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Educational Case

Making sense of complex data using interactive data visualization

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ABSTRACT

An important role for accountants today is to provide decision support to senior management by assisting them in the analysis of large, complex data sets. Interactive data visualization (IDV) facilitates this process by allowing users to navigate, select, and display data via an easy-to-use interface often used as a component of data analytics. Given the increasing popularity of IDV as a tool for making sense of complex data, it is important that accountants become familiar with and learn how to use this technology. This case provides a hands-on opportunity to organize complex accounting data to create IDVs for decision makers to use. Further, the case enables students to understand the potential impact of IDVs on preparers and users of accounting information. Students will assume the role of a division controller in a hypothetical company and create an IDV to assist the chief executive officer (CEO) in decision making.

1. Background

1.1. Introduction

Today, accountants provide essential decision support to senior management, which often involves the analysis of complex data. Indeed, the accountant's role is moving away from an emphasis on transaction processing towards a focus on providing decision support to top management (Beaman & Richardson, 2007). To support management decision making, accountants are often involved in

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business intelligence, or the gathering, processing, and analysis of large, complex data sets (Chaudhuri, Dayal, & Narasayya, 2011; Romney & Steinbart, 2015). Interactive data visualization (IDV) facilitates this process by organizing and visually displaying data in an easy to use interface.

"Interactive data visualization" (IDV) refers both to the above-defined technology and to a specific application of that technology. IDV applications are also commonly referred to as "dashboards" (Tableau Software, 2012; Yigitbasioglu & Velcu, 2012). Unlike existing *static* information visualization technologies, where preparers select information items and their display format for decision makers, IDV allows users a choice of which data to display, how to represent the data, or both (Dilla, Janvrin, & Raschke, 2010). As discussed below, spreadsheet packages such as Microsoft Excel can be used to analyze large data sets via dashboards. However, many organizations are now using interactive visualization software since this technology seamlessly provides navigation, selection, and representation of data. Indeed, recent research reports that 57 percent of business and IT executives are currently implementing IDVs and 31 percent plan to do so in the next few years (Stodder, 2013).

Further, IDVs are one of many techniques used in data analytics, i.e., the processing of massive volumes of data that are too volatile, large, and complex to be handled effectively using current technologies found within most organizations (Livingstone, 2013; Schneider, Dai, Janvrin, Ajayi, & Raschke, 2014). With the recent availability of user-friendly interactive visualization packages for commercial use (SAP, 2012; Stodder, 2013), the exponential growth in data available for analysis (Moffitt & Vasarhelyi, 2013), and the demand for quick responses to changing scenarios, it is likely that this technology will be used increasingly to support management decision making (Chaudhuri et al., 2011; Heer, van Ham, Carpendale, Weaver, & Isenberg, 2008). Therefore, given the availability of IDV packages and the increasing use of IDVs for making sense of complex data, it is important that accountants learn how to use this technology.

As information *preparers*, accountants may be responsible for determining how to visualize and present information to management to support diverse tasks such as evaluating sales trends, monitoring IT network security, and detecting fraudulent transactions (Chaudhuri et al., 2011; Dilla et al., 2010; Yigitbasioglu & Velcu, 2012). Further, accountants may develop IDVs of financial information for investors and other external parties (e.g., BP, 2013; Microsoft, 2013a). The development of IDVs for investors is likely to increase due to the Securities and Exchange Commission (SEC)'s mandate that requires publicly-traded companies to furnish financial statement information in XBRL format (Dilla et al., 2010; SEC, 2009). In addition, given the increasing emphasis on accounting as a decision support role and the availability of IDVs within many ERP systems, accountants often are information *users* and employ IDVs to identify and investigate unusual patterns in complex information sets (Dilla et al., 2010; Yigitbasioglu & Velcu, 2012). Finally, the Pathways Commission (2012, p. 72) report sponsored by the American Accounting Association (AAA) and American Institute of Certified Public Accountants (AICPA) recently recommended that instructors "transform learning experiences to reflect current and emerging technologies." Further, the AICPA notes that enabling decision support and analytics is a top technology concern for accountants (AICPA, 2013). It is therefore important that accountants understand how to both *prepare* and *use* IDV applications.

This case introduces IDVs to students by requiring them to create a simple interactive application to support pricing and product-line strategy decisions. The case exposes students to the advantages of interactive visualization, as compared to the static graphical representations of accounting information that they might have prepared in introductory information systems or accounting courses. Similar to real-world applications, the data set does not generate a pre-determined optimal pricing and product-line strategy. The case can be implemented using a spreadsheet program such as Excel or one of several interactive visualization software packages currently available for instructional use.

2. The case

In this case, students assume the role of the division controller assigned the task of developing an IDV to support the parent company chief executive officer (CEO)'s decision. Specifically, this assignment involves creating an IDV for the CEO to use when making pricing and product-line strategy decisions for an office supply retailer. Students will complete the following tasks: