

[Alnoor Bhimani](#)

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Exploring Big Data's Strategic Consequences

Alnoor Bhimani*

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***Department of Accounting, London School of Economics, Houghton Street, London WC2A 2AE,
United Kingdom Email: a.bhimani@lse.ac.uk**

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Abstract

Big data multiplies the potential of organizational data engagement and the shaping of enterprise strategy processes. The paper argues that big data qualitatively alters strategic processes by extending managerial possibilities for acting on both structured and unstructured information because the conceptually presumed linear links between corporate strategy, firm structure and information systems design no longer hold. Big data draws organizational information systems into a shifting dynamic of altered forms of information access and use as part of a wider complex loop of interventions and analyses. Big data analyses are for many firms becoming indispensable strategic ploys which themselves alter strategies that further mobilize big data consequences. The paper also argues that the use of big data for directing enterprise activities effects behavioural and political organizational consequences. The paper concludes with a discussion of wide level strategy issues tied to big data analytical shifts.

Keywords: Data and information, big data, strategy

Introduction

Novel ways for enterprises to alter the speed of their operations, enhance the flexibility of their decision making, change their strategic posture; and extend their achievable economic efficiencies are continuously being advanced through technological means. Virtually no dimension of modern enterprise activity today remains untouched by digital technologies. These include ‘the internet of things’, ‘the internet of you’, immersive interfaces, social media, 3D printing, cloud computing and networked mobile devices which have enabled the rise of new forms of organizational intelligence through big data collection and analysis. Traditionally information used by organizations in decision making has been produced by formal systems whose architectures aligned with specified standards of retrieval and presentation. Such information systems were designed to capture transactions, both physical and economic, rather than reflect indications of possible consumer intent and focused primarily on historical events rather than on real time changes. Big data now poses a challenge to enterprises in that it arises from wider configurations of information pools – past and present, structured and unstructured, formal and informal, social and economic, and which constantly evolve in their content and representation. Big data in effect multiplies the potential of organizational data engagement and the shaping of enterprise strategy processes.

Big data is used by a growing number of organizations in combination with established data sources impacting their managerial decisions and actions (Davenport 2014; Rifkin 2014). It is for many firms generating asset value both through the storage of information whose potential grows by virtue of its volume as well as from the consequences of its examination (Brynjolfsson and McAfee, 2014; Schmidt and Cowen, 2013). Big data arguably adds an analytics dimension to existing organizational capabilities unleashing a diversity of strategic re-orientation

possibilities (Galbraith 2014). So the suggestion that it implies new rules is not an overstatement – indeed it is timely and appropriate to seek to expound on the changing context of strategy and explore how it is qualitatively affected by big data as Constantiou and Kallinikos (current issue) undertake to do.

Most of the data organizations collect, create and store is unstructured. Awareness that the analysis of unstructured data can potentially engender decisions which hitherto could not be posited via formal information outputs has been ample but the means to accomplish this have only recently emerged. What is now coming to light as large bases of data are retrieved, analysed and interpreted, is that consequent decisions can be sufficiently significant as to alter the core of enterprise strategic processes (Beath et al. 2012; Galbraith, 2014; Mayer-Schonberger and Cukier, 2013). Although ‘technologising’ solutions for the codification of knowledge into managerially useful forms dependent on ‘informating’ business activities (Willcocks et al. 2014) continue to preoccupy enterprise information roles, more and more technologies for data collection, storage and processing geared to addressing big data issues are evolving and are influencing strategic processes. This paper considers aspects of strategy process consequences of big data deployment to add to the view that big data creates challenges to ‘established rules of strategy making’ (Constantinou and Kallinikos, current issue). The paper first considers how strategy might be seen to be tied to information systems. Here, it discusses the traditional links between enterprise strategy, structure and the information provision function and how big data is affecting this dynamic. Second, the paper explores what happens when the form information takes as an input into decisions, both operational and strategic, alters. Information that is unstructured and derived from collection objectives not established *ex ante* are argued to potentially influence strategic processes in a variety of ways. Third, the paper identifies how big data analyses affect strategies such as to further effect consequences for the analysis of big data. The paper concludes with a discussion of wide level strategy issues tied to big data analytical shifts.

What connects information to strategy?

Management thinkers have propounded the foundational idea that corporate strategy sets out long-term objectives, which provide a basis for delineating requisite action and resource requirements to achieve a firm's goals (see HBR 2011). Chandler's (1962, 1977) extensive and influential research substantiates such a view. He saw structure as the design of an organization via which strategy is advanced. Consequently a change in corporate strategy leads to novel administrative challenges because new structures are essential to put into effect the organizational achievement aims of the newly advanced strategy. Chandler saw enterprise structure as arising from formally defined strategic intent whereby the nature of the linkage would affect organizational results via the use of compatible informational systems. If strategic pursuits can define appropriate enterprise structuring then information flows can be deemed to likely require conformant shaping. Some writers have posited similar lines of argument offering environmental contextual detail in support of the strategy-structure-information system thesis whereas others have critiqued the notion that such dependencies are too linear and unproblematic focusing solely on efficiency arguments rather than social and political effects (Argyris and Liebeskind 1999, Bain 1968, Bucheli et al. 2010, Chandler and Daems 1979, Johnson 1983, Livesay 1989, Marglin 1974, O'Sullivan 2006, Stack 2002, Stigler 1951, Williamson 1985).

Within advanced economies, markets, firms and interagency arrangements are deployed to enable certain fundamental functions of economic activity, specifically, the allocation of resources and their coordination and monitoring to be carried out (Chandler and Daems 1979). Numerous management writers on strategic issues, including Chandler, have considered the functioning of firm structures that are specifically industrial in relation to their economic imperatives. Such firms they suggest appeal to information systems as means of enabling the administrative oversight of resource allocation as well as coordination and performance monitoring.

Enterprises appeal to appropriate controls including information systems to establish price setting structures and internal resource allocative mechanisms. Thus, since the late eighteenth century, enterprises in the West have been seen to have developed systems that provide information essential to business managers of entities which partially operate outside the market system. Firms became structured such as to earn yields from economic resources that exceed those that can be achieved via ordinary market exchange.

The broad contention has been that information delineates the internally controlled domain of opportunities in which organizers can search for higher returns. The information developed via evolving systems makes possible targeting levels of required efforts by employees within firms such as to maximise returns through the use of information and outcome dependent incentives. Under this view, establishing parameters for enterprise management in essence, necessitates the alignment of broad strategic objectives with operational activities where a necessary condition is the establishment of formal control structures and supporting information systems. The question arises: Does this perspective need reconsideration where the very form, provenance and volume of information alter?

What happens when information form alters?

The rise of internet based technologies, digital products and web-based business models pose a challenge to the continued coherence of Chandler's ideas upon which much of strategic conceptualisations are premised. This arises in the light of new information forms which potentially affect strategic processes and alter organizational structures. It is clear that for many enterprises 'strategic information has started arriving through unstructured channels' (LaValle et al. 2011 p. 29). The linear logic of past conceptions of strategy-structure-information domains is facing tensions when applied to the context of increasingly digitised enterprise realities. Changes in technology are well known to bring about new information characteristics which can alter the tacit versus explicit knowledge mix (Nonaka and Takeuchi 1995).

In relation to big data analyses, new information insights are upending conventional tacit versus explicit knowledge balances and dismantling the presumed sequential relationships binding strategy, structure and information arenas. Inter-dependencies now exist in strong form within enterprises whereby these elements have become co-mingled. Firm strategies are growingly predicated on technological structures that are the result of specific information system outputs (Bhimani and Bromwich 2010; Willcocks et al. 2014). Information systems are involved in a shifting dynamic of altered forms of information access and use as part of a wider complex loop of interventions and analyses. Further, novel technologies trigger new enterprise forms which rely on transformations of information assessments to create added corporate value. No doubt much capacity for organizational processes to continue to ‘drive business value from data and information’ (Bharadwaj et al., 2013: 477) remains. But new forms of information intelligence are driving the installation of defined enterprise structures as means of enabling the evolution of altered strategic aims. Little room thus exists in the modern day digital economy for linear conceptions of strategic processes.

Enterprise information systems rest extensively on the notion that consumer activities are to be captured in relation to their economic consequences. But a transformation in information source is rapidly challenging this narrow conceptualisation of organizational control. Information systems which solely locate predetermined elements of economic transactions ignore less structured data forms whose analysis can offer relevant insights. Online searches for instance leave information trails that can be subjected to macro-analyses and tied to forward looking action that ultimately creates economic value. Information specialists are directing their focus toward information for enabling organizational action tied to evolving social activity prescient of economic effects rather than solely retaining their focus on historical events and transactions that are principally *ex post* and economic in nature (Bromwich and Bhimani 2010). What is examined as part of the exercise of customer choice creates value not just for the customer but also for the enterprise

since it enables strategic repositioning to heighten the prospect of economic value creation. 'Data exhaust' becomes crucial data if it is effectively monitored and analysed. The sequence of information access, the duration of information exposure, the concern with pricing alongside other information gathered by a customer for instance all offer predictive intelligence possibilities and pave pathways to economic value creation. Such information provides insights on appropriate technological infrastructural changes and on desirable strategic action (Bhimani and Willcocks, 2014; Davenport, 2014; Schroeck et al. 2012). More widely sourced information content and form point to the capacity for enterprises to utilise data that alters corporate strategy rather than which simply supports it and to mobilise effective restructuring instead of alignment with current organizational priorities and arrangements.

How big data shapes strategy which shapes big data

The altered nature of data and the capacity to collect and analyse it across many of its structured and unstructured variations enable enterprise decisions and their underpinning rationalisations to be much wider reaching than has been the case conventionally. Data is becoming diverse in a variety of ways as are its sources and modes of collection. Data relevant to organizational intelligence can be micro-level, defined and highly specific or more aggregate, raw and amorphous. Some firms which are accelerating investments into digital capabilities to enable decision making tied to broadened product offerings and production bases find that they also engage in further consolidation and use of digital technologies which open up different and new orders of data volume, specificity and form. Firms which manifest network effects through big data based decision making are likely to experience faster growth from effective strategic action which can spur a greater rate of data production that in turn, accelerates managerial action with positive data feedback effects. In such contexts, revenue generation can become increasingly data driven. Moreover, differentiation strategies used by enterprises exposes them to specific types of customers. Some

firms vie for innovator and early adopter types of customers whereas others seek customers favouring established mass marketed products. Big data analyses derived from customer information by a market incumbent will likely provide information which enables the firm to further entrench its existing customer base into the domain of products they favour via a better understanding of these customers' needs. Big data thus offers the prospect of firms raising barriers to entry to challengers because they benefit from being able to act upon data insights before the competition.

Management information systems have traditionally produced information for decisions that fairly demarcates long versus short term implications. Such clarity of differentiation does not arise from big data analyses. Big data collection is by definition focused on the aggregation of large amounts of digital activities that are ongoing and therefore operational in nature. Strategic insights derived from this data will perforce extend the implications of aggregated operational information content onto longer term planning decisions which will reduce clarity as to what comprises the short term and the long. In-depth judgmental assessment by organizational decision makers will be required. The low decipherability between the long and short term within the data itself suggests a need on the part of decision makers to adjust to alterations as to data sources and levels of aggregation inherent in the data. Again decision makers will find it essential to qualitatively widen their perceptions as to what comprises legitimate data sources. Individuals who show adeptness in big data evaluation and draw strategic implications from the data will emerge as particularly influential. The articulation of big data drawn insights into convincing argumentative terms to support managerial action along a certain direction as opposed to another will alter the dynamics of organizational decision making and authority. The use of big data for directing enterprise activities is thus much more than a technical endeavour without behavioural and political organizational consequences. The ability to assess big data will redefine lines of authority, influence and organizational power.

There is little question that the generation of large amounts of digital data reconfigures the relationship between an organization and its constituencies. Consumers become involved in the design and customisation of products via enterprise platforms creating ‘prosumers’ who generate new orders and forms of data that reduce the usefulness of conventional information management mechanisms. Inevitably qualitative changes arise in the use, collection and insights drawn from data which dismantle traditional conceptions of strategic processes. The argument that data whose reconfiguration is made sense out of after rather than before its production generates significant challenges for organizations. The ‘*ad hoc*, inductivist way of strategy making’ (Constantinou and Kallinikos, current issue) is likely to have profound effects on what we think we know about strategy. Further, as Constantinou and Kallinikos (current issue) note, the decontextualisation of data this entails may prove ‘misleading’. Perhaps, it is in the nature of novel managerial information and decision making tools to show ‘bandwagon’ propensities (Abrahamson and Fairchild 1999), but the harnessing of big data analyses will not abate in the face of its many uncertainties.

Current and impending developments in digitization, software and processing power mobilize new possibilities for firms and their information systems. Differentiating data from information from knowledge will likely see refining and redefining as their connections become blurred and as further insights emerge from varying forms of information presentation. Where information experts report information derived from structured pre-determined sources alongside that drawn from big data analyses, questions will mount as to whether the former is less or more supportive of strategic executive action.

Digitisation has ushered in a real world of informational processing that is structured in part around big unstructured data collection and examination. This influences economic value creation potential through information assessments that are deeply empirically grounded and that create a dynamic of physical actions and subsequent

decision repercussions. Further, structured information itself is becoming more diverse as an outcome of action inspired by unstructured data analyses. The informational domain which firms confront today thus presents analytical and decision consequences which inevitably impact strategic processes.

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About the author

Alnoor Bhimani is Professor of Management Accounting and Director of LSE Entrepreneurship at the London School of Economics. His research interests encompass financial controls in the digital economy; entrepreneurship and economic growth; strategic finance; and global development and governance issues. His recent book *Strategic Finance: Achieving High Corporate Performance* (Strategy Press, 2014) addresses issues that are central to enterprise management, innovation and digitization. His other books including *Management Accounting in the Digital Economy* (Oxford University Press, 2003), *Management Accounting: Pathways to Progress* (CIMA, 1994) and *Management Accounting: Prospect and Retrospect* (CIMA/Elsevier, 2010) deal with organisational innovations and financial management. Professor Bhimani has written books and articles across a range of journals including *Review of Accounting Studies*, *Accounting Organisations and Society*, *Journal of Accounting and Public Policy*, and *Management Accounting Research*.