

PRELIMINARY INVESTIGATION OF BIG DATA AND IMPLICATIONS FOR ACCOUNTING CURRICULA

ABSTRACT

Purpose - The paper explores the implications of the use of big data in business for the accounting curricula.

Approach – An exploration of the opportunities and risks that big data brings to the accounting profession and implications for the accounting curricula at undergraduate level.

Findings – The review of undergraduate accounting programmes across New Zealand shows no evidence of standalone courses on big data.

Practical implications – Accounting educators need to ensure that students are cognisant of the potential of big data and how accountants can add value to business by their ability to interpret the data analysis.

Value – The paper focuses on a trend that may have a disruptive impact on future accountants if the profession and accounting educators do not respond quickly.

Keywords Big data, business analytics, accounting education

Carol McKnight
Department of Accounting & Finance
Unitec Institute of Technology
cmcknight@unitec.ac.nz

Introduction

The purpose of this paper is to look at the implications for accounting curricula as a result of the pervasiveness of the use of big data in business. According to Griffin & Wright (2015), big data is “one of the [accounting] profession’s most pressing challenges”. The phenomenal increase in the amount of digital information, together with technological advances in cost-effective data storage and cloud capabilities, has seen an explosion in the collection of data. Accounting students need to be cognisant of the opportunities, risks and language of big data so they are able to take on the role of the intermediary between the data analysts and the ultimate decision makers.

This paper reports on a preliminary investigation on the coverage of big data and business analytics in current undergraduate accounting programmes in New Zealand. This requires accounting educators to consider what changes are required in the curricula.

The paper is structured as follows. A literature review examines the role of big data as a business enabler. This is followed by a discussion of the impact of big data for the accounting profession, particularly financial and management accountants and auditors. Finally the paper looks at whether big data and business analytics are taught in undergraduate accounting programmes at some tertiary institutions in New Zealand and Australia. The paper concludes by identifying further areas of research necessary to be able to make recommendations for undergraduate accounting education to enhance students’ knowledge and appreciation of big data.

Literature review

A definition of big data is often specific to the context, however it can be seen as the “exponentially growing amount of information made available by developments in computing and information technology, particularly the internet” (Vasarhelyi, 2015). The

increase in the amount of data is not new, but the rate of growth is unparalleled. Similarly, analysing data or business analytics is not new. Accountants have performed analytical procedures such as ratio and trend analysis for years. However the difference is that the technology and tools available today change the focus from looking backward using historical data, to the application of predictive modelling and predictive analytics (Cokins, 2013).

Kaplan (2013) explains that big data is different from ordinary database information because of the massive volume of data, the variety (structured, semi-structured, and unstructured) of data sources and the velocity of data generation. Additional forms of data include emails, video, blogs, social media content and data generated by machines such as sensors.

Big data offers opportunities for innovation and competitive advantage, however the value of big data comes from the ability to generate useful insights, not from the data itself. Business analytics can be defined as the ability to transform the “mountains of raw data into information to test hypotheses, see trends and make better decisions” (Cokins, 2013). This often requires reliable forecasting techniques and powerful computational software. Tools facilitating data analysis and predictive analytics are the products of technology vendors such as Oracle, IBM, Microsoft and SAP, to name a few.

SAP (2014) promotes predictive analytics as the conversion of big data into real time intelligence to drive creative and strategic thinking and informed decisions and actions. Analysis of alternative options can utilise future trends to provide simulated results and insights into organisational results, operational impacts, and customer behaviours.

Big data as a business enabler

Gartner (2014) explains that advanced analytics, using data and statistical methodology, can be used to solve business problems and enhance fact based decision making. This is possible through the provision of improved forecasts, understanding of causal relationships and identification of patterns. Other outcomes may include process improvement, optimisation of resource utilisation and enhanced scenario and sensitivity analysis.

Potential benefits accruing from using big data include the provision of data to more users who may provide new perspective(s), easier identification of patterns by having additional data, increased precision leading to better decisions (Fanning and Grant, 2013). They also identify some problems associated with big data, including the shortage of trained personnel and suggest an emphasis on analytics in universities. KPMG (2015) also identifies skills and expertise as one of the top three challenges to successful use of data and analytics.

Kaplan (2013) provides examples of the use of big data in retail, automotive, healthcare and financial services. The retail industry uses customer information such as website browsing patterns, past purchase behaviour and responses to promotions, to inform pricing changes, increase customer retention and cross-selling opportunities. In the automotive industry, sensor-generated data can be used to improve vehicle performance and generate predictive maintenance information. Big data is used in medical and pharmaceutical research to model predictive reactions in clinical trials. Financial service companies utilise big data to assess product, customer and channel profitability as well as predict fraudulent behaviour and monitor compliance with money laundering regulations.

In its annual report, the Inland Revenue Department (2015) notes the use of predictive modelling to change customer behaviour. Specifically, the department is able to identify

taxpayers who are likely to file late GST returns. This allows early interventions resulting in a significant reduction of outstanding GST returns.¹

There is compelling evidence that big data provides benefits for business, however EY (2014) identifies eight barriers or impediments to successful implementation of big data strategies. These include challenges relating to the necessary technology, shortage of talent, difficulty of building the business case and fear of cyber attack with its potential for business and reputation loss. Issues of ensuring data privacy compliance represent legal and regulatory risks. Inadvertent data security breaches, for example release of credit card information and confidential personal details held by organisations, attract unfavourable publicity. This affects customer and public confidence and willingness to share personal data which in turn may limit the value of insights from data analysis.

Big data and the accounting profession

Association of Chartered Certified Accountants (ACCA) (2013) discusses how big data and business analytics will impact the roles of accountants in the next five to ten years. As technology automates many of the traditional compliance and reporting functions of accountants, there is an opportunity for them to move to more strategic, proactive roles in business. The successful accountant in the future will be an important connector between the data analyst and senior management, utilising strong analytical and information management skills. Consistent with the traditional gatekeeper role and responsibility for integrity of financial information, the professional accountant is also the natural overseer of privacy and ethical usage of big data.

Financial accounting

¹ Note: The IRD database holding all tax and social policy customer information is three terabytes (3×2^{40} bytes) in size, the single largest Unisys database of its type in the world. (Inland Revenue Department, 2015).

Transactional data forms the basis for financial statements. Methods of recording and analysing have developed over the ages, from quill pens and the abacus, to enterprise resource planning (ERP) and cloud-based accounting systems. Warren et al (2015) assert that traditional financial information is already augmented by additional data, such as video and images, audio and textual data, including emails.

Financial accountants need to be cognisant of the effect of big data on traditional accounting records and information (Krahele and Titera, 2015). Real-time accounting information such as specific unit costing available with the big data environment means that aggregation inventory methods like FIFO or weighted average costing are inaccurate. Similarly, predictive analytics will produce better information for bad and doubtful debts expense. Present value information can be more accurate with real-time market data.

ACCA (2013) suggest that an entity's data will become so important in wealth creation, that it will be seen as a business asset that needs to be valued. Providing data valuation services is a potential opportunity and differentiator for accountants in the future. However the problems in performing such valuations are significant: determination of the basis for valuation of the data, its depreciation and market value are issues that financial accountants and accounting standards will have to confront.

Management accounting

Management control systems (MCSs) are important management accounting tools. Business analytics can be used in management control systems design, affecting decision-making, business strategies and performance measures. According to Warren et al (2015) analysis of big data elements such as metadata can provide important information for MCSs. Cokins (2013) discusses how a balanced scorecard, sensitivity analysis and forecasting can be improved with the use of business analytics. This may require changes to budgeting and

return on investment calculations, according to ACCA (2013). Risk management is another area to utilise big data, as the real time nature of the data should improve its reliability.

Auditing

The impact of big data on auditing will partly depend on its adoption by clients (Alles, 2015). Evaluation of controls over client's data capture, processing and facilities will be critical if auditors are to rely on client's analysis. Auditors can use non-traditional forms of information to validate financial statement assertions by management (Warren et al, 2015). For example, photographic evidence of fixed assets will corroborate other forms of evidence supporting the existence assertion.

There is potential for big data to influence accounting and auditing standards, especially the criteria for audit evidence, according to Krahel and Titera (2015) and Alles (2015). Big data could change the concept of sampling in auditing, as data analytics would enable testing of the entire population. International Standard on Auditing (NZ) 520 Audit Sampling would be subject to change as a result. It is likely that the auditor's evaluation of going concern could be enhanced by predictive analytics. Continuous auditing would become a real possibility with big data (Zhang et al. 2015).

Future accountants

It is important that accountants can 'value add' through bridging the gap between those who are doing the analytics work and those who utilise the results to make business decisions. They must understand 'big data-speak' and be able to critically evaluate the results of big data analysis. Familiarity with the tools of data analytics is desirable however capability to use the tools is not essential.

CAANZ (2015) in the recent study Disruptive Technologies Risks, Opportunities states that data analysts are predicted to benefit from disruptive technologies due to their skill-sets,

including technical knowledge, critical business thinking, strategic insight and relationship management.

Undergraduate accounting programmes research

The first stage in this research was to determine the coverage of big data and business analytics in existing undergraduate accounting programmes. This analysis included eight universities and eighteen institutes of technology and polytechnics in New Zealand and five universities in Australia.

Table I Tertiary institutions

<u>NZ Universities</u>	<u>NZ Institutes of Technology and Polytechnics</u>
AUT University	Aoraki Polytechnic
Massey University	Bay of Plenty Polytechnic
Otago University	Christchurch Polytechnic Institute of Technology
University of Auckland	Eastern Institute of Technology
University of Canterbury	Manukau Institute of Technology
University of Waikato	Nelson Marlborough Institute of Technology
Victoria University of Wellington	Northland Polytechnic
	Otago Polytechnic
<u>Australia Universities</u>	Open Polytechnic of New Zealand
	Southland Institute of Technology
Queensland University of Technology	Tai Poutini Polytechnic
RMIT University	Unitec Institute of Technology
Swinburne University of Technology	Universal College of Learning
University of Sydney	Waiariki Institute of Technology
Victoria University	Wellington Institute of Technology
	Waikato Institute of Technology
	Western Institute of Technology at Taranaki
	Whitireia Community Polytechnic

This first stage revealed that there are no standalone courses in big data or business analytics required as compulsory courses in the undergraduate accounting programmes. It was noted that there are relevant courses covering data mining, databases and analytics, however these courses are generally offered in Computing / Information Technology studies, and are not required courses for accounting students.

Recently, postgraduate offerings in Analytics have been established by Massey University and AUT University. The Master of Analytics (Massey University, 2015)

provides technical ability and the competence in critical thinking needed to transform massive amounts of data into information that is useful for crucial business decisions. The Master of Analytics (AUT, 2015) provides the data analytics skills needed in the rapidly growing ICT sector.

Further research

This preliminary investigation requires additional information on how big data and business analytics are covered in undergraduate accounting programmes. Further areas of research have been identified as a result.

It is recommended that further study be done to determine the extent and coverage of big data and analytics, if any, imbedded in statistics, management accounting and accounting information systems courses in the undergraduate accounting programmes of the sample tertiary institutions identified in Table I.

A further study would identify desired knowledge requirements in big data and analytics for accountants and perform a gap analysis with the coverage of big data and analytics imbedded in statistics, management accounting and accounting information systems courses in undergraduate accounting programmes. This would provide the basis for recommendations for financial accounting, management accounting and auditing courses.

The accounting profession and accounting academics have a duty to ensure that future accountants are aware of the opportunities and risks of big data. The successful accountant in the future will need analytical and information management skills to fulfil the role of an important connector between the data analyst and senior management. The professional accountant will also need skills to oversee the privacy and ethical usage of big data.

REFERENCES

- Association of Chartered Certified Accountants (2013) Big data: its power and perils available at <http://www.accaglobal.com/bigdata> (accessed 29 October 2015).
- Alles, M. (2015) “Drivers of the use and facilitators and obstacles of the evolution of big data by the audit profession”, *Accounting Horizons*, Vol. 29, No. 2, pp. 439-449.
- AUT University (2015) Master of Analytics available at <http://www.aut.ac.nz/study-at-aut/study-areas/computer-mathematical-sciences/postgraduate-degrees/master-of-analytics> (accessed 10 September 2015).
- Chartered Accountants Australia and New Zealand (2015) Disruptive Technologies Risks, Opportunities – can New Zealand make the most of them? available at <http://www.charteredaccountants.com.au/futureinc/> (accessed 21 October 2015).
- Cokins, G. (2013) “Driving acceptance and adopting of business analytics”, *Journal of Corporate Accounting and Finance*, Vol. 24, No. 2, pp. 69-74.
- EY (2014) Ready for takeoff? Overcoming the practical and legal difficulties in identifying and realizing the value of data. Available at <http://performance.ey.com/2014/03/31/ready-takeoff/> (accessed 13 October 2015).
- Fanning, K. and Grant, R. (2013) “Big data: implications for financial managers” *The Journal of Corporate Accounting & Finance*, Vol. 24, No. 5, pp. 23-30.
- Griffin, P.A. and Wright, A.M. (2015) “Commentaries on big data’s importance for accounting and auditing”, *Accounting Horizons*, Vol. 29, No. 2, pp. 377-379.
- Gartner Inc. (2014) “Strategic CPM as a driver for organizational performance management”, available at <https://www.gartner.com/doc/2647823/strategic-cpm-driver-organizational-performance> (accessed 13 October 2015).
- Inland Revenue Department (2015) “Annual Report” available at <http://www.ird.govt.nz/aboutir/reports/annual-report/annual-report-2015/> (accessed 29 October 2015).
- Kaplan, M. (2013) “Analyzing big data: the path to competitive advantage” available at http://hosteddocs.ittoolbox.com/zd_wp_big_data_v2.pdf (accessed 28 October 2015).
- KPMG International (2015) Going beyond the data: turning data from insights into value. Available at <http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/going-beyond-the-data.pdf> (accessed 13 October 2015).
- Kraheil, J.P. and Titera, W.R. (2015) “Consequences of big data and formalization on accounting and auditing standards”, *Accounting Horizons*, Vol. 29, No. 2, pp. 409-422.
- Massey University (2015) Master of Analytics available at <http://www.massey.ac.nz/massey/learning/programme-course->

[paper/programme.cfm?prog_id=93537&major_code=&study_year=2015](#) (accessed 10 September 2015).

Ramlukan, R. (2015) How big data and analytics are transforming the audit, *EY Reporting*, Issue 9, pp.10-13.

SAP SE (2014), “Predictive analytics customer successes” available at http://www.sap.com/bin/sapcom/fi_fi/downloadasset.2014-08-aug-27-15.predictive-analytics--customer-successes-pdf.html (accessed on 25 October 2015).

Vasarhelyi, M.A., Kogan, A. and Tuttle, B.M. (2015), “Big data in accounting: an overview”, *Accounting Horizons*, Vol. 29, No. 2, pp. 381-396.

Warren, J.D., Moffitt, K.C. and Byrnes, P. “How big data will change accounting”, *Accounting Horizons*, Vol. 29, No. 2, pp. 397-407.

Zhang, J., Yang, X. and Appelbaum, D. “Toward effective big data analysis in continuous auditing”, *Accounting Horizons*, Vol. 29, No. 2, pp. 469-476.