BIG DATA AND RISK ASSESSMENT

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LAURA RICKETT

Big data continues to be a big topic of discussion in the business world, and while companies tap into big data and data analytics as a strategy to achieve improved decision-making and performance, other areas of business have begun to tap into big data to improve processes. Improving the audit process in a number of ways, big data is expanding the data available to auditors, providing technology for advanced analytics, and producing data standards.[1] An essential element of the internal audit function, risk assessment can also greatly benefit from big data and data analytic methods. As audit committees and executive management continually challenge internal auditors to become more effective at quickly and accurately identifying all relevant risks facing a company, big data can enhance and improve the risk assessment process.

Prior to discussing the advantages and challenges of using big data in internal audit for risk assessment, it is important to provide an overview of big data. Organizations have enormous data sets available to them from countless big data sources, including web clickstream data, e-mail, and social media content (tweets, blogs, Facebook posts, etc.) as well as data from video surveillance, call centers, and research and development. Just how big is big data? It is estimated that approximately 2.5 exabytes of data are being generated daily as of 2012, which is expected to double about every 40 months.[2] An exabyte is approximately one quintillion bytes or one billion gigabytes and would fill 10 million blue-ray discs. It is estimated that 90 percent of today's data has been created in the last two years alone.[3] More data crosses the Internet in each passing second than was stored on the entire Internet 20 years ago. Companies can obtain petabytes of data in a single data set. A petabyte of data is the equivalent of one quadrillion bytes or approximately 20 million filing cabinets filled with text. Walmart collects approximately 2.5 million petabytes hourly from customer transactions alone.[4] In other words, companies have a lot of data!

LAURA RICKETT, Ph.D., *is an assistant professor of accounting in the Monte Ahuja College of Business at Cleveland State University, where she primarily teaches accounting information systems. Dr. Rickett has 10 years of experience working in public accounting as an auditor at Deloitte as well as her own private practice. She has been awarded a variety of teaching and merit awards along with several research grants. Dr. Rickett's research examines issues in auditing such as auditor tenure and PCAOB inspection deficiencies, in addition to accounting systems-related research matters. Dr. Rickett's research has been published in leading academic journals and she has presented her research at numerous regional and national conferences.*

Big data can also be defined by four characteristics, referred to as the four V's:

1. volume (the growing amount of data);
2. velocity (the incredible speed at which data is moving in and out of organizations);
3. variety (the wide variety of data types, formats, and sources); and
4. veracity (the level of certainty and reliability of data sources).[5]

Big data is often unstructured and evolves quickly. While these enormous data sets can seem overwhelming for companies to maintain and analyze, big data analytic methods allow companies to more easily deal with large volumes of unstructured data in order to produce useful information and insights — often in real time.

Big data analytics

Data analytics involves inspecting, cleansing, transforming, and modeling big data to deliver useful information and identify patterns to support decision-making. A survey was conducted by MIT Sloan Management Review and the IBM Institute for Business Value. The findings reveal that top performing organizations are five times more likely to use analytics than lower performing organizations, and top organizations focus on improving information and analytics.[6] Senior executives require that strategic and operating business decisions be supported with data-driven analytics. Given the focus that highly successful organizations place on the use of analytics, internal auditors can leverage big data analytic tools to enhance risk assessment and more accurately and quickly identify significant risks facing their company.

Data analytics is a "process by which insights are extracted from operational, financial, and other forms of electronic data internal or external to the organization."[7] These insights are not only performance-based, but can also be risk-based to address areas like control effectiveness, fraud, and regulatory compliance. Furthermore, recent innovations related to data analytics and data visualization, predictive analytics, and machine learning suggest that barriers limiting the use of audit data analytics in the past have been reduced.[8] These insights based on data analytics can provide considerable improvements in performing risk assessment.

Data analytics and risk assessment

Data analytics can be used to assess audit risk to predict the likelihood of fraud or misstatement. Internal auditors can conduct predictive analysis in order to identify data that do not adhere to expected patterns. Unusual patterns allow auditors to identify high-risk areas such as employee fraud. For example, data analytic techniques can uncover issues such as duplicate payments resulting from either employee fraud or errors and inefficiencies. Additionally, internal auditors can employ data analytic methods to focus on risk-based fraud detection and regulatory compliance.[9]

Wang and Cuthbertson suggest that the two audit areas particularly suited for data analytics are risk assessment and evaluation of internal controls.[10] Furthermore, internal auditors are continually challenged to be more efficient and effective at identifying risks.[11] Data analytics allows auditors to improve the identification of financial reporting fraud and operational business risks. Moreover, data analytics can generate risk-related information in real time thus allowing firms to take necessary measures to address risks in a timely manner. This can take place during normal operations to avoid disruptions to regular data processing.

DATA ANALYTICS INVOLVES INSPECTING, CLEANSING, TRANSFORMING, AND MODELING BIG DATA TO DELIVER USEFUL INFORMATION AND IDENTIFY PATTERNS TO SUPPORT DECISION-MAKING.

Given how frequently risks change, it is essential that internal auditors quickly identify both new risks and changes to previous risks in order to continuously adjust controls.[12] Big data analytics can also enhance the ability of internal auditors to perform continuous auditing, which is defined as:

> the collection of audit evidence and indicators by an internal auditor on information technology systems, processes, transactions, and controls on a frequent, repeatable, and sustainable basis.[13]

Continuous auditing also includes continuous risk assessment whereby internal auditors incorporate up-to-date information and assess risks as they emerge.[14] Continuous risk assessment is necessitated by quickly evolving risks that can render an internal audit plan obsolete almost overnight.

Cao et al. describe a variety of data analytic techniques that are ideal for auditing, including risk assessment.[15] Similar to the use of Twitter data and other social media to predict stock price averages, big data sources can be employed in risk assessment to predict bankruptcy and assess the overall financial health of a firm. Companies like Walmart use big data analytics to manage inventories; for example, they predict that customers buy more flashlights and Pop-Tarts when there is a threat of hurricanes. Similarly, internal auditors can use big data to predict sales by business location as well as peer-based metrics to highlight potential issues, allowing auditors to focus on high-risk areas.

Internal auditors can adopt a broader view of risk assessment due to the variety and volume of big data that can be employed to identify new and different relationships. This allows internal auditors to better define the most critical risks facing the company and, in turn, implement, evaluate, and monitor policies and processes to adequately address these risks. While internal auditors have used technology to analyze large data sets of structured numerical data, big data analytic methods now allow for the analysis of unstructured data such as e-mail, texts, audio, and social media data. This substantially expands auditors' ability to identify important exceptions that may represent significant risks for the company.

Challenges

As internal auditors capitalize on the growing opportunities related to big data, there are challenges. There has been significant growth in the development of data warehouses by internal audit departments. Brown-Liburd et al. note that as auditors begin to utilize big data, there may be behavior implications, as suggested by academic literature.[16] One issue is that audit judgment could be impaired due to information overload, making it more challenging to identify relevant information. Given that big data sources include semi-structured and unstructured data sets, auditors may need to increase their tolerance for ambiguity. Since data may not be well structured and, therefore, not easily uploaded into organizational databases, it is critical that either internal auditors or data scientists working with internal auditing departments be able to extract, manipulate, and properly structure big data to allow for effective analysis.

WHILE INTERNAL AUDITORS HAVE USED TECHNOLOGY TO ANALYZE LARGE DATA SETS OF STRUCTURED NUMERICAL DATA, BIG DATA ANALYTIC METHODS NOW ALLOW FOR THE ANALYSIS OF UNSTRUCTURED DATA SUCH AS E-MAIL, TEXTS, AUDIO, AND SOCIAL MEDIA DATA.

Advanced statistical skills are required to manage and analyze big data and to interpret the results of said analysis. Although there is an increasing call to include these skills in accounting programs, as of yet, most accounting curricula do not fully integrate such proficiencies. Companies hiring graduates to work in internal auditing should begin to demand these skills from accounting programs so that future internal auditors are fully prepared to utilize big data and data analytics in the internal audit function. Internal audit departments will likely need to collaborate with other disciplines with data science expertise, but eventually having the ability to recruit graduates with both accounting and advanced statistical analysis skills will be ideal to take advantage of all the benefits that big data offers to internal auditing.

According to Wang and Cuthbertson, auditors may have difficulty using data analytics in the audit process due to the following:

1. difficulty in acquiring appropriate data;
2. lack of training;
3. inadequate investments in technology;
4. uncertainty in where to start;
5. unclear cost and benefit information; and

6. concerns about false positive results.[17]

Furthermore, surveys by PricewaterhouseCoopers and Protiviti indicate that although respondents want to use technology and data analytics, the acceptance and use of computer-assisted audit techniques, which includes data analytics in auditing, is lower than expected.[18] At the same time, both academic and practitioner articles, along with auditing standards, continue to emphasize the use of data analytics in the future of auditing.[19]

While most internal audit professionals recognize the value of continuous auditing, they may lack financial and human resources as well as the design and implementation capabilities. However, internal auditors are beginning to develop data analytic tools and techniques that may allow for effective continuous auditing processes in the future.[20] As internal auditors begin to develop their data analytic capabilities to take advantage of the opportunities in internal audit (such as working with large operational data sets, pattern identification, etc.), they should consider issues associated with the quality of the results. Firms need to implement steps to validate data that can now be obtained from a wide variety of sources, and, therefore, they should implement processes to review and verify data quality.[21] Internal auditors may be uncertain about implementing big data and data analytic techniques in the internal audit process due to inexperience with technologies; therefore, effective training is vital.

INTERNAL AUDIT DEPARTMENTS SHOULD AIM TO DEVELOP AND IMPLEMENT DATA ANALYTIC CAPABILITIES THAT CAN PROVIDE BETTER INSIGHT INTO THESE RISKS, ALLOWING INTERNAL AUDITORS TO DEVISE AUDIT PLANS THAT ADEQUATELY ADDRESS THOSE RISKS.

Conclusions

One of the most important uses of big data and analytics in the internal audit function is to enhance risk assessment.[22] Big data and analytics can provide a clearer picture of the risks companies face as well as insights into how these risks can be mitigated. Internal audit departments should aim to develop and implement data analytic capabilities that can provide better insight into these risks, allowing internal auditors to devise audit plans that adequately address those risks.

The use of big data and data analytics continues to evolve in the internal audit function and is expected to have a growing impact. In 5 to 10 years, we will see a new generation of auditors who hardly recognize the internal audit function prior to the use of data analytics; this is similar to current internal auditors who would not recognize the audit function prior to electronic work papers in the generation before computers.[23] Big data and data analytics are leading the way for the future of internal auditing. ■

NOTES

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