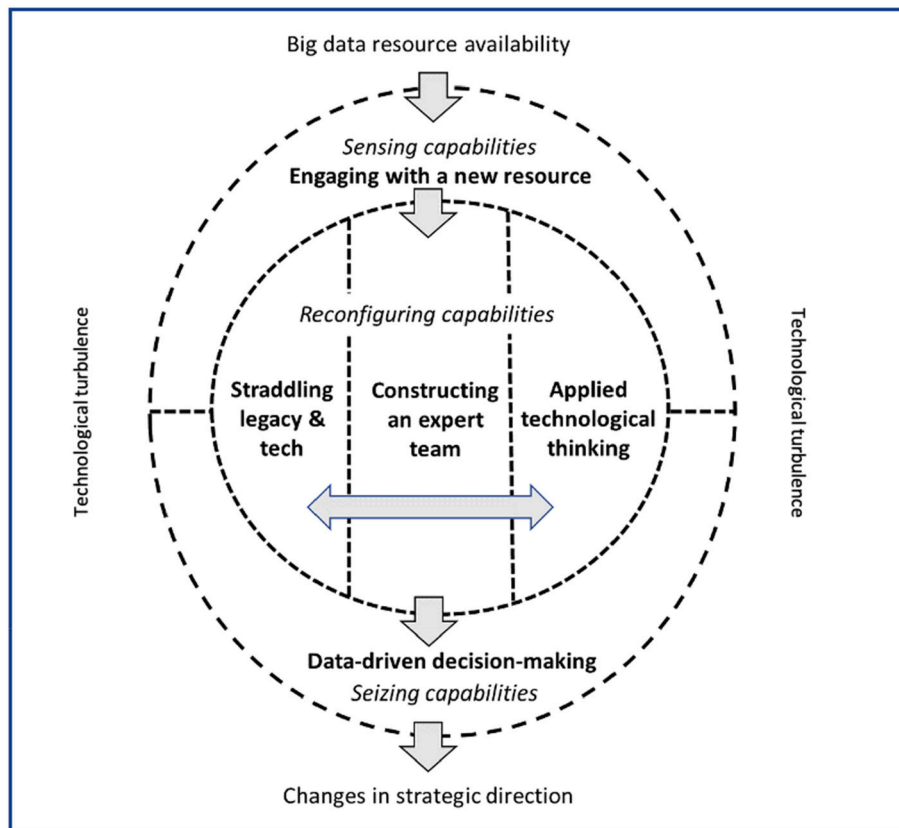


Fig. 2. The Big Data Capabilities Model.

At the same time, introducing this disruptive resource could produce “friction which doesn’t exist when the business is stable. It is difficult to achieve transformation with stability and without friction” (MediaCo02). This suggested that engaging with big data could provide a catalyst for business transformation and potentially assist organisations in overcoming organisational rigidities, such as inertia or complacency.

#### 4.2. Straddling legacy and tech

Interviewees reported particular challenges in improving market responsiveness when using the big data resource. They found it necessary to balance the exploration of novel, big-data-related opportunities with the exploitation of their existing business operations. This dual focus is referred to in the dynamic capabilities literature as ambidexterity (Duncan, 1976). Achieving this balance could be challenging, as one MediaCo04 interviewee observed; “it is difficult when you straddle a mode, between legacy and tech”. Initially this duality could be navigated using internally-held data in small, phased projects. This involved exploiting existing processes and resources in ways that allowed the organisations’ senior managers to engage the Board with big data’s potential, thus building confidence that investing in the resource was worthwhile. Interviewees recalled how achieving stakeholder buy-in led to greater investment in external data sources and a willingness on the part of the Board to engage in new collaborations. The process of implementing this new ambidextrous capability involved the organisations in ‘accommodating opposing business models’ and applying overt ‘strategic leadership’, as described below.

##### 4.2.1. Accommodating opposing business models

The ability to respond to the changing market could be constrained by the organisations’ established business infrastructure. Where technology-led organisations might be able to secure funding from venture capitalists, the incumbent case study firms relied on traditional

bank overdrafts and were often accommodating financial burdens, such as pension fund obligations. As one interviewee explained:

The whole funding structure is completely different. It’s entirely the opposite approach to the legacy business approach. The Board and shareholders are used to a growth scale which increases in a linear way, rather than a model where you have 0 % value in year 1, which increases to 400 % by year 3. It’s typically a very different financial model. (MediaCo03).

The Board and investors often had unrealistic expectations of swift returns from data-led innovations; “the firm has to invest in data lakes and data warehouses ... but the infrastructure ... can take a year” (MediaCo04). The Managing Director of the traditional news business used a football analogy to explain the combination of legacy and tech contributions to the organisation’s strategy. He presented the data-led digital division as the “glory boys”, “attacking” new market opportunities and delivering the differential strategy, whilst the traditional business “defends” the existing market position, and secures the cost leadership strategy.

##### 4.2.2. Strategic leadership

Some interviewees described the crucial role of the Board in directing the organisations’ market responsiveness: “It’s a leadership issue, whether to optimise existing assets or create a future-driving business. How transformative the firm is willing to be, to replace one business with another” (MediaCo02). Leveraging value from big data often required radical changes in the organisations’ infrastructure which needed the Board to commit and champion big data use, and to provide “strategic clarity” (MediaCo02) that the organisation was embracing data-led change. As AutoCo’s Head of Business Insight observed: “That’s why a lot of companies never get to the point where they start to look at what they need to do, unless there is someone at the top saying we need to do this”.

The transition to organisation-wide engagement with big data therefore took time and was challenging because as one project leader

acknowledged: “We were asking them to move from comfy slippers to running shoes” (EducationCo01).

#### 4.3. Constructing an expert team

While big data might be viewed as a purely technological domain, the skills needed to leverage value from big data and improve market responsiveness were not limited to technical skills such as data analytics. Instead, a triumvirate of expertise was needed that included data science, understanding of technological infrastructure and knowledge of the organisation’s market and industry (Alvarez, 2016). The global demand for this new skill base has resulted in talent shortages (McAfee and Brynjolfsson, 2012), requiring companies to find creative ways to develop new capabilities. Some organisations had responded by recruiting polymaths with expertise in the three areas, through “making strong hires” from the big data-led brands (MediaCo02). Targeting these sorts of firms provided quality assurance for the recruits’ technical data handling capabilities:

We are hiring ‘Google capability’ talent – it’s an attractive company with a super solid hiring bar. Picking people from Google therefore guarantees specific tech strengths; they are culturally geeky. (MediaCo02).

However, unintended consequences sometimes arose concerning the fit of these recruits, as the same interviewee observed: “... they have other shortcomings – put them into a legacy business in a transformative situation and you get friction and problems” (MediaCo02). Other organisations sought to construct their expert team by addressing skills gaps through ‘collaboration’ and greater ‘intreprenurship and experimentation’, as described below.

##### 4.3.1. Collaboration

EducationCo’s Head of Marketing and Recruitment explained that the “holy grail” was to bring together knowledge of data science, technological infrastructure and business intelligence, to drive and direct business decisions and secure competitive advantage. For some organisations, such as FMCGCo, this required the introduction of more technical skills:

We have been working with a group of people from analytics, statistics and maths, and more recently have added skills in computer programming and computation. (FMCGCo01)

For other interviewees, optimising the value of the data involved integrating in-house business knowledge into the technical team: “you need to have a certain level of understanding of the market and the industry in order to be able to know where you need to get to and what the benefits are” (AutoCo01).

In all cases, the importance of inter-functional co-ordination in securing the necessary breadth of skills, viewpoint and functional expertise was emphasized. This co-ordination involved marketing, technology, finance and other functions collaborating in the organisation-wide generation of market intelligence (Gresham et al., 2006). One interviewee explained how involving these different business functions was considered to enhance knowledge exchange:

There are areas of business I understand that others don’t. There are areas of business others understand that I haven’t got a clue about. And having that conversation ... that’s a really good conversation to have. (EducationCo10)

Resolving capability gaps, particularly in technical areas, led the organisations to establish contractual and partnership relationships with unconventional external partners, such as microfirms, which were: “more modernised and have more advanced skills and data scientist capability” (FMCGCo01). However, defining clear contractual terms and outcomes could be difficult in the fast-evolving data field. Relying on more flexible partnerships or project-based, contractual relationships

could help provide the necessary agility, as MediaCo’s Managing Director commented:

We are buying in software design and analytical skills... They have a project-related contract with the company. This type of relationship gives us short-term agility and it allows for failure.

##### 4.3.2. Intreprenurship and experimentation

To improve their market responsiveness, the organisations became more intreprenurial, exhibiting more experimental and innovative behaviours. Firms can be considered intreprenurial when employees are given greater freedom and support to create new products and services, systems and processes, without following the organisation’s usual routines or protocols (Bosma et al., 2010). For example, MediaCo’s Chief Innovation Officer described the organisation’s people-based changes, such as the recruitment of an “*entrepreneur in residence*”, who was tasked with identifying radical new, data-led, product development from existing resources and new partnerships. The organisation also established an in-house “*product experimentation team*”, bringing together key personnel to get new products to market on short timescales. “They were targeted to launch a product in one month to users. They proved it could be done. Also, it didn’t have to be perfect – it had to be live...” (MediaCo02). The focus for this experimental team was to increase organisational agility, market responsiveness and speed-to-market, whilst acknowledging the need for post-launch revision of the newly developed products.

#### 4.4. Applied technological thinking

BDA is often discussed in conjunction with big data because it is the most observable activity involved in generating added value from it (Côte-Real et al., 2014). However, rather than emphasizing BDA, the interviewees stressed the importance of applying the data to the organisation’s strategy to improve market responsiveness and add value. The term *applied technological thinking* was used by MediaCo’s Chief Innovation Officer to encapsulate the kind of value-creating activities that other interviewees also described. This term has not previously been used in the literature and is more holistic in scope than BDA. Whereas BDA can provide organisations with “*the ability to see things that we wouldn’t expect to see*” (EducationCo03), applied technological thinking concerns the alignment of data to organisational strategy, to answer questions such as: “*What do we want to do? What information do we need?*” (MediaCo04), and to “*make the most of data assets*” (EducationCo01). According to MediaCo’s Chief Innovation Officer, “*Firms need applied technological thinking – if it’s missing, you can’t deliver*”. Two of the approaches used by the organisations in relation to applied technological thinking were through ‘connecting data and strategy’ and ‘innovative problem solving’, as described below.

##### 4.4.1. Connecting data and strategy

The findings indicate that BDA at an operational level has the potential to improve operational performance or the organisation’s knowledge of customers. However, for big data to inform strategic decisions, alignment was required between the data and the organisation’s strategy:

You need Board-level interest in doing something with the data and systems. That’s where strategists come in – What do we need to do? What do we need to know? How do we find out? You need organisations to prioritise asking those questions. (AutoCo01).

As well as involving a top-down commitment to aligning data and strategy, there was a view that big data “*needs to be part of an organisation’s workflow DNA, not only part of its culture*” (MediaCo04). Interviewees spoke about the need for an operational focus on the purpose of the data, the information required from it and to understand how the two would deliver the firm’s strategic aims. One interviewee described

this process as “chicken and egg”:

...you need some sort of overriding concept of what you are trying to achieve... You also need to understand what's in there...kind of chicken and egg. Giving me a dump of today's data and let me look at it and then, 'ok, now I understand what's out there', and the question I need to ask, or query I need to write, or filters I need to apply to get what I am interested in. (AutoCo01)

#### 4.4.2. Innovative problem solving

Many of those interviewed had previously used traditional approaches to solving problems, which started with an issue or question and then sought the data to address it. Using big data pooled in data lakes enabled a more innovative approach to problem solving, involving looking for patterns in the data:

Because with a lot of things, you can start off with an idea or a question and go away and find the data for it. But one of the things with insights and the predictive analysis is that you start to find things that you weren't expecting to find, and you are looking then at patterns. You are looking at 'blue sky'; let's see what happens if you change this, or how can I link these bits of data – is there anything I can link between these two areas? Is there a pattern? If I add information to it, does that create a new pattern? (AutoCo01)

EducationCo's Vice Chancellor commented on the opportunities that arose from this data aggregation: “*We don't know what patterns we'll see that we don't know exist ... until we see it together... then we have the ability to see things that we wouldn't expect to see*”. Having successfully addressed their business intelligence problem by capturing “*a single version of the truth*” (EducationCo01), the strategy team was able to look for patterns in the pooled student data. Consequently, they were able to use big data as the basis for a pilot project to increase student retention.

...so we have an algorithm that sits behind student data that brings together and creates an engagement score. For the students who are deemed to be least engaged in a course, compared to their cohort, we'd call them and say, Are you okay? Can we help? Is something going wrong? (EducationCo03)

This data-led intervention resulted in significant improvements in coursework marks in the pilot group and informed more effective targeting of support, leading to better service provision to support students.

#### 4.5. Data-driven decision-making

The organisations used their capabilities in data-driven decision-making to draw on big data insights to deliver new products, services, systems and processes, in response to market changes. EducationCo's Dean described their use of big data analytics as helping them to: “*...find the insight that would direct and drive business decisions*” (EducationCo05). Describing how greater agility and market responsiveness would result from using big data, one interviewee commented that: “*using different forms of big data, particularly social data for identifying consumer trends and behaviour, and anticipating product opportunities based on consumer behaviour*” (FMCGCo02). The descriptions of their organisations' data-driven decision-making involved ‘responding to new customer and market knowledge’ and the adoption of ‘data-driven product development’, as described below.

##### 4.5.1. Responding to new customer and market knowledge

Big data can provide organisations with rich insights into customers and their behaviour, which can enable the development of innovative solutions that are better able to meet customer needs. According to interviewees, a range of operational-level benefits arose from the use of big data, including achieving greater innovation in customer recruitment, enhanced customer retention, improved customer experience, altered market positioning, and more customer-centric operational

marketing decision-making. For example, FMCGCo focused on data analytics for “*better insights on consumers and why they like the properties of the product*”, with the result that “*we can optimise product and the packaging*”. (FMCGCo02). An interviewee from MediaCo spoke about the potential for big data to support forecasting, explaining how they had developed:

...a future forecast model for sales, based on real computation. Previously forecasts were based on historical data. This year we have built a statistical machine-learned model, to make finance more accurate and make decisions based on that. We won't be looking through foggy glasses. (MediaCo04)

At the strategic level, the greater customer and market knowledge that had been achieved led to the generation of new income streams through the commercialisation of proprietary data. MediaCo used this type of commercialisation to commoditise their news content by “*... engaging in content partnerships with global partners wanting a UK foothold*” (MediaCo02). EducationCo interviewees had also investigated the commoditisation of intellectual content in conjunction with global, digital delivery partners that could bring complimentary technical and distribution competences, such as Amazon and Apple. Data commoditisation offered a step-change in market positioning for these organisations. For example, AutoCo had commoditised their data management system and big data content by establishing an online business aimed at retail customers, in addition to their mainstream business-to-business service offering.

##### 4.5.2. Data-driven product development

According to the interviewees, big data-driven decision-making had changed their organisations' business processes in ways which increased their agility. The benefits included being able to respond to customers and changing markets “*in a more timely way, because we can identify problems and actions ahead of time*” (EducationCo07). As mentioned above, EducationCo used their big data repository to support an early-intervention student retention project. Students at risk of failing or withdrawing from their course were identified by correlating their registration data, record of falling attendance and reducing assessment scores. Those identified as being ‘at risk’, were then telephoned:

...to see whether after the call, they become more engaged or not. The really interesting thing is it shows very clearly ... there are several hundred students who are now on course who would historically not have been. (EducationCo03)

Although the speed of market responsiveness improved following such changes, several new product development attempts could be required. Interviewees acknowledged that not all of these attempts would be successful, as MediaCo's Head of Digital Product Development explained:

The challenge for legacy businesses is the difference in speed of decision-making. We accept that there will be failures - we call it ‘fail fast’... making many, low value mistakes quickly to get the best understanding of what works.

As well as getting products to market faster, the big data-led approach highlighted the potential of ‘digital scale’ product development.

There is almost a light bulb moment that happens in a digital company that doesn't happen in a traditional company. It's to do with scale... is this idea one which has true digital scale? What that means is, is that idea bounded by physical limitations in order to scale it? (MediaCo03)

The development of ‘digital scale’ is reliant on algorithms, which are applied to larger or different datasets, to expand the product scale or make the product available to a different market (Swaminathan and Meffert, 2017). “*Once you have defined the algorithm you simply switch it on, your growth is unbounded, scale is unbounded*” (MediaCo03). Engaging

in fail fast or digital scale approaches to big data-driven product development was considered to enhance the organisations' agility, enabling them to seize new market opportunities.

## 5. Discussion

The findings highlighted two key areas of contribution. First, the study has identified five dynamic capabilities developed by the case study organisations to leverage value from big data to improve market responsiveness. Second, the relationship between the capabilities, and the sequence in which they were applied, has been explored, with important implications for organisations' abilities to leverage value from the data to inform strategic marketing.

### 5.1. Big data capabilities

The findings indicate that the four case study organisations used five dynamic capabilities to leverage value from big data in their strategic marketing. The big data capabilities align with Teece's (2007) sensing, reconfiguring and seizing dynamic capability categories (see Fig. 2). The interviewees described:

- Engaging with a new resource in the form of big data (sensing)
- Straddling legacy and tech in exploring new markets and exploiting their existing position (reconfiguring)
- Constructing expert teams in scarce conditions (reconfiguring)
- Applying technological thinking to ensure the data connected with the organisation's strategy (reconfiguring)
- Data-driven decision-making capabilities (seizing) to respond to strategic market opportunities.

The findings provide details of the microfoundations the organisations used in constructing their dynamic capabilities (Nonaka et al., 2016). Although the five capabilities were implemented within all of the organisations, each did so according to its own strategy, resources and existing market position. This finding aligns with Eisenhardt and Martin's (2000) theory of equifinality, which proposes that the way firms practice dynamic capabilities differs, since these capabilities are path dependent and subject to organisational inertia and commitment.

The findings position the sensing capability, 'Engaging with a new resource', at the interface between the organisation and the technologically turbulent operating environment. Destabilisation resulting from turbulence increases the significance of sensing changes within the operating environment, and the likelihood of using big data to maintain the organisation's competitiveness. The case study organisations appeared to leverage value from the big data resource to improve their market intelligence and identify new development opportunities. Engaging with big data alerted them to new trends and market opportunities, to the growth potential of market segments, customer behaviours and product development opportunities, all of which could inform their marketing strategy (Dibb et al., 2019). Organisations also used internally-curated big data to establish a more accurate perspective of their own market position. These insights stimulated business transformation, assisting them in overcoming organisational rigidities that had resulted from inertia and past strategic choices.

The findings place the three reconfiguration capabilities at the centre of a Big Data Capabilities Model. The capabilities are central to the realignment, renewal and redesign of organisations' internal processes and activities (Agarwal and Helfat, 2009) needed to leverage value from big data. The 'straddling legacy and tech' dynamic capability, which was shown to be vital to the digital transformation of these incumbent firms, has not previously been described in the literature. Straddling legacy and tech requires the adoption various techniques that balance the exploitation of existing resources with the exploration of new data resources.

Concepts highlighted in the ambidexterity literature also emerge in

the findings. For example, conflicting demands were managed through structural ambidexterity (O'Reilly and Tushman, 2004), by allocating different activities to different business functions; and through temporal ambidexterity, where long periods of incremental data exploitation were punctuated with significant strategic, big data exploration projects. The organisations also applied contextual ambidexterity (Birkinshaw and Gibson, 2004), where decision-making was delegated through the organisations' structures and routines, giving individual employees autonomy to make judgements to meet conflicting demands. A novel form of ambidexterity, which is described as expert team ambidexterity, involved engaging experts in cross-functional project teams to focus either on exploration or exploitation activities, depending on the organisation's strategic priorities. The cross-functional team approach reduced risk and stakeholder resistance, providing traction for wider big data engagement. The strategic choices made for straddling legacy and tech were dependent on the Board and stakeholders' willingness to transform, as well as to prioritise existing assets and investment in the resources, capabilities and systems required to create a data-driven business.

The findings related to 'constructing an expert team' support previous evidence suggesting that data-related skills are in short supply (McAfee and Brynjolfsson, 2012), with key personnel in high demand and likely to move jobs frequently. As a result, employment relationships were relatively unstable, and the organisations often sought novel solutions to address capability gaps, such as collaborating with technical micro-businesses or establishing partnerships with suppliers and competitors (Jagadish et al., 2014). An entrepreneurial mind-set was in evidence, increasing the organisations' agility, flexibility and experimentation, as reflected in data-led new product development and innovative process redesign. The use of short-term, cross-functional expert teams, including contracted partners, helped to stabilise the skills base and optimise in-house expertise (Day and Schoemaker, 2016).

The 'applied technological thinking' dynamic capability, which was essential to the alignment of big data with business strategy, has also not previously been described in the literature. The value added by big data has mainly been discussed in relation to the potential of BDA (Aker et al., 2016; Akhtar et al., 2019), as studied in contexts ranging from healthcare (e.g., Weerasinghe et al., 2021) to agriculture (Li et al., 2021), and from the circular economy (Awan et al., 2021) to emerging markets (Shamin et al., 2020). However, the findings reported here suggest that organisations should take a more holistic view, using applied technological thinking to assimilate big data, aligning the data with the organisation's strategy, and converting it into an asset that adds value. In addition to BDA, applied technological thinking has been shown to involve activities that include defining the organisation's data objectives, identifying customers or users by their data records, selecting data sources and data forms, supporting data preparation and management, as well as identifying the required processes and software for BDA. These findings reinforce the view of BDA as a lower order capability (Sivarajah et al., 2017) which may be a function of information systems, rather than a multi-disciplinary capability. By aligning BDA with the organisation's strategy, insights that can drive better, more focused, strategic decision-making are secured.

The fifth dynamic capability, 'Data-driven decision-making', was applied at the interface between the organisation that had reconfigured to assimilate big data and its external operating environment. This positioning enabled the insights gained from big data to inform strategic marketing decisions. The incumbent case study organisations emulated digitally-born firms in adopting novel approaches to product development (Adler and Shenhar, 1990), albeit with significantly different expectations of the likely short-term returns. Data-driven decision-making was used to leverage value from big data (Awan et al., 2021; Shamin et al., 2020), using fail fast and digital scale product development to increase the organisations' agility in responding to market changes and opportunities. The organisations were shown to make strategic marketing choices which capitalised on big data's VRIO characteristics

(Barney, 2007) and were difficult for competitors to emulate. For example, EducationCo planned to distribute their proprietary learning content to new international markets through alliances with digital-distribution experts, such as Amazon.

### 5.2. The relationship between the big data capabilities

A new conceptual model - the Big Data Capabilities Model - has been developed, in which the connections between the five dynamic capabilities and the sensing, reconfiguring and seizing categories are shown (see Fig. 2).

The model shows the organisation existing within a technologically turbulent operating environment, where big data is available as a potential resource. To leverage value from big data to inform its strategic marketing, it indicates the organisation must apply sensing, reconfiguring and seizing capabilities in a sequential order. This process should start with the organisation utilising sensing capabilities that enable it to engage with the big data. Next, the reconfiguring capabilities should be developed to assimilate the data. All three reconfiguring capabilities evident in the findings, must be utilised, to engage fully with the data. Once the organisation has adapted to engage with big data, it can apply seizing capabilities which enable insights from it to be used to inform changes in strategic direction.

In contrast to much of the extant literature that considers categories of capabilities in isolation from each other (e.g., Khan et al., 2021; Kump et al., 2019; Wagner et al., 2017), this study has explored the inter-relationships between sensing, seizing and reconfiguring capabilities. This leads to three important observations on the sequence of capabilities. Firstly, extant literature tends to identify Teece's (2007) dynamic capabilities categories as occurring in the order: sensing-seizing-reconfiguring. Recent studies relating to digital technologies, such as Yeow et al. (2018), have positioned 'reconfiguring' at the centre of this process, reflecting the need for the organisation to respond to changes in its external environment as well as to internal tensions. The findings in the study reported here, support this sequential 'sensing-reconfiguring-seizing' configuration of dynamic capabilities in this digital context. This sequence is shown in the model using vertical arrows.

Secondly, the findings highlight the significance of reconfiguring capabilities for incumbent firms engaging with big data. Three reconfiguring capabilities, which occur simultaneously and relate to one another, are revealed. For example, the capability 'applied technological thinking' requires the organisation to have 'construct(ed) an expert team'. This relationship is shown in the model by a horizontal arrow.

Thirdly, the findings indicate that the reconfiguring capabilities must be in place prior to the organisation seizing new opportunities through data-driven decision-making. The mediating role played by internal reconfiguration within the organisation's marketing strategy is revealed; it enables the conversion of sensing activities (such as spotting marketing and development opportunities) into the seizing of opportunities (e.g., supported by a capability in data-driven decision-making). This finding contrasts with extant research (Helfat and Winter, 2011; Makadok, 2001; Chiu et al., 2006) which emphasises other categories as more significant in improving organisations' competitiveness.

The paper has drawn on empirical evidence to identify the dynamic capabilities that incumbent firms require to leverage value from big data for strategic marketing. It has also evidenced vertical and horizontal relationships between the capabilities that affect the sequence in which the capabilities should be applied. Both findings have implications for theory and practice.

### 5.3. Implications for theory

This paper makes the following contributions to management theory. Firstly, it addresses the shortfall in marketing literature investigating the effect of advanced technologies and data proliferation on strategic

marketing opportunities (Quinn et al., 2016) and the capabilities required for digital transformation (Herhausen et al., 2020; Homburg and Wielgos, 2022). It does so by revealing the five specific dynamic capabilities required to leverage value from big data for strategic marketing.

The Big Data Capabilities (BDC) Model presents the five capabilities in relation to extant dynamic capabilities theory (Teece, 2007, 2018). Two of these capabilities, 'straddling legacy and tech' and 'applied technological thinking', have not previously been identified. The BDC Model reveals a sequential relationship between the 'sensing-reconfiguring-seizing' dynamic capabilities categories proposed in Teece's (2007) work. This is important because it suggests that to maximise the benefits of big data, organisations need to identify and build interconnections between dynamic capabilities instead of developing capabilities in isolation. This sequential relationship enhances dynamic capabilities theory by giving credence to the works of Yeow et al. (2018) and Warner and Wäger (2019), which argue that an interconnected relationship exists between dynamic capabilities. Moreover, it supports arguments in the extant literature that favour shifting attention from individual capabilities toward configurations of capabilities, to gain a better understanding of the complexities of adapting strategy in a digital context (e.g. Park and Mithas, 2020). In configurational approaches, the conditions that indicate an outcome - such as user behaviours - are regarded as configurations of interrelated structures, rather than as entities to be examined in isolation (Pappas and Woodside, 2021). In particular, future research adopting approaches based on fuzzy sets can allow researchers to gain deeper and richer insight into their data (Ragin, 2009; Park and Mithas, 2020; Pappas and Woodside, 2021).

While previous studies have emphasized the importance of sensing and seizing capabilities, or combinations of capabilities in value creation (Chiu et al., 2006; Helfat and Winter, 2011; Makadok, 2001), the BDC Model highlights the crucial role played by reconfiguring capabilities in leveraging value from big data.

### 5.4. Implications for practice

This research was stimulated by evidence suggesting that despite the availability and potential of big data, organisations were resisting engagement (Stone and Woodcock, 2014), thus risking detrimental effects to their competitiveness. Current practitioner literature (e.g., McKinsey, 2021) indicates the continuing debate on achieving the benefits of data and analytics in business strategy, addressing topics such as the need for organisations to acquire new capabilities in improved decision-making and anticipate complex market dynamics. The BDC Model provides a visual tool to help practitioners identify and explain the inter-related dynamic capabilities needed to leverage value from big data. To improve business competitiveness, the model shows that big data requires organisation-wide engagement and is not limited to information systems activities. Furthermore, the model shows the importance of factors that are specific to incumbent businesses. These include the capability to exploit legacy business, while simultaneously exploring new technologies, which require different kinds of resourcing and support than is used by digitally-born firms. The BDC Model will also have a useful role in informing Board and stakeholder decision-making about strategic and resourcing priorities.

In addition, the research offers exemplars from case organisations' experience of how big data capabilities can be constructed. Insights into the construction of capabilities could provide the basis for a question-based audit tool to assess organisational readiness to use big data strategically and make recommendations for development. The practices highlighted by the case study organisations, such as using cross-team working to bring together disparate skills to resolve a data-related problem, provide examples managers could use when seeking solutions to optimise their data skills. The insights into using experimental teams and fast fail techniques, offer clues about whether an existing product development process is suitable for digital product

development. Taken together, the BDC Model and the supporting research findings provide a set of practical resources for managers, the organisation's stakeholders, business support organisations and policy-makers, to help overcome organisational resistance to engaging with big data.

### 5.5. Limitations and future research

Adopting a systematic methodology for data collection and analysis meant that research limitations were addressed throughout the research process. Two potential limitations were the variation in type of organisation and number of interviewees per organisation. Three firms were from the private sector, while EducationCo was a not-for-profit organisation run on a commercial basis. As the phenomenon under scrutiny related to the implementation of a big data initiative, the legal/financial status of the organisations was not considered a limitation. The variation in the number of interviewees for each case organisation was addressed by having a common unit of analysis centred on a specific strategic marketing initiative and by using cross-case analysis of the participating organisations' activities.

Future research could test the validity of the BDC Model through a large-scale quantitative study drawing on a more extensive sample from across sectors. Another avenue would be to investigate how organisations construct the five capabilities, with reference to microfoundations and mesofoundations theory, as this would address gaps in the extant dynamic capabilities literature (Nonaka et al., 2016). Finally, further research could investigate whether the sequential and interconnected relationship between capabilities from the BDC model is evident in other contexts.

New technologies, underpinned by big data, continue to grow apace. The opportunities for organisations to improve output, productivity levels and earnings growth by building on the exponential growth in big data, emphasises the importance of continued research in this area.

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### Declaration of competing interest

The authors have no competing interests to declare.

### Data availability

The authors do not have permission to share data.

### Appendix A. Interview protocol

This document was used to guide the semi-structured interviews.

#### 1. Project background

- Participants will be given a verbal explanation of the project, its background and aims.
- Interview timing of up to 1½ hours will be identified.
- Permission to record will be requested, as per email brief; participant consent may be withdrawn at any time.
- Confirmation of the anonymisation of the data will be provided.

- Confirmation will be given that the interviewee will be given a copy of the research findings.
- Consent form will be signed.

#### 2. Interviewee background

- Interviewee role in the organisation; time with the firm; background / experience in data / Big Data.
- Interviewee involvement with data / Big Data and customer relationship projects.
- What does Big Data mean to you? (to generate a description of what Big Data is, from the participants perspective)
- Identify an example of a significant strategic customer relationship project using Big Data or discussion in more detail on a project outlined within their Marketing Conference paper.

#### 3. Forms of big data being used

*In relation to the customer relationship project identified:*

- What data does the firm collect? External/ traditional / Big Data / internal?
- How are the data / insight used?
- Questions relating to the chosen project

#### 4. How is big data used?

- Who specifies the purpose and the data to be used?
- What is the process for transforming the data into marketing action?
- What and how are the data analytics carried out?
- What actions result from the analytics?

#### 5. Who is involved in the big data initiative?

- CEO involvement?
- Representation of business functions?
- In house or contracted? Role of partners?

#### 6. Capabilities for using big data in strategic marketing initiatives?

How do you adapt, bring together and reconfigure the firm's resources (skills, investment) to use the data to deliver the project? *Minimal prompting.* Where necessary prompting could include:

- Integrating resources e.g., *combining skills / functions or pooling expertise*
- Reconfiguring resources e.g., *copying/transferring resources in the firm or distributing scarce resources or collaborating for new resource*
- Gaining new resources e.g., *knowledge creation or alliance and acquisition routines*
- Releasing resources e.g., *jettisoning resource combinations*

#### 7. Thank you for your time

- Confirmation of the timescales for the research and completion of the report.
- Confirmation regarding consent and withdrawal from the research.
- Any questions from the interviewee?
- Identify other research participants within the organisation.

*Ends.*

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