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White paper

Data Mining using Excel

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Background

Purpose

Data-mining automates the detection of relevant patterns in pre-existing databases. It examines data to identify hidden patterns, predict future trends, and generate new information. In simple terms, data-mining helps to answer questions that were too time-consuming to resolve in the past.

Internal auditors have increased their use of data-mining¹ over the last decade to:

- Identify possible frauds.
- Test entire populations rather than sampling.
- Discover potential issues through risk or control monitoring.
- Test for regulatory compliance.
- Identify business improvement opportunities.

Background

During internal audit engagements, it can be difficult to perform detailed and meaningful testing, with auditors often faced with large amounts of data to analyse, test and conclude upon. More innovative techniques are required to help the auditor gain insights into trends in the data and identify any areas for additional attention.

Data mining is an analysis technique available for internal auditors who are endeavouring to best utilise resources in their budget, skill-set and capacity. As illustrated through examples provided through this White Paper, data mining is a technique that is scalable for different size internal audit functions, is relatively inexpensive and uncomplicated, and does not require specialist IT skills or consultant services.

The global Common Body of Knowledge (CBOK) survey conducted in 2015 by the IIA Research Foundation established that enhanced audit findings through greater use of data analytics was one of the top ten imperatives for driving success in a changing world. The CBOK survey captured insights from 14,518 respondents from 166 countries.

Data mining has a range of benefits for the auditor as well as providing useful information to Management. Benefits include productivity and cost savings, efficiency in data access, and reduced audit risk.

The use of data mining by internal auditors requires planning and analysis. The key stepsⁱⁱ for establishing this technique typically include identifying all manually performed audit tests, assessing each test to determine whether it can be performed using data mining, and developing and implementing a plan to evolve specific manual tests to automated data mining routines.

Discussion

Issue

Internal Auditors are faced with the difficulty of performing efficient and effective audit testing over balances or processes which have significant amounts of data.

History

Internal Auditors are required by Standard 2320 of the International Professional Practices Framework (IPPF) to perform appropriate analysis and evaluations when making an assessment.

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Meeting this requirement requires the review, testing and documentation of a balance, process or transaction. Internal auditors have a range of options to use in order to perform this step. However, being faced with significant amounts of data can be overwhelming, and some options are less effective than others. For instance, sampling only provides a small snapshot of a whole population.

Data mining is an alternative technique that can help see the bigger picture, make sense of large amounts of data, and identify trends or abnormalities for detailed testing. It can also help to pinpoint which areas require additional focus throughout the audit.

Discussion

Data mining firstly requires the relevant data to be retrieved and available to the auditor. As the data will form the basis of the analysis, the data should be reliable and accurate.

Barriers to effective data mining include:

- poor integrity in the data, leading to incorrect trends and conclusions,
- incomplete data,
- difficulty with formatting, e.g. exporting records from the record keeping system or general ledger into Microsoft Excel (Excel).

The auditor should consider what it is they would like to understand about the population in the context of their audit objectives, then obtain the relevant data. They should document some key questions that may be based on risks, objectives of the audit, or following discussions with Management. These could include:

- Where are the opportunities for fraud to occur, and what would it look like in the data?
- Where do errors typically occur in this area or process?
- What would we expect to see from a summary of this data?

What sort of things could be unusual in this data? Data mining does not require specialist software, though this might be appropriate for larger internal audit teams. Functions available in Excel can be used to assist the internal auditor in analysing a population. Some examples are explained below, referenced to the fixed asset example used in the next section:

Filtering: this function allows the user to identify particular text or numbers easily using defined criteria. Filtering can be used to:

- Identify any negative values in a population. For example, are any fixed assets incurring negative depreciation? Auditors can filter the depreciation column to see any negative balances.
- See data above/below a particular threshold. For example, are any fixed assets being depreciated at a rate lower than 10%? Auditors can perform a custom filter on the depreciation rate column to see any rates below 10%.
- Identify any transactions with missing data. For example, are there any fixed assets that are not being depreciated?

Sorting: this function allows the user to redistribute the data, such as:

- highest to lowest value (or vice versa): this can be useful to easily see the highest value fixed assets to be selected for testing

Pivot tables: this function allows the user to easily summarise their data. In regards to our example, a pivot table can show:

- the total amount (cost, written down value or depreciation) of each category of assets
- how many items are in each category of fixed assets (motor vehicles, office equipment or computer equipment)
- how many items are being depreciated at the same rate.

Formulas: the formulas available in Excel allow an internal auditor to check or re-perform calculations already in the data.

- the average actual depreciation rate per category of assets
- count the number of items in total and per category
- ensure the sequencing of asset numbers is consecutive.

The above techniques have been useful in reviewing large populations of financial balances such as debtors or creditors, payroll or other expenses. This type of analysis is also valuable for non-financial records such as property records or customer lists.

Example – Fixed Assets

An organisation's fixed asset register generally contains a large amount of data in a table, and may be presented in Excel format. When reviewing a substantial fixed asset register

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an internal auditor could be interested to know:

- How many items are in the register, and in each category of assets?
- Are all assets being depreciated?
- What are the highest value purchases in the year?

Knowing this information will help direct the audit testing, such as identifying items that look unusual or focusing on exceptions. Furthermore, this testing technique can extend to analysing non-financial balances.

For instance, data mining can allow the auditor to identify specific trends in property records, such as:

- which types of requests for maintenance works are most common
- how much work has been allocated to one contractor compared to others
- how many work orders were raised, closed and cancelled in a period
- analysis of which staff members raised the work orders.

Data mining can also help to identify specific trends in customer (tenant) records:

- which tenants did not undergo a rent review
- which tenants have incomplete records/fields in their data
- average amounts of income earned, rent paid or debt outstanding by the tenant population.

Insights obtained from the mining and analysis of data can help form the basis of a value-added discussion around what the data should look like, recommendations for improvement or areas of concern, and whether the findings are different to Management's expectations.

Conclusion

Summary

Data mining does not have to be a complicated audit test, and it does not require specialist software. It can provide an efficient way of analysing large amounts of data, using programs such as Microsoft Excel. There are a number of data manipulation techniques that can be used including filtering, sorting, pivot tables and formulas.

The analysis of data in this way can help the auditor answer key questions or concerns about the area they are reviewing.

Additionally this information can be provided to Management for feedback and to add value to the internal audit process.

Conclusion

Audit techniques such as data mining are a low cost method of analysing data with a significant population. This and other innovative techniques can be used by Internal Audit functions of all sizes (including small functions) to help add value to the business and achieve the requirements of the International Professional Practices Framework Standards.

Bibliography and References

Bibliography

Driving Success in a Changing World: 10 Imperatives for Success, Larry Harrington and Arthur Piper, IIA Research Foundation, 2015

Staying a Step Ahead: Internal Audit's Use of Technology, Michael P Cangemi, IIA Research Foundation, 2015
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i Driving Success in a Changing World: 10 Imperatives for Success, Larry Harrington and Arthur Piper, IIA Research Foundation, 2015, page 16

ii Staying a Step Ahead: Internal Audit's Use of Technology, Michael P Cangemi, IIA Research Foundation, 2015, page 10

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Purpose of White Papers

A White Paper is a report authored and peer reviewed by experienced practitioners to provide guidance on a particular subject related to governance, risk management or control. It seeks to inform readers about an issue and present ideas and options on how it might be managed. It does not necessarily represent the position or philosophy of the Institute of Internal Auditors–Global and the Institute of Internal Auditors–Australia.

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As the chief advocate of the Internal Audit profession, the IIA serves as the profession's international standard-setter, sole provider of globally accepted internal auditing certifications, and principal researcher and educator.

The IIA sets the bar for Internal Audit integrity and professionalism around the world with its 'International Professional Practices Framework' (IPPF), a collection of guidance that includes the 'International Standards for the Professional Practice of Internal Auditing' and the 'Code of Ethics'.

IIA–Australia ensures its members and the profession as a whole are well-represented with decision-makers and influencers, and is extensively represented on a number of global committees and prominent working groups in Australia and internationally.

The IIA was established in 1941 and now has more than 200,000 members from 190 countries with hundreds of local area Chapters. Generally, members work in internal auditing, risk management, governance, internal control, information technology audit, education, and security.

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