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Research Executive Summary

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A Field Study of Innovating with Big Data Analytics

Contents

We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.

A Field Study of Innovating with Big Data Analytics

Key Conclusions:
Innovating with analytics is about culture, cultivating a spectrum of business and technical skills and working collaboratively across analytics teams and business functions.

Abstract

The transformative effects of Big Data Analytics are widely reported. Yet understanding about the disruptive and (de)stabilizing processes through which these promises of transformation come to fruition remain limited. An in-depth longitudinal case study of the design and deployment of analytics in a large organisation operating in a highly competitive environment was conducted. We found that the crafting of analytics is a socio-material process. Whilst legacy systems have impact, factors such as the history and identity of the organisation and acculturated practices significantly influence the development of an analytics capability. In addition, a decentralized analytical capability with centralization of certain technical capabilities and data governance can be effective. Also, datawork (the creation of relevant and fit for purpose data) forms a significant part of any analytical project that extends well beyond working with readily available datasets. Finally, numerous functions traditionally labelled as within the remit of 'management accountants' are now performed by teams of data scientists with well-developed commercial sensibilities. This has significant implications for the accounting profession and associated educational programs.

Introduction

Business transformations enabled by Big Data Analytics (BDA) are widely recognised (Ransbotham & Kiron 2017) and especially so in accounting and audit (Appelbaum, Kogan & Vasarhelyi 2017). BDA are increasingly acknowledged as a key component of digital business strategies designed to improve process efficiencies, customer experience and productivity (Davenport & Bean 2018). However despite investments in sophisticated analytics tools, information infrastructures and the establishment of data science in many organisations, significant uncertainty remains about the extent to which Big Data initiatives meet desired outcomes (Ghasemaghaei, Ebrahimi & Hassanein 2018).

The ubiquitious references to Big Data, Analytics, Business Intelligence, Data Science, Machine Learning, Artificial Intelligence or some combination thereof, has resulted in a blurring of definitional boundaries and debate about what 'exactly' is meant by Big Data. The question of what is Big Data cannot be easily separated from how analytics and forms of business intelligence are created and used. That is, asking the 'what' question may be less helpful for it assumes a static and stable 'essence' embedded in changing 'objects'. Thus it seemed more helpful to us to ask not 'what is' but 'how' Big Data 'comes to be'; how its be-ing is enacted in organisational settings.

Leveraging BDA comes with a host of challenges. A consistent finding is that technology is not necessarily the primary obstacle in deploying BDA. Rather the significance of people, organisational structures, processes and culture has been underestimated (Carande et al., 2017). For example, Günther et al.'s (2017) review of the literature revealed that organisations are not only challenged about how to acquire and develop the necessary human and technical resources, but also how analytics teams/departments should be structured, that is, centralized, decentralized or shaped into some hybrid type. Clark and Wiesenfeld (2017) also wrote that organisational cultures that are too "data driven", may "blindly follow" flawed models even if they "defy common sense or run counter to business goals," yet heavy reliance on "gut instincts" may risk not questioning taken for granted assumptions. Finally, while the data scientist has been described as the "sexiest job of the 21st century" (Davenport & Patil, 2012), little is known of how the emergence of this professional group 'rubs up' against other professional jurisdictions, such as that occupied by accountants.

To date only a limited number of research studies have been conducted on the deployment of analytics. These tend to be survey-based (eg. Raguseo, 2018) or vendor depictions. Less attention has been paid to the investigation of analytics and innovation not just as technical processes but as cultural practices within organisations.

Objectives

The aim of this study is to conduct an in-depth, longitudinal field study of the design and deployment of new analytics and forms of business intelligence, and in so doing investigate the: (a) socio-material relationships and networks at play in innovating through analytics; (b) factors that inhibit and enable 'successful' innovation; and (c) the involvement of accountants in the practice of Big Data Analytics. In particular, we focus on mapping three processes: the materialisation of data through 'datawork', the development of new analytical 'objects'/tools and accountabilities, and interactions between analytics teams and the accounting function.

Research Method

This study was conducted in a focal organisation that is making material investments to develop its analytics capabilities. The organisation is in the retail industry sector; it is large and comprises several strategy business units. Our field engagements were in two parts of the organisation at group level – Sales and Assurance. In this way we were able to study the development of key projects in each of these areas. In Sales, we examined the design of new performance dashboards and a set of predictive analytics. In Assurance, we studied the use of analytics for control and risk management purposes, namely the detection of duplicate invoices or fraud. Examining these projects also involved engaging with personnel from other business functions, including finance and information technology. As part of our field study we undertook 30 hours of interviews with senior managers in data science and analytics, risk and assurance analytics, IT, data governance, technology risk management, finance systems, data scientists and business analysts. We also attended two dashboard user workshops. This dataset built on an earlier set of 47 hours of interviews that were collected in 2016-2017. We also compiled an extensive literature review comprising research in accounting and information systems.

Main Findings and Implications for Practice

1. The development of an analytics capability in the focal organisation has been rapid in the last two years, resulting in the formation of numerous dedicated analytics teams in dispersed locations. Different elements of the analytics capability included: domain area expertise within and across business functions and processes; data science, data management and data governance; technology platforms and infrastructure; managing 'analytics' projects; and leadership in terms of roles, responsibilities and cultural change.

   Implications
   Understanding how these different capability elements develop and come together in a dynamic and rapidly expanding field is challenging. The research has pointed to the need for firms to understand that the crafting of analytics is a social and 'material' endeavor in which non-human 'actors' can have effects. Legacy ERP, extant data warehouses and business intelligence applications have impact. Additionally, factors such as the history and identity of the organisation and acculturated practices significantly influence the development of an analytics capability. Further, developing an organizational mindset that 'data is an asset' is a cultural process that requires time and ongoing senior managerial commitment.

2. There is no centralised 'analytics function' in the organisation. The decentralised approach reflects the organisation's identity as a 'federation' and the institutionalized strength of the its strategic business units. Each is run as an independent business and this has influenced the ecology of the information networks that operate in these businesses. There has been a compensating focus on the centralisation of specific technology capabilities in the choice of a standardised set of tools, a single cloud platform and a common visualisation package. In addition, there is now a Group Head of Analytics although there is not a single, central 'department of analytics'. A formal data governance function was also established but remains a work in progress. An 'agile' approach has been adopted to create coordinating structures and share knowledge about how data is being harnessed and manipulated to generate predictive analytical insights. However, a degree of uncertainty exists in parts of the organisation about the potential benefits derived from adopting agile practices in management more generally.

   Implications
   A decentralised analytical capability with centralisation of certain technical capabilities and data governance can be effective in terms of: simplifying access to different data sources; faster and more focused development of specific forms of analytical insights, improving the speed of analytical processing; developing skills through the (re)use of common tools; and working collaboratively across teams and business functions. However, establishing mechanisms to avoid duplication and to support collaboration, coordination and communication within and between analytics teams and business functions, as they change and grow, requires ongoing investment.

3. Decisions to invest in the creation, storage, retrieval, manipulation and visualisation of data were made in response to senior management beginning to foster a culture that treats data as an asset across the business. The work related to accessing, preparing, transforming and governing data, however, was not without challenges. We label this work – datawork.

Implications
Datawork forms a significant part of any analytics project and extends beyond just working with the technicalities of specific datasets. It also requires developing an understanding of the wider formation infrastructure through which data is created, stored, accessed and analysed. Further, it involves understanding the dynamic needs, concerns and sensitivities of multiple users and stakeholder groups as well as the politics and ethics of datawork. Datawork is not a passive assembling of required datasets. It is generative - capable of changing projects, organizational relationships (for example, between different owners of data) and concepts such as organizational risk.

4. Some within the corporate accounting function felt they did not move into the analytics space early enough and is now seeking to hire dedicated 'analytics' staff. The challenge for the corporate accounting function as well as the broader analytics community is the recruitment of data scientists who have strong business acumen and who understand how 'analytics' is as much about 'culture' and business imperatives as it is about algorithms and machine learning. In addition, determining the appropriate mix of skills required, assessing the capability of the current team and shifting ingrained thinking in the organisation about 'partnering' with multiple analytics teams, was also viewed by the corporate accounting function as key issues.

Implications
Corporate performance management applications and processes, typically within the remit of 'management accountants' are now performed by teams of datascientists with well-developed commercial sensibilities. This points to the need to rapidly adapt the teaching of accounting, not only to look at the role of 'audit analytics' but more generally, the role of analytics within management planning and control.

Conclusions

This research study contributes to the theoretical and empirical understanding of analytics. We found that innovating with analytics is a socio-material process. Legacy systems and existing infrastructures have impact. However, factors such as institutional identity, history and acculturated practices also significantly influence the development of an analytical capability.

Analytics is as much about culture and politics as it is about information technicalities. Datawork forms a significant part of analytics projects. The use of analytics for historical analysis as well as for predictive purposes points to the need for the management accounting function to become more knowledgable about the possibilities and constraints of analytical modelling and to partner with data scientists.

The accounting curriculum at the tertiary as well as professional levels also needs to change quickly in order to enable future practitioners to be more effective in a highly digitized world.

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