

**Data Strategies for Global Value Chains: Hybridization of Small and Big Data in the  
Aftermath of COVID-19**

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**Declarations**

**Funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Conflicts of interest/Competing interests:** None

Accepted for Publication in  
*Journal of Business Research*

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#### Abstract

Senior executives must make strategic decisions on (re)configuring global value chains (GVCs) in a post-COVID-19 world, with digital technologies playing a decisive role in enabling decision-making on both the reconfigurations and their implementation. Against this backdrop, the paper explores in depth how executives can leverage and combine big and small data analytics into their GVC (re-)configuration decisions. We draw on a longitudinal single-case study of an analytics firm supporting decision makers in agri-food GVCs, enriched through multiple interviews with experts from the industry. Our analysis reveals an interesting shift towards hybrid data strategies combining big and small data to arrive at new forms of decision-making processes after the outbreak of COVID-19. Through this hybridization, executives aim to improve their understanding of GVCs as well as their own agility and flexibility in decision-making to ensure GVC resilience and efficiency.

**Keywords:** global value chain; small data analytics; big data analytics; decision making; uncertainty; agri-food.

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#### 1. Introduction

The global value chain (GVC) framework is well established in research explaining how multinational enterprises (MNEs) and other firms come together across geographies in efficiently delivering products and services (Gereffi, 1994; Gereffi, Humphrey, & Sturgeon, 2005). Based on a finer slicing and dispersion of value chain activities across the globe, an increasing focus on core competencies, conducive institutional contexts, and advanced technologies, GVCs rapidly gained significance for organizations until recently (Kano, Tsang, & Yeung, 2020; McWilliam, Kim, Mudambi, & Nielsen, 2020). However, even before the COVID-19 pandemic struck, there were signs of changes to GVCs due to digitalization, environmental developments, and rising socio-political concerns (De Marchi, Di Maria, Golini, & Perri, 2020; Kano et al., 2020). The disruptions caused by the pandemic only exacerbated the need to review and reconfigure GVCs, revisiting their structure and governance (Kano & Oh, 2020; Strange, 2020) and exploring their resilience (Gölgeci, Yildiz, & Andersson, 2020; Miroudot, 2020). Given the co-evolution of GVCs within dynamically changing institutional contexts (McWilliam et al., 2020), executives of leading MNEs must take ex-ante steps to continuously account for changing environmental conditions and adapt GVCs ex-post by altering control or location decisions among others (Buckley, 2011; Buckley, Craig, & Mudambi, 2019).

In this regard, there is a need for deeper understanding on how executives make these decisions and on how investments in digitalization might help to improve them (Kano & Oh, 2020; Kano et al., 2020; McWilliam et al., 2020; Verbeke, 2020). Access to data and the ability to process information is crucial in ensuring the effectiveness of strategic decisions (Galbraith, 1973; Moser, Kuklinski, & Srivastava, 2017). Technological advancements have led to substantial

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progress in the capacity to collect, store, communicate, and process data globally (Akter, Michael, Uddin, McCarthy, & Rahman, 2020; van Knippenberg, Dahlander, Haas, & George, 2015). To this end, there has been increasing scholarly attention to the role of big data analytics in supporting strategic decision-making (Côte-Real, Ruivo, Oliveira, & Popovič, 2019; Sivarajah, Kamal, Irani, & Weerakkody, 2017; Yasmin, Tatoglu, Kilic, Zaim, & Delen, 2020), which is matched by a slowly growing interest in applications of small data (Fahey, 2019; Nielsen & Lund, 2019; Wilson & Daugherty, 2020). In this paper, we assess and interpret the usage of small and big data analytics as an input to the strategic decision-making of executives regarding the configurations of their GVCs.

Against this background, this paper explores the changing role of big and small data in strategic GVC decision-making in dynamic environments. Specifically, we examine the evolution of data strategies during COVID-19 to infer their use in post-COVID-19 GVCs. The purpose of this paper is to develop a better understanding of how executives leverage big and especially small data analytics when making GVC decisions and how this has been impacted by COVID-19. Further, we seek insights on how this plays a role in helping to improve the resilience and efficiency of GVC configurations. For this, we have adopted a qualitative methodology, longitudinally studying the evolution of data strategies of customers at DataIntel, a firm specializing in providing data analytics and intelligence for decision makers in agri-food GVCs among others. Further, we contextualize and enrich these findings by drawing on multiple interviews with executives at lead and participant GVC firms.

Analyzing the collected information reveals how much the executives relied on big and small data analytics respectively before and during the pandemic, and how they are equipping themselves to deal with disruptions in a post-COVID-19 world. We find that hybrid data strategies, combining big and small data analytics in decision-making models, are of critical importance in re-configuring GVCs for a post-COVID-19 world. Further, our research

indicates that such data strategies help executives secure resilience and ensure efficiency in their GVCs by increasing their visibility across the value chain, enabling them to be decide and act more agile.

The next section reviews three relevant streams of literature by using the lens of decision making - GVCs, agri-food GVCs, and data analytics. Subsequently, we present the case of DataIntel. Based on the case findings, we develop propositions on long-term big and small data strategies for strategic GVC decision-making. We conclude the paper with a discussion on the research and practice implications of the study results, its limitations, and suggestions for future research.

### **2. Conceptual background**

Mintzberg (1977) proposed that strategy can be seen as a pattern in a stream of decisions. Adopting a decision-based view of strategy in the past, scholars found that the comprehensiveness of strategic decisions could positively affect organizational performance in stable environments, but this relationship turns negative in unstable environments (Fredrickson, 1984; Fredrickson & Mitchell, 1984). This has been explained through the bounded rationality of individual decision-makers (Simon, 1972, 1991) and the limits on the information processing capacities of organizations (Egelhoff, 1991; Galbraith, 1973). Given that comprehensive decisions based on objective analyses can help companies to be more successful (Bettis-Outland, 2012), recent research suggests that executives must reflect on their contextual decision-making challenges, master the ability to use multiple strategy frameworks, draw on diverse information sources, and be cognizant of the various potential biases in decision-making (Moser, Rengarajan, & Narayanamurthy, 2021; Rengarajan, Moser, & Narayanamurthy, 2021). Such an approach helps executives address these challenges while making strategic decisions on their GVCs.

Building on this perspective, this section synthesizes extant academic literature on GVCs to identify major uncertainties and ambiguities faced by executives and the resulting decision-making challenges. We then review recent advances made in the fields of data analytics in aiding strategic decision-making, and aspects specific to the research context of agri-food GVCs. This helps us identify and define the research gaps.

### *2.1. GVCs and decision-making*

While early GVC literature explored commodity chains (Gereffi & Korzeniewicz, 1994), it has evolved to study value chains with production activities across geographies (Gereffi et al., 2005). Building on research in fields including economic sociology and international economics, researchers have explored the various dimensions of GVCs including their input-output structure, geographical scope, governance, upgrading of peripheral participants, and institutional contexts (Fernandez-Stark & Gereffi, 2019). There has also been increasing attention from international business scholars on the topic as evidenced by recent literature reviews (De Marchi et al., 2020; Kano et al., 2020; McWilliam et al., 2020). The focus of these studies have however largely been on governance of GVCs with limited attention to strategies of the firms in them (Pananond, Gereffi, & Pedersen, 2020).

Executives leading the firms in GVCs have to make strategic decisions regarding how much, how long, and where individual activities in the chain are assigned (Buckley et al., 2019; Yeung & Coe, 2015). Traditional GVC literature takes a systemic, but static, view on explaining these governance aspects (Pananond et al., 2020). However, given the dynamics in institutional contexts (Ahlstrom et al., 2020), these decisions need to be revisited continuously in response to external disruptions to have a corresponding strategic fit (Buckley, 2011; Liesch, Buckley, Simonin, & Knight, 2012; Verbeke & Kano, 2016). In fact, flexible ex-ante and ex-post adaptations of control-location combinations to continuously capture value through cost

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reductions and capability development is a core competence of successful lead firms in GVCs (Buckley et al., 2019; Liesch et al., 2012).

While the focus of GVC scholars before COVID-19 was on the economic practices of lead firms, there was much lesser attention to the risks and vulnerabilities involved in GVCs (Gereffi, 2020; Gereffi & Lee, 2016). Black swan events like the COVID-19 pandemic put a sharper focus on how executives make strategic decisions in highly uncertain environments (Sharma, Leung, Kingshott, Davcik, & Cardinali, 2020). In addition to helping executives deal with such uncertainty, agility and flexibility in decisions aid in improving the resilience of GVC firms by helping them absorb unforeseen external shocks (Buckley et al., 2019; Haarhaus & Liening, 2020; Sharma, Adhikary, & Borah, 2020). In this regard, the pandemic has provided the latest impulse for firms to revisit their GVC location and control decisions (Donthu & Gustafsson, 2020; Strange, 2020) and improving their resilience with minimal loss of efficiency in the long term in a post-COVID-19 world (Gölgeci & Kuivalainen, 2020; Gölgeci et al., 2020; Miroudot, 2020).

Recent commentaries on the impact and implications of the pandemic on GVCs have identified some important themes which need to be investigated from a strategic decision-making perspective (Gereffi, 2020; Pananond et al., 2020). For one, firms need to clearly identify the concrete issues, risks, and uncertainties they face (Miroudot, 2020). Further, responding to the disruption requires firms to economize on their changed bounded rationality and bounded reliability challenges in an entrepreneurial way (Kano & Oh, 2020). This is a direct consequence of the lack of information and visibility across the value chain, exacerbated in cases of lower reliance on relational governance mechanisms. Thus, it is important to explore how GVC participants make strategic decisions under uncertainty and the correlated investments in boosting their intelligence (Kano & Oh, 2020; Verbeke, 2020). This relates to improving risk assessment activities and building foresight to improve resilience in case of

future disruptions (Haarhaus & Lienen, 2020; Strange, 2020), while making minimal use of available resources to attain maximum benefits (Gölgeci et al., 2020).

### *2.2. Decision-making in agri-food GVCs*

Agri-food chains are truly global and have been extensively studied in GVC literature (De Marchi et al., 2020). Decision-makers in agri-food GVCs must contend with various risks (e.g. supply and demand, financial, logistics and infrastructure, environmental, climate) and uncertainties regarding management, operations, policies, and regulation (Sharma, Shishodia, Kamble, Gunasekaran, & Belhadi, 2020). These risks and uncertainties are becoming increasingly critical due to the volatile conditions faced by agricultural systems and can lead to ineffective and inefficient decision-making processes (Hernández & Kacprzyk, 2021). These challenges are further exacerbated by short-term disruptions like the COVID-19 pandemic and long-term effects like climate change (Alemany et al., 2021; Dong, 2021; Sharma et al., 2020). The pandemic specifically has highlighted the need to identify susceptibilities and vulnerabilities in the GVC configurations and improving their resilience (FAO, 2020; Morton, 2020). To find the right responses and strategies to cope with these challenges, scholars and practitioners are collaborating across and adopting knowledge from various sectors (Hernández & Kacprzyk, 2021).

These dynamics have been pushing agri-food GVCs towards a paradigm shift, away from industrial agriculture to resilience-focused and eco-friendly chains leveraging the advancements in data analytics and digitalization to innovate their business models (Dong, 2021). Agriculture is increasingly digitalized in facets ranging from machinery to agribusiness decision-making systems (Panetto, Lezoche, Hernandez Hormazabal, del Mar Eva Alemany Diaz, & Kacprzyk, 2020). Scholars have explored applications of various technologies including blockchains (Zhao et al., 2019), big data analytics (Belaud, Prioux, Vialle, & Sablayrolles, 2019; Nagendra, Narayanamurthy, & Moser, 2020) internet of things (Moser et



al., 2021), and Industry 4.0 (Sharma et al., 2020). This unlocks potential to increase efficiency, productivity, and sustainability on one hand, but also increases the complexity in the system on the other (Panetto et al., 2020). Further, subjective perceptions of GVC players, organizational and managerial capabilities, and environmental factors constrain full-scale adoption of such advancements (Annosi, Brunetta, Monti, & Nat, 2019).

While precisely understanding and defining the uncertainties faced is key to developing the right decision models (Alemany et al., 2021; Moser et al., 2021), it is equally important to manage information sharing and integration of small data and (tacit) knowledge across the GVC. Scholars recognize the need for collaborative decision-making approaches which embed various stakeholders in a participative solution generation process (Hernandez et al., 2017; Liu, Moizer, Megicks, Kasturiratne, & Jayawickrama, 2014). In doing so, decision-support tools can not only help them make decisions based on the data generated from individual fields, but also account for system-level interdependencies of subsequent decisions of GVC participants (Dong, 2021). This underscores the need to study the applications of big and small data analytics as a part of decision-making models and processes in agri-food GVCs.

### *2.3. Data analytics in decision-making*

Information processing theory posits that organizations must strive to achieve a fit between their information requirements and their information processing capacities to make better decisions (Egelhoff, 1991; Galbraith, 1973; Moser et al., 2017; Tushman & Nadler, 1978). Achieving this fit is increasingly difficult in a new normal characterized by increasing uncertainties, disruptions, and dynamics leading to exacerbated information requirements (Ahlstrom et al., 2020; Bennett & Lemoine, 2014). However, the advances made in information and communication technologies provide firms with access to immense volume and variety of data, as well as the capacity to store and process it (van Knippenberg et al., 2015). This led to burgeoning research on the applications of big data analytics and advanced algorithms to

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complement traditional information processing methods (Akter et al., 2020; Fosso Wamba, Akter, Edwards, Chopin, & Gnanzou, 2015; Sivarajah et al., 2017; Yasmin et al., 2020).

Concurrently, scholars have also identified potential barriers in leveraging such approaches (Matthias, Fouweather, Gregory, & Vernon, 2017). Unprecedented disruptions, such as the COVID-19 pandemic, imply that only limited insights may be derived from available past data (Craighead, Ketchen, & Darby, 2020). Without access to the right data, firms risk making poor decisions based on inappropriate or low quality data, wasting scarce organizational resources in the process (Fosso Wamba et al., 2015; Wessel, 2016). Further, an ex-ante understanding the context and clarity on the problems faced is necessary (Moser et al., 2021), which enables human intelligence to extract the right insights based on coordination and domain knowledge (Trunk, Birkel, & Hartmann, 2020). This is also crucial for training big data analytic models and advanced algorithms (Wilson & Daugherty, 2020).

From a microfoundations perspective, the information processing capacity of a firm is an aggregation of the information processing capacities of its individuals despite the developments in big data approaches at a firm and network level (Corner, Kinicki, & Keats, 1994; Turner & Makhija, 2012). At this level of analysis, there is increasing interest in the concept of small data – the tiny clues and bits of information that individuals can comprehend, understand in a given business context, and draw decision-relevant insights from without being cognitively overloaded (Fahey, 2019; Nielsen & Lund, 2019). With a greater focus on understanding than on prediction, small data is characterized by being fine-grained and actionable for individuals (Bonde, 2013; Lam, Sleep, Hennig-Thurau, Sridhar, & Saboo, 2017; Saklani, 2017). While big data approaches can reveal correlations, small data aids in understanding underlying causations (Lindstrom, 2016; Nielsen & Lund, 2019). Further, small data approaches help executives get acquainted with data analytics and become successful in implementing a culture conducive to leveraging digitalization (Redman & Hoerl, 2019).

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While there are many sources for gathering small data, it is especially important to emphasize the role of interpersonal networks and relationships as informal institutions that provide access to information in dynamic and uncertain environments (Meyer & Peng, 2005; Peng & Luo, 2000). Such small data accessed from individual networks is a part of the executives' social capital (Adler & Kwon, 2002; Burt, 1992; Coleman, 1988), the role of which has been extensively investigated in contexts such as supply chain resilience (Gölgeci & Kuivalainen, 2020; Johnson, Elliott, & Drake, 2013; Polyviou, Croxton, & Knemeyer, 2019). While leveraging informal institutions was perceived to be cost-intensive in the past (Meyer, Estrin, Bhaumik, & Peng, 2009), information and communication technologies have significantly lowered barriers and enabled easier and faster access to insights embedded in networks and relationships (Fletcher-Brown, Turnbull, Viglia, Chen, & Pereira, 2021; Cartwright, Davies, & Archer-Brown, 2021; Cheng & Shiu, 2020). Finally, small data can be aggregated at scale to generate big data sets for analytics (Rengarajan, Moser, Tillessen, Narayanamurthy, & Reddy, 2021).

### *2.4. Research gaps*

The review clearly reveals that scholars have stressed the need to study GVCs from a strategic perspective, evaluating how firms cope with their decision-making challenges when facing dynamic and uncertain environments. In such situations, it is critical to understand how executives gather and leverage data analytics to address these challenges while (re)configuring GVCs for a post-COVID-19 world. Taking agri-food GVCs as the specific research context, this study specifically investigates the role of data strategies to this end with a view towards sustaining resilience and efficiency in GVCs.

## **3. Methodology**

The following subsections elucidate the methods adopted to achieve the purpose of this research. We outline our methodological choices, followed by an explanation of the research

context in terms of industry and organization focus. We then shed light on our data collection and analysis.

### *3.1. Research design*

Qualitative research methods involving case studies are widely used to investigate contemporary and complex phenomenon (Meredith, 1998). The COVID-19 pandemic has not been a short exogenous shock to GVCs, but rather a global disruption with multiple waves spread across regions and time. To study the resulting complexity and uncertainty over time and given the lack of past empirical work investigating the impact of these dynamics on GVC decision-making, we chose an in-depth, longitudinal single-case study approach (Eisenhardt, 1989; Pettigrew, 1990). This allowed us to closely study the nuances in “how” and “why” the data strategies and decision-making approaches of executives evolved (Eisenhardt & Graebner, 2007; Jarzabkowski & Balogun, 2009; Yin, 2003). Synthesizing these findings by drawing on extant literature and by applying multiple theoretical lenses allowed for theory triangulation and extends the internal validity of the study (Gibbert, Ruigrok, & Wicki, 2008).

Though case study methodologies enable significant contextual sensitivity, the high degree of dynamics induced by the pandemic and the resulting cognitive load on executives and financial strain on companies severely constrains data collection efforts for academic researchers. Hence, we opted against a multiple case study approach. Instead, external validity was addressed by extending the data collection efforts beyond the case organization (Gibbert et al., 2008). To this end, we gathered insights and perspectives from executive decision-makers at GVC firms across industry sectors and geographies, including potential clients of the focal case organization. Integrating the different perspectives gathered from these firms and leveraging multiple data sources also allowed us to triangulate our findings, thereby enhancing construct validity (Gibbert & Ruigrok, 2010; Gibbert et al., 2008; Meredith, 1998) and facilitated a strong corroboration of the developed propositions (Eisenhardt, 1989). Finally, drawing on the views

and experiences of practitioners also aided in increasing managerial relevance (Gibbert et al., 2008).

### *3.2. Research context*

Typical players in agri-food GVCs include large retailers, small to large scale farmers, seed and fertilizer companies, supported by logistics, warehousing, distribution, and processing organizations, as well as firms providing data analytics support for strategic decisions and operations (Sgarbossa & Russo, 2017; Sharma et al., 2020). With technology advancements driving agri-food GVCs towards a digitalized and data-driven business environment, there are already examples of successful decision support systems in agri-food GVCs (Mondino & Gonzalez-Andujar, 2019). Despite this, how information system innovations help agri-food GVCs gather important information or evaluate solutions alternatives is an active research field, with current software applications often lacking functionalities and not integrating all stakeholders in collaborative development (Urbieta, Firmenich, Zaraté, & Fernandez, 2021). Supply chain visibility and resources are key for developing data analytics capabilities and improving GVC performance (Kamble, Gunasekaran, & Gawankar, 2020), be it capturing small data from individual farmers (Antonelli et al., 2021) or integrating big data from sources such as satellite imagery (Nagendra et al., 2020). This underscores the need to investigate the evolving data strategies being employed by decision-makers in agri-food GVCs.

Given this paper's focus, we selected DataIntel as case organization, a firm providing data analytics support to strategic decision-makers in agri-food GVCs. DataIntel was founded in 2015 as a startup leveraging a unique intelligence creation platform commercializing data towards solving problems at the nexus of sustainability in food, water, and energy security among others. To achieve this, it built proprietary decision-support models and machine learning algorithms by combining traditional agriculture, weather, socioeconomic, and market data with innovative sources like satellite remote sensing, IoT, and drone imagery, to deliver

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near real-time, location-specific insights. DataIntel offers a portfolio of solutions to decision-makers spanning risk estimation and insurance, production and acreage estimates, agriculture banking, customer needs and sales intelligence, food processing, supply chain visibility, and regulatory policy development. With operations in Europe, Asia, and Australia, DataIntel supports data-driven strategic decisions at a variety of GVC firms spread globally. Thus, the choice of DataIntel as a case organization provides an outside-in view across different GVCs instead of a narrow view into a single organization (even if it is the lead firm/orchestrator of a GVC).

DataIntel has been globally recognized as a key player in its sector by various industry and media publications and has received several awards from governments, international banks and global think tanks. Throughout our research, correspondents in the broader industry ecosystem repeatedly confirmed that DataIntel was a key player in its sector, further justifying the choice of case organization as a source for in-depth insights (Dyer & Wilkins, 1991). Longitudinal data access was another important reason for selecting DataIntel as case company, allowing for a transparent observation of the progress made within such a single-case organization (Pettigrew, 1990) and its provision of big and small data to its customers to make strategic decisions on their GVCs. The authors have had many interactions and closely observed the growth of DataIntel since its inception. This provided a deep understanding of and insights into the firm and its data strategies prior to the COVID-19 pandemic and how it served its customers with these insights. The relationship nurtured over time with executives at DataIntel was used to unobtrusively study the organization and the evolution of its analytics capabilities during the pandemic as well as its support to clients in the agri-food sector.

### *3.3. Data collection & analysis*

#### *3.3.1. Study Phases*

The data collection and analysis were organized in four phases (Leone, Schiavone, Appio, & Chiao, 2021). The first phase comprised on retrospectively collecting information from DataIntel (Miller, Cardinal, & Glick, 1997; Reficco, Layrisse, & Barrios, 2021), once the initial disruptions at the onset pandemic had been managed by the firm and the executives had time and cognitive capacity to engage with the research team. This entailed establishing a baseline of how DataIntel was offering analytics support to companies managing GVCs in the agriculture sector based on their archival documents and interviews. The second and third phases of data collection have been conducted during the pandemic. The second phase focused on observing how the data strategies evolved in real-time, contextualized and enriched through regular discussions with DataIntel executives. The third phase entailed collecting data from lead firms and extended GVC participants through interviews with various executives including potential clients of DataIntel. The fourth phase comprised of continuously triangulating the data being collected in the other three phases with documents accessed from DataIntel as well as publicly available information on the impact of the pandemic on agri-food GVCs in media publications and reports.

#### *3.3.2. Data sources & collection*

The research aggregated various information sources. The primary data collection was through participatory observations at DataIntel (Becker, 1958; Spradley, 1980). One of the researchers had been embedded in the organization since its inception and had an in-depth understanding into its operations before the pandemic and real-time insight into the changes during the pandemic. This embedded approach helped circumvent the risk of incomplete information sharing by the respondents (Becker & Geer, 1957), especially since the stress of dealing with the pandemic exacerbated this risk.

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In addition, the research team engaged in multiple rounds of interactions with the top management team of DataIntel between December 2019 and January 2021, tracking its evolution over the course of the pandemic and its reorientation and preparation for a post-COVID-19 world. In this period, a total of 29 interactions were held, with at least two sessions scheduled each month, each lasting between 30 and 45 minutes. Out of the 29 interactions, 11 were held before the outbreak of COVID-19, five were held immediately after the outbreak of COVID-19 when tight restrictions were in place, and the remaining 13 were held when the restrictions imposed after the outbreak of COVID-19 were starting to be relaxed. The number of interactions immediately after the outbreak of COVID-19 is less when compared to other stages because the firm had other pressing priorities to cater to in that period. To ensure all the important insights were captured, we asked the team to retrospectively answer any left out questions on the stage immediately after the outbreak of COVID-19 in the interactions that happened after the restrictions were starting to be relaxed. At least two of the executives were present in each of these exchanges, and shared insights into the decision challenges faced by DataIntel's clients and its implications on the company's data strategies. Care was taken to ensure that the researchers only observed and documented these developments, without interfering or influencing executive's responses. Thus interviewing multiple executives on "how" and "why" questions across hierarchy levels multiple times over the study period leads to richer and more reliable emergent theory (Eisenhardt, 1989; Leone et al., 2021; Miller et al., 1997).

The observations and insights at DataIntel were supplemented through semi-structured interviews and conversations with executives and stakeholders in agri-food GVCs globally (Savage, 2000). In total, 21 interviews were conducted between May and December 2020, which helped to contextually ground the insights gathered at DataIntel and improve the validity and reliability of the findings (Gibbert et al., 2008). The interviews lasted between 45 to 90



minutes, with an average duration of 65 minutes, and were conducted through video conferencing. These respondents were identified through networks of the research team, as well as through contacts of DataIntel and referrals from prior respondents in a snowballing approach across different GVCs. The demographics of the respondents is captured in Table 1. Appendix A includes the questionnaire used to guide these interviews. However, each interview flowed as a conversation based on the profile and responses of the executive. Nevertheless, following an interview guide and guaranteeing anonymity to the respondents helped mitigate some informant biases in longitudinal studies (Battistella, De Toni, De Zan, & Pessot, 2017; Reficco et al., 2021). The gathered primary data was also complemented through secondary data sources (e.g. news and media), publicly available documents (e.g. consultancy reports and studies), and company archival data sourced from DataIntel. This aided in contextualizing and triangulating the findings (Gibbert et al., 2008).

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Insert Table 1: Demographic Profile of Interview Respondents here

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### *3.3.3. Data analysis*

While the discussions with DataIntel were mainly inductive in nature (Strauss & Corbin, 1998), the interviews also comprised of abductive and confirmatory dimensions (Dubois & Gadde, 2002). This process aided in mitigating observer-induced biases (Savage, 2000). The interviews were recorded, transcribed, and complemented with detailed handwritten notes and verbatim quotes within the boundaries set by confidentiality and anonymity agreements with each respondent. The respondents reviewed the compiled case study report and descriptions on the basis of the collected data to validate it and avoid misunderstandings and ambiguities. We also regularly analyzed and summarized the findings to further reduce any ambiguity (Becker, 1958). Simultaneously, iterative efforts were undertaken to bring the emerging findings

together with relevant literature with a focus on data strategies in GVC decision-making, comparing them within the case (Eisenhardt, 1989).

### 4. Findings

This section explores the evolution of the data strategy approaches at DataIntel during COVID-19. We capture how DataIntel was catering analytics support to agri-food GVCs before the pandemic as a baseline. We then explore how this changed during the course of the pandemic, leading to propositions based on how DataIntel is gearing itself to support agri-food GVCs in a post-COVID-19 world.

#### 4.1. Baseline before the pandemic

DataIntel executives explained that strategic decisions made by their clients were typically based on their business plans over three, five, or even ten-year horizons. These plans were translated into growth targets per market, which then determined the development of new or existing products, sourcing/upstream activities, manufacturing/operations, and downstream value capture models. Big data played an important role in supporting these decisions. While this included automated data collection from various sources, it also entailed collecting a lot of small data from individuals or experts and aggregating them into larger datasets. As an industry executive explained, *“Ultimately, decisions are eventually made by individuals. So, aspects like their past experience, personality, or background play a role in their decisions. However, by relying on robust big data analytics, the variance attributed to these factors can be brought down by up to 80%.”*

As a data analytics firm, DataIntel’s business model relies on synthesizing various disparate datasets using proprietary algorithms and models to create unique intelligence inputs for GVC decision makers. To quote an executive at DataIntel, *“Creativity and insights are necessary to bring various data streams together and to identify causations. We build complex models*

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*utilizing tailored algorithms for each of these data streams in deriving decision-specific knowledge*". Examples of major big data sources include remote sensing satellite imagery, information on infrastructure like warehouses and cold storage facilities, or automated inputs from weather stations. Data on crop quality and harvests from individual farmers and financial data from lenders and banks are also collected and scaled into larger datasets.

Despite the emphasis placed on big data analytics, DataIntel recognized that small data also plays a supporting role as an enabler. For example, it was critical for training the big data models to improve the veracity and validity of the results. As one DataIntel executive explained, *"We used small data to stratify our big data through sampling techniques, thus ensuring that the models didn't have to be run over hundreds of terabytes of data while building them. This allowed us to significantly bring down costs while developing our proprietary algorithms"*. As another example, small data insights helped DataIntel identify that big data available on mobile phone usage and network coverage density shows a significant correlation with the prosperity of a location, which in turn is correlated with market access and crop yield.

Concurrently, DataIntel's clients also have access to a lot of downstream data aggregated from thousands of end customers. Big data analytics was particularly important to understand customer buying behaviors and demand mixes, especially through e-commerce channels. Sales data at different levels and from different sources helps understand the trends from a market perspective. Crunching this big data results in a narrower range of decision choices, and at this stage, small data helps in pinpointing and making trickier case-specific decisions. On the upstream side, research forecasts and speculative data on commodity supplies and price trends are commonly purchased by GVC firms. Such big data is more focused and depends on the level of digitalization and usage of industrial automation by upstream GVC participants. At the same time, small data insights and referrals are also key in upstream decisions comprising supplier evaluation and selection.

### 4.2. Adaptations during COVID-19

The pandemic was a paradigm shift for GVC executives, not only disrupting existing strategic plans, but also inducing a significant shortening of planning cycles. *“This was essential to react flexibly to changes in operating conditions, contextual factors like infection rates and restrictions, and spikes or troughs in demand. The playbooks developed through the experiences of dealing with past value chain shocks addressed some parts of the disruptions we faced now, but not all of them systemically.”*, explained one DataIntel executive. This exacerbated the uncertainty (i.e. lack of information inputs) and ambiguity (i.e. lack of contextual understanding) faced by them. Another industry respondent added, *“The pandemic put a magnifying glass on every weak link in our value chain. As a result, we were running blind, knowing neither what questions we really need to address nor what data we really need”*. GVC executives recognized a need to be agile and assertive in their decisions, while integrating and adapting their decision-making models dynamically and focusing their attention on essential and critical aspects.

This shift was overwhelming for most existing big data models and algorithms. In theory, large data lakes not only allow executives to identify trends and correlations, but also evaluate options using complex scenario and risk analyses tools. However, many executives realized that in reality, proactively identifying and managing risks through applications of complex algorithms and artificial intelligence was still at its nascency. Quoting one industry respondent, *“Many of our models failed because fundamental behaviors and the rules of the game changed, and they couldn't relearn frameworks or recognize new patterns quickly enough”*. This led to an immediate spike in the reliance on small data analytics, with short-term decision making based more on intuition and heuristics of individuals, rather than big data powered algorithms. GVC executives first turned to their immediate and existing networks as a source of information. Concurrently, they also started looking for signals and insights based on publicly

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available and macroeconomic data at sub-sectoral and sub-regional granularity. Additionally, they increased efforts to expand their existing networks to include experts from various domains and GVC positions.

For example, one of DataIntel's clients was using various downstream indicators to derive production and operation plans, as well as for making strategic sourcing and location decisions. These included, for example, ground research and surveys on consumer demand conducted in person at points of sale. However, changes in consumer behaviors and demand patterns at the outbreak of the pandemic were unpredictable and all existing forecasting models failed due to a lack of reliable inputs. In this case, small data insights from their investors and from regulatory authorities was crucial in identifying alternative sources of demand and quickly understanding the dynamics in alternative value spaces. Quoting the executive, *"Though this was not a scientific approach, informal intelligence gathering through direct conversations helped us rejig our strategic focus on enterprise customers and on essential products as downstream alternatives"*. This helped their production and sales rebound to 90% of the pre-pandemic levels by August and even exceed that by December 2020.

These observations were also reflected in the changes in DataIntel's offerings. In some cases, GVC executives had big data available but didn't know what it meant since the algorithms couldn't make sense of it during the pandemic. DataIntel's proprietary models showed false positives or negatives in analyzing some data streams. Increased noise in the data had a butterfly effect on the model outcomes. However, thanks to robustness and redundancies built into their proprietary models, they could afford to shut out data streams affected by socioeconomic and regional conditions and instead rely on other unaffected data streams. Thus, DataIntel didn't have to change their decision models entirely, but rather only their service designs. As an example, the company was analyzing credit default risk based on crop quality assessment, harvest predictions, price forecasts, market arrivals, and other data points. The

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barriers to physical movement and trade in the early lockdowns led to farmers switching to digital marketplaces, which adversely affected the price forecast and market arrival data streams in their model. Using expert insights to identify and understand these disruptions, DataIntel decided to mute these data streams and work around them with small data inputs instead.

One of DataIntel's major competitive advantages emerged as its ability to switch seamlessly between big and small data analytics to provide timely support to GVC decision-makers. This also allowed them to rationalize the costs for their services, especially for smaller clients. This required the company to not over design their products and determinedly reduce the amount of data analytics employed. Quoting a DataIntel executive, *"In some instances, we replaced machine intelligence with human intelligence since this was cheaper than running deep neural networks, and quicker than building up, training, and validating models for time-sensitive and critical decisions."* In this process, the usage of small data increased, instead of relying exclusively on big data analytics. As an example, this was critical in quickly interpreting insights at the level of an individual farm, while also checking and controlling the quality of the results and ensuring data privacy, security, and agility.

In parallel, DataIntel maintained its edge on digitalizing and automating data collection, allowing it to gather information quickly. As one DataIntel executive explained, *"To my knowledge, four of our competitors relying purely on small data, collected mainly through field visits, folded during the pandemic. Having automated data pipelines, alternative data sources, and big data analytics capabilities was a significant competitive advantage"*. By leveraging remote sensing technologies, DataIntel could *"offer an eye in the sky"* and *"digital pathways around social and travel restrictions"*. For example, in some instances, satellite data revealed that the harvest had happened, but the produce was not arriving at the physical marketplace. This was an early signal indicating potential wastage, price increases, and credit defaults from

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farmers. As predicted, commodity prices crashed soon, and surpluses were wasted in some locations whereas there were shortages in others due to transportation disruptions. Timely access to such data allowed executives to focus on more critical issues of understanding and interpreting potential disruptions and taking course correction decisions. Thus, DataIntel's ex-ante investments in technologies not only helped improve visibility across the GVC, but also allowed their clients to rapidly simulate alternate data-backed decisions.

DataIntel also recognized a need to switch to alternative sources of big data. As one industry executive explained, *“using traditional economic indicators pushed us behind the curve constantly. Instead, newer lead indicators like government-imposed restrictions, mobile phone usage location patterns, testing rates, and pandemic navigators helped anticipate short-term demand spikes, allowing us to adjust our value chain configurations accordingly”*. In the early phases of the pandemic, DataIntel leveraged any slack engineering resources to identify and gather relevant alternative parameters for extending their models. Over the course of the pandemic, their focus shifted towards scaling data to support and leverage these models. This led to a gradual shift back towards reliance on big data analytics. Executives realized that big data platforms are a powerful tool to generate required insights, in turn increasing the visibility across the GVC and allowing them to identify and analyze various risks and evaluate potential alternatives. Meanwhile however, small data analytics continued to play a very important role not only in validating these models, but also in supporting executive decisions, even if not as much as at the outbreak of the pandemic. For example, changes in local regulations like new lockdowns or disruptions lead to small dips in the degree of reliance on big data and a corresponding uptick in the reliance on small data.

### 4.3. Equipping for Post-COVID-19

#### 4.3.1. Adaptation of data strategies

The unprecedented scale and disruptive impact of the pandemic triggered executives to reexamine the configuration of agri-food GVCs and their strategic planning over time. This also influenced the data strategies underlying these decisions. The degree to which DataIntel and GVC executives have relied on big and small data during COVID-19 are schematically captured in Figure 1. We find that while there was a high reliance on big data before the pandemic, there was a sharp rise on the reliance on small data and a drop in the usage of big data at the outbreak of the pandemic. This was also observed when there were subsequent disruptions like local restrictions or lockdowns. This leads us to posit the following in case of future exogenous shocks to GVCs:

*Proposition 1a: The reliance of executives solely on big data strategies in GVC decision-making decreases when there is an external disruption.*

*Proposition 1b: The reliance of executives solely on small data strategies in GVC decision-making increases when there is an external disruption.*

The findings also indicate that the role of big data grew during the course of the pandemic, with executives developing and leveraging new models using alternative data sources over time. However, we also find a broad consensus among the executives that small data continues being important, especially in addressing the limitations of big data models. Consequently, they suggest that there is a need for methods and models which can integrate and synthesize both big and small data. This leads us to conclude that in post-COVID-19 GVCs, hybrid data strategies combining big and small data will be important.

*Proposition 2: The reliance of executives on hybrid data strategies increases confidence in decision-making in post-COVID-19 GVCs.*



Insert Figure 1: Big and small data in GVC decision-making during COVID-19 here

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Further, the interviews suggest that while past focus has been on value slicing and cost effectiveness, executives expect a paradigm shift in GVC decision-making after the pandemic towards risk competitiveness and developing business continuity plans. To quote one respondent, *“Though resilience was bought at the cost of efficiency during the pandemic, this is not sustainable post-COVID-19.”* Another executive added, *“While location decisions in the past were largely guided by factor costs, inventories, or asset utilization, there is a need to move beyond the more obvious economic considerations to build risk assessment and evaluation of potential vulnerabilities into the decision models.”* Taken together, this stresses the need to understand how executive decisions not only help improve efficiency but also resilience in GVCs.

In addressing the resulting requirements on data strategies underlying these decisions, DataIntel executives identified three important dimensions. As one DataIntel executive explicated, *“There is a dichotomization in the temporal dimension of value chain decisions. In the short-term, executives must ensure that they can adjust to external changes quickly and flexibly. In the long-term, they also must build resilience to deal with challenges like climate change or future pandemics. For this, we need much more transparency into value chains globally.”* In the following subsections, we further delve into DataIntel’s pivot to hybrid data strategies to improve visibility, agility, and flexibility for improving GVC resilience and efficiency.

### 4.3.2. Visibility

Executives recognize the need for having access to end-to-end data across agri-food GVCs. Such visibility is a crucial prerequisite to have a system-level view to evaluate risks and impacts of any disruptions across complex GVCs. As one executive stressed, *“Data from farmers can help track sustainable production practices and land use, while positively contributing to near real-time identification of and addressing food safety issues.”* Automated data collection from various sources across the GVC plays a crucial role in achieving visibility. In addition to acquiring big data from secondary sources like remote sensing or weather stations, DataIntel has been promoting open data dissemination across complex agri-food GVCs. This can entail collecting granular and local small data from individual farmers or upstream participants, which are then aggregated into larger datasets.

These datasets, in conjunction with the automated data streams, are used by DataIntel to establish statistically significant correlations, develop system-level models, and create sets of decision choices. Further, leveraging blockchain technologies helps them address information asymmetries and improve their service delivery. To quote DataIntel’s management, *“Decision-making models reflecting the entire value chain from farm to customers must consider all possible options and be supported by optimization engines with predictive and prescriptive analytics capabilities and in-memory processing”*. Concurrently, this provides the executives with perspicuity in making GVC configuration decisions that maximize efficiency.

*Proposition 3a: In post-COVID-19 GVCs, investments in hybrid data strategies increase GVC efficiency given a specific resilience level by increasing the visibility across the GVC.*

*Proposition 3b: In post-COVID-19 GVCs, investments in hybrid data strategies increase resilience given a specific efficiency level by increasing the visibility across the GVC.*

### 4.3.3. Agility

The interviews reveal that the time available for executives to make GVC configuration decisions and the tolerance for delays has reduced after the outbreak of COVID-19. To reckon with this, DataIntel sees a need to identify and incorporate early signals, sourced from expert networks as well as by interpreting causalities in data analytics, into quantitative prediction models for risk evaluation. *“There is a need to double down on the investments flowing into digitalizing the value chains in support of quicker and better decision-making,”* explained one executive. Automated collection and aggregation of diverse data points definitely helps here. Additionally, as one executive explained, *“Proactively connecting with various GVC partners and seeking their insights helped us to quickly understand, react to, and recover from the disruption”*. This also hastened the decisions to mitigate GVC efficiency losses.

However, with the pandemic accelerating digitalization, executives are facing increasing data volumes from existing sources. In this regard, small data plays a crucial role in helping identify and filter relevant information from the noise. Simultaneously, GVC executives realize that legacy models impede efficiency and hinder the agility needed in decision-making in dynamic environments. Challenges persist in building the right models to analyze the information gathered and to create insights for decisions. For this, DataIntel relied on small data analytics for designing new models in cases of high ambiguity, adapting their existing models in cases of high uncertainty, and in plugging information gaps due to unavailability of relevant big data. This allowed DataIntel to provide faster decision-making support to executives, instead of having them wait till new models are developed, trained, and validated.

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*Proposition 4a: In post-COVID-19 GVCs, investments in hybrid data strategies increase efficiency given a specific resilience level by enabling executives to be more agile in their decision-making.*

*Proposition 4b: In post-COVID-19 GVCs, investments in hybrid data strategies increases resilience given a specific efficiency level by enabling executives to be more agile in their decision-making.*

### 4.3.4. Flexibility

The pandemic has highlighted the need for flexibility in GVC configurations and correspondingly in decision-making. DataIntel's failed competitors show that the ability to deal with disruptions requires ongoing investment in data analytics. For example, having access to alternative data sources allowed DataIntel to shut off and work around noise in particular data streams. Developing algorithms and models which afforded them such flexibility was a major competitive advantage for DataIntel during the pandemic. In turn, this allowed their clients to alter their GVC configurations in accordance with the changing context efficiently.

At the same time, one executive added that *“New collaboration models have been built during the pandemic, with firms cooperating and building relationships across classic industry boundaries in the value chain to share information and practices. Coordinating and collaborating across multidisciplinary teams will continue to be a key capability in accessing small data in the future.”* This underscores that while big data is crucial in system-level analysis at a global level, small data analytics is important for contextualizing decisions to the local environment and increasing local responsiveness. In the case of DataIntel, a seamless integration of big and small analytics not only added to the robustness of their models, but also allowed them to adjust their costs to support their clients. Building on its extant capabilities, DataIntel is exploring ways to leverage small data in addressing the inability of machine

learning models to deal with external shocks. As a DataIntel executive explained, “*We are moving from structured and pre-defined strategy formulation towards a more continuous experimentation of strategic initiatives based on big and small data analytics, simulations, and new forecasting approaches.*”

*Proposition 5a: In post-COVID-19 GVCs, investments in hybrid data strategies increases efficiency given a specific resilience level by allowing for greater flexibility in executive decision-making inputs.*

*Proposition 5b: In post-COVID-19 GVCs, investments in hybrid data strategies increases resilience given a specific efficiency level by allowing for greater flexibility in executive decision-making inputs.*

## 5. Discussion

The research at DataIntel, enriched through the interviews with executives in agri-food GVCs, sheds light on the evolution of data strategies and the role of big and small data analytics before and during the pandemic. Additionally, the findings also provide indications on their role in decision-making in GVCs post-COVID-19. This section discusses the implications of this study, its limitations, and potential future research directions.

### 5.1. Research implications

Executives were already facing a new normal before COVID-19 (Ahlstrom et al., 2020). The pandemic was a black-swan event that not only disrupted GVCs, but also emphasized the need for dynamic and continuous adaptation of their configurations (Buckley et al., 2019; Pananond et al., 2020). These trends have also been observed in the case of agri-food GVCs (FAO, 2020; Morton, 2020). These changes coincide with a growing attention to data analytics and its role in helping executives make ex-ante and ex-post strategic decisions for (re)configuring GVCs (Buckley et al., 2019; Verbeke, 2020) and in improving ineffective and inefficient decision-

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making processes (Hernández & Kacprzyk, 2021). Against this background, drawing on the findings in the context of agri-food GVCs, this paper makes three important contributions to the study of GVCs.

Firstly, this is one of the first papers to our knowledge that explores the role of data strategies in executive decision-making in GVCs. Recently, scholars have identified the need to study GVCs under a strategy lens and how firms are investing in digitalization technologies to support their intelligence and decision-making (Gereffi, 2020; Kano & Oh, 2020; Pananond et al., 2020; Verbeke, 2020). Explicitly focusing on a firm providing data analytics support to various GVC participants longitudinally allowed us to understand these mechanisms dynamically and systemically. We believe that is a crucial step towards developing a more robust and effective decision-based view of GVCs.

Secondly, we shed light on how data strategies help executives address GVC resilience and efficiency. Scholars have argued that executives must strive for achieving efficiencies without sacrificing the resilience of GVCs (Gölgeci & Kuivalainen, 2020; Gölgeci et al., 2020). Our research suggests that future decisions on GVCs configurations must integrate risk considerations into extant models which are focused on achieving cost efficiencies through fine slicing and distribution of value adding activities. Further, it examines how data strategies help in achieving resilience and managing efficiency in GVCs by improving the visibility, agility, and flexibility in executive decision-making.

Additionally, there have been recent calls for research into how executives address their bounded rationality and reliability entrepreneurially (Kano & Oh, 2020; Verbeke, 2020). Our research throws light on how investments in big and small data analytics are leveraged for providing a basis for executive decisions, which helps address bounded rationality challenges of individual decision-makers. Concurrently, the frequent use of informal institutions and

relational mechanisms in gathering small data from experts leads to more cooperation and communication between the GVC participants (Meyer & Peng, 2005; Peng & Luo, 2000). These repeated interactions in turn lead to stronger ties and network closure (Burt, 1992; Coleman, 1988), which helps address bounded reliability challenges.

In addition to these core contributions, this paper also contributes to the extant body of literature specifically examining agri-food GVCs. The COVID-19 pandemic exacerbated the pre-existing challenges including various risks and uncertainties in agri-food GVCs (Dong, 2021; Sharma et al., 2020), thus placing a renewed emphasis on investigating the drawbacks in current decision-making processes (Hernández & Kacprzyk, 2021). There is a trend towards greater digitalization and use of (big) data analytics in agri-food GVCs (Panetto et al., 2020). Concurrently, the need for collaborative decision-making and integration of multiple stakeholders and small data is recognized (Hernandez et al., 2017; Liu et al., 2014). However, COVID-19 revealed potential issues of purely relying on one of these approaches with insufficient focusing on the other. Against this background, DataIntel's attempts to integrate various agri-food GVC participants and in employing hybrid data strategies provide hints on how decision-making challenges can be tackled effectively and efficiently in a post-COVID-19 world.

### *5.2. Practice implications*

As a qualitative study based on insights gained from a case organization and expert interviews, this paper is also relevant for practitioners. First, the case of DataIntel emphasizes the need for GVC firms to continue investing in building their data analytics capabilities. The COVID-19 pandemic has shown the critical importance of having diverse data sources and automated data collection in dealing with unforeseen disruptions. Secondly, it is important for firms to recognize the limitations of big data analytics and proactively invest in building and leveraging small data approaches to address them. As DataIntel shows, being successful in the future

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requires a seamless meshing of big and small data analytics in decision support models. To this end, GVC firms must rethink their data strategies and enable executives to build up social capital to access small data while developing their data analytics capabilities. This is especially crucial in cases of unforeseen disruptions where past data and models are inadequate in addressing current challenges. We are convinced that through further research, GVC executives can benefit from better decision models and supporting data strategies to effectively deal with their decision-making challenges.

### *5.3. Limitations and future research*

We recognize some limitations of our research, given its explorative nature. The paper relies on qualitative studying a single case longitudinally. While this offers rich insights into the evolution of data strategies at one firm, it is also limited as a sample. Though we tried to improve the external validity through interviews with executives from various GVC participants, we recognize that generalizability of the findings would be limited. The COVID-19 pandemic has been an unprecedented disruption that has affected various firms in different industries and regions differently. Additionally, firm size is also correlated with the availability of resources for investing in data analytics capabilities, with smaller firms typically being more reliant on small data than bigger firms. Corporate culture also plays a crucial role in acceptance and application of data analytics capabilities. Given these considerations, we see the need for future research to take up empirical research in different industry and firm settings to investigate the role and impact of data strategies in executive decision-making in GVCs. This is also important since we are still not entirely in a post-COVID-19 world yet, which encourages academic scholars to revisit the findings of this study.

Further, we also recognize that there is scope for examining the scope of operationalization of small and big data. Future research can examine a continuous categorization of data strategies, moving from our binary categorization of small and big data. This could also entail identifying



a comprehensive set of factors on the basis of which data can be classified as small, medium, or big data along the continuum. Simultaneously, we also see a need to better understand what a hybrid data strategy entails in terms of proportion of small and big data. Further research could shed light on how this proportion is contingent on different scenarios of firm and environment contexts.

Additionally, our research also has implications for research methodologies. While a lot of extant research has focused on the role of big data (Sivarajah et al., 2017; Yasmin et al., 2020), academic research on small data analytics is still nascent. Given that the ability to combine small and big data analytics was a significant source of competitive advantage for DataIntel, we see potential for academic research to also adopt mixed methods in investigating the role of big and small data analytics, and in turn, the combination of human and artificial intelligence in executive decision-making in GVCs and strategy research.

### **6. Conclusion**

The COVID-19 pandemic has precipitated fundamental changes in how executives make decisions while (re)configuring GVCs and the underlying role of data analytics in enabling them. The objective of this research was to explore how this has evolved during COVID-19 and the implications for post-COVID-19 GVCs. The findings indicate that to ensure resilience as well as efficiency in future GVCs, executives need to blend big and small data analytics to increase their visibility and enable agility and flexibility in decisions.

COVID-19 has had an irreversible impact on many dimensions which will persist even after the pandemic subsides. Our research is embedded in this space to help firms create long-term competitive advantages in GVCs by understanding this impact on data strategies and decision-making. We believe that this paper thus takes an important step in exploring how GVC executives leverage data analytics capabilities to support their decision-making from a strategic

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perspective. In turn, this is an important step towards developing a decision-based view of strategy management.

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Figures

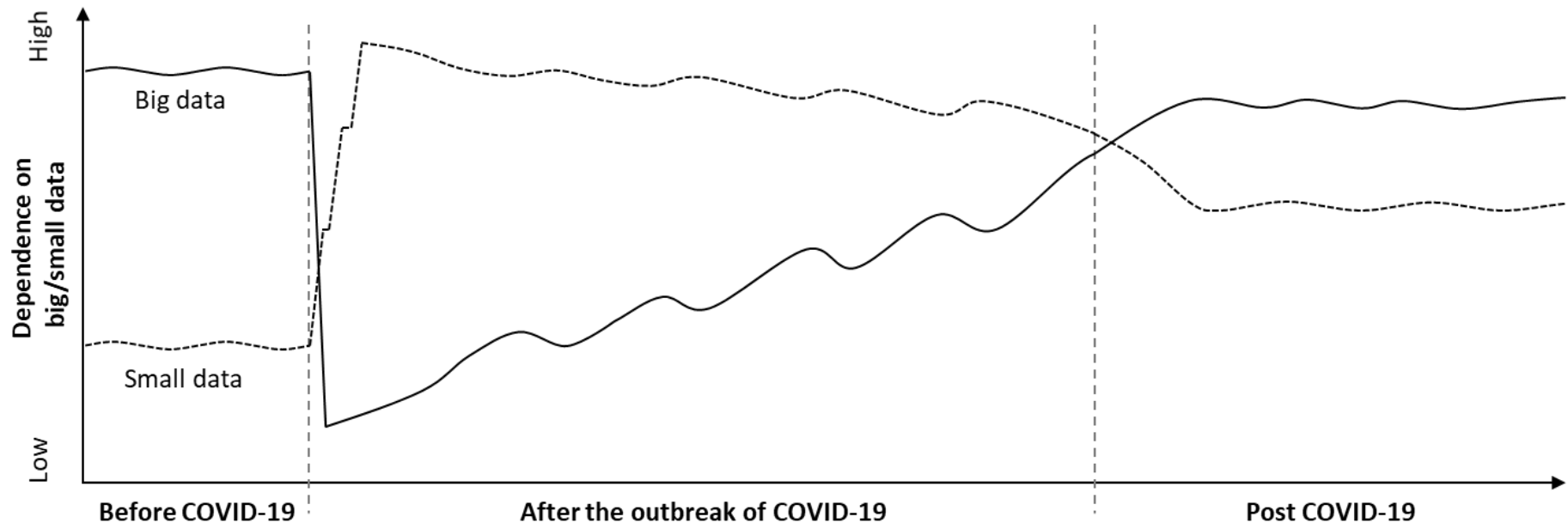


Figure 1: Big and small data in GVC decision-making during COVID-19

**Tables**

Table 1: Demographic Profile of Interview Respondents

Demographic Profile of Interview Respondents	
<b>Organizational Affiliation</b>	
DataIntel	5
GVC lead firms/orchestrator	6
GVC participant firms	10
<b>Years of Experience</b>	
5 to 10	6
10 to 15	5
Over 15	10
<b>Current Position</b>	
C-Suite/Board	8
Top Management	7
Regional/Functional Leadership	6
<b>Education</b>	
Advanced degree (e.g. Ph.D.)	4
Master's degree (incl. MBA)	11
Bachelor's degree	6
<b>Geography</b>	
Asia/Australia	9
Americas	4
Europe	7
Africa	1

### Appendix A: Guiding questions for interviews

- Could you please introduce yourself and the firm you work for?
- Could you please give a brief background of your role and the responsibilities associated with it?
- How does the value chain of your firm's offering look like? Is it global in nature?
- What are the different types of decisions you make on a regular basis and how does it impact the value chain?
- What are the different types of data you rely on while making decisions for the value chains?
- How did COVID-19 impact your value chain?
- Please explain how the type of data being relied upon for making value chain decisions has been changing after the outbreak of COVID-19?
- Could you please throw some light on the limitations of your traditional data driven approaches in the new context after the outbreak of COVID-19?
- How has your approach towards data for insights changed from the start of COVID-19 till today?
- What will be your recommendations on approach towards data for other companies struggling after the outbreak of COVID-19?

### Highlights

- Explores the role of data strategies in re-configuring GVCs in post-COVID-19 world
- Simultaneous investment in hybrid data strategies tackles bounded rationality challenges in GVCs
- Small data gathering efforts lead to stronger ties and network closure addressing bounded reliability challenges in GVCs
- Configuration of hybrid data strategies decide the robustness and effectiveness of decision-based view of GVCs

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