



USE OF DATA ANALYTICS TOOLS FOR INCREASED EFFICIENCY IN THE INTERNAL AUDIT PROJECT PORTFOLIO

Uso de ferramentas de análise de dados para aumentar a eficiência no portfólio de projetos de auditoria interna

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ABSTRACT

The constant evolution and dependence of technologies on corporate business activities and processes brought an increase in electronic transactions in company processes and, consequently, a need for transformation in the project portfolio of the Internal Audit area. Based on these needs, technological tools such as Data Analytics appear as technical support options for audit project managers to extract, model, improve and optimize the analysis and scope of the data. The purpose of this report was to present how the implementation of technological Data Analytics tools contribute positively to increasing the efficiency of the internal audit project portfolios. The results showed that the implementation of this type of technology during internal audit projects and processes could reduce the intensity of the work, expand its reach in the results and increase the efficiency of production in time and cover the cycles of audited processes. The use of Data Analytics has positive advantages for the AI project portfolio and for the future of the area, such as better project planning, greater resource management, more comprehensive scope definition, agility in the execution of audit work, traceability and record of analyzes performed and performance increase.

Keywords: Internal Audit; Project Portfolio, Project Management; Data Analytics; Data analysis.

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USO DE FERRAMENTAS DE ANÁLISE DE DADOS PARA AUMENTAR A EFICIÊNCIA NO PORTFÓLIO DE PROJETOS DE AUDITORIA INTERNA

Use of data analytics tools for increased efficiency in the internal audit project portfolio

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RESUMO

A constante evolução e dependência das tecnologias nas atividades e processos dos negócios corporativos trouxe um aumento das transações eletrônicas nos processos da empresa e, conseqüentemente, uma necessidade de transformação no portfólio de projetos da área de Auditoria Interna. Com base nessas necessidades, ferramentas tecnológicas como o Data Analytics aparecem como opções de suporte técnico para que os gerentes de projetos de auditoria extraiam, modelem, melhorem e otimizem a análise e o escopo dos dados. O objetivo deste relatório foi apresentar como a implementação de ferramentas tecnológicas de Data Analytics contribuem positivamente para aumentar a eficiência das carteiras de projetos de auditoria interna. Os resultados mostraram que a implantação desse tipo de tecnologia durante projetos e processos de auditoria interna pode reduzir a intensidade do trabalho, ampliar seu alcance nos resultados e aumentar a eficiência da produção no tempo e abranger os ciclos dos processos auditados. A utilização do Data Analytics traz vantagens positivas para o portfólio de projetos de IA e para o futuro da área, como melhor planejamento de projetos, maior gerenciamento de recursos, definição de escopo mais abrangente, agilidade na execução dos trabalhos de auditoria, rastreabilidade e registro das análises realizadas e aumento de desempenho.

Palavras-chave: Auditoria Interna; Portfólio de projetos, gerenciamento de projetos; Análise de dados; Análise de dados.

INTRODUCTION

Among the definitions found in the literature, project portfolio management, from the English Project Portfolio Management (PPM), may be defined as a series of models, procedures and processes that aim to manage a set of projects in a systemic way (Carvalho & Rabechini Jr., 2008). In addition, the Project Management Institute defines that the PPM has the function of structuring and coordinating the components of the project portfolio, in order to achieve the organization's goals and strategies (Garfein, 2009).

Inserted in the Internal Audit (AI) companies, the PPM has the role of performing the shared management of financial and human resources in search of increased performance (Rabechini et al., 2005). The objective is to understand the consolidation of projects, to better manage shared resources and obtain better performance results in the quality of projects (Carvalho, Lopes & Marzagão, 2013). Regarding management practices, the purpose of PPM is to work with several projects with common results objectives in a single portfolio, (Hill & Jones, 1992). In companies in this segment, the projects aim to develop an objective assessment plan, using a systemic and disciplined approach to assess and, in future projects, improve the effectiveness of risk management processes. The ultimate objective of these premises is to add value and improve the operations of companies (Oliveira, 2018).

The traditional approach to managing AI projects is based on consulting data, facts and records of projects carried out in the past, which may become insufficient for the current scenario, marked by greater access to information and technologies (Silva & Almeida Jr, 2014). According to the report presented by Pricewaterhousecoopers (2019)¹, the lack of use of technologies to access data to support AI projects can contribute to companies in this segment being outdated in their organizational processes. To remain competitive, the report argues that these companies need to keep up with the digital pace of business, knowledge, and skills to provide advice and strategic assurance through their projects. Otherwise, they may suffer from negative impacts such as slowness in the execution of projects, with the low periodicity of the business process review cycle and the limitation of analyzes of corporate transactions by samples, which become factors of concern and must be the scope of project portfolios.

Given these needs, Data Analytics (DA) tools emerge as technical support options for project managers in AI companies to model, improve and optimize data analysis and scope. The DA techniques approach the extraction, mining, statistics, and research of the data using software. Through its use in project activities, it is possible to identify changes and deviations from procedures, to generate an accurate and detective standard of analysis in business transactions through its schedules and scripts (commands or instructions automatic), in addition to contributing to the reaction and treatment of project activities (Russom, 2011).

In this way, the constant evolution and dependence of technologies on corporate business activities and processes brought an increase in electronic transactions in AI companies and, consequently, a need for transformation in the project portfolio. To remain competitive, AI companies with project portfolios need to innovate, which can be a challenging task, where 56% of companies in this AI segment in Brazil will seek transformation in their project portfolios over the next 5 years (Deloitte, 2018)². Given this changing scenario and marked by factors of concern, such as slowness in the execution of audit projects, low periodicity of the business process review cycle and limitation of analyzes of corporate transactions by samples, this technical report aims to answer the following question: **How can technological tools contribute to the efficiency of the Internal Audit project portfolios?**

In this context, the present technical report aims to present a case of implementing a continuous audit project through the application of DA software in a leading company in the segment of paper and personal care products in Brazil and Latin America. The project had the participation of CAE (Chief Audit Executive) from the internal audit director, responsible for the project portfolio, and the local coordination of the area, responsible for the configuration and development of the DA tool under the supervision of the Systems Audit Manager. The company had 34 business processes mapped that convert into audit projects, and has a team of 3 local auditors, as a result, the company suffered from negative delays in the execution of audit projects, low periodicity of review

¹ <https://www.pwc.com/us/en/services/risk-assurance/library/internal-audit-transformation-study.html>

² <https://www2.deloitte.com/content/dam/Deloitte/br/Documents/technology-media-telecommunications/ICT-insights-report-eng.pdf>

of business processes and limitation in the analysis of corporate transactions by samples. In short, negative impacts on time and availability of operational resources to meet all expected demand.

The purpose of this report was to present how the implementation of technological Data Analytics tools increases the efficiency of the internal audit project portfolios. This technical report is organized into seven sections, including this introduction. In the following, a brief review of the literature on Management of AI and Data Analytics Project Portfolios will be presented to support the Management of Internal Audit Project Portfolios. Then, methodological aspects will be addressed. Then, the results and final considerations will be presented. This technical report was prepared in accordance with the protocol for preparing technical production reports proposed by Biancolino et al., (2012).

1. THEORETICAL REFERENCE

In this section, the concepts of Project Portfolio and their relationship with AI are presented, as well as the possible solutions for Data Analytics software for AI projects as a contribution to optimize their results.

1.1 Internal Audit Project Portfolio Management

PPM is highlighted as a set of projects, programs and other work grouped to facilitate its management, making it more efficient and allowing the company, or an area, to achieve its goals (Carvalho & Rabechini Jr., 2008). Focused on the organization and not on the project, an organization or area strategy was initiated in the late 1990s with an emphasis on project alignment and on the effective allocation of available resources. (Rabechini et al., 2005). In 2009, the Project Management Institute released a PPM guide proposing a model for its management (Garfein, 2009).

PPM techniques consider that the company's resources are limited and that projects must align with organizational objectives (Castro & Carvalho, 2010). Unlike a project or program, portfolios are not temporal. They exist as a set of planned initiatives, in line with the strategic objective of the area. Project proposals become part of a portfolio when they are identified, selected and approved (Garfein, 2009).

CAE in the AI area is responsible for creating initiatives to improve efficiency in its portfolio and activity plans. At this point, projects are established that align with the company's strategy (Cooper & Edgett, 2010), grouping them into portfolios and programs in order to balance the use of resources and maximize the generation of value for the area and the organization (Martinsuo, 2013) and (Silva & Almeida Jr, 2014). The choice and selection of projects in an audit portfolio, must be done carefully so that they are aligned with the strategy of the organization it belongs to. By effectively managing the project portfolio with a focus on improving and efficiency of results, CAE will maintain the right balance of projects. Cooper, they claim that strong portfolios contain high-value projects with few trivial and low-value projects, and that the best performing companies are the ones where projects are prioritized correctly and where there is a right balance between available resources and the number of projects.

However, with limited resources and a traditional approach, internal audit projects can become insufficient, and negatively impact the results of the portfolio, as they demand more execution time and can lead to slowness in the closing of audit projects. Consequently, impact on the periodicity of the business process review cycle and limitation in the analysis of corporate transactions by samples. (Chan & Vasarhelyi, 2018). This scenario can generate occurrences of project re-planning, result in alteration of resources in activities and projects, which can aggravate the management of critical projects. (Castro & Carvalho, 2010).

Given the complexity and technological advances of corporate transactions, managers in the AI area have increasingly resorted to technology projects to support processes and operations and increase their efficiency (Silva & Almeida Jr, 2014). The objective is to offer an analytical approach to the data that the organization has, in support of its projects, in order to optimize time and resources. The studies point to DA software as the main tools used, which allow to maintain a continuous audit of the processes, maximizing the projects of its portfolio.

According Deloitte, (2018), in the last two years in Brazil the use of DA in the areas of Internal Audit has doubled from 16% to 32%.

1.2 Use of Data Analytics to Support Internal Audit Portfolio Management

Corporate information systems, along with the latest business application technologies in the digital and internet age, have led to a profound change in the AI project portfolios and their tools (Costa & Inácio, 2012)³. The technological tools, ERP (Enterprise Resource Planning), Data Analytics, Machine Learning and Artificial Intelligence have become a support for project management and its portfolios (Chan & Vasarhelyi, 2018). Such tools emerged as resources capable of using technology to integrate all the organizational functions of a company, such as: human resources, finance, production, sales and distribution, in a single set through software modules (Madani, 2009).

In the view of Chan & Vasarhelyi, (2018), DA is characterized by the applied use of data through software in order to analyze systematic reasoning as a support in a decision-making process. This tool is configured with data modeling and analysis techniques based on statistics, data mining and research used for analytical procedures, and can be applied in various business operations and departments. (Russom, 2011). The use of DA is directly aimed at improving analytical performance, which can be demonstrated through indicators related to the fundamental domains of an area or project (The Institute of Internal Auditors - IIA, 2018)⁴.

These technological resources support the AI project portfolios to organize and optimize their results in projects and increasing their efficiency in time and use of resources, currently there are several applications available on the market. Amaral; Marques & Inácio (2019) mention in the context of analysis and data extraction for AI, software such as Interactive Data Extraction and Analysis (IDEA) and Audit Command Language (ACL) that are Data Analytics tools. The purpose of this software is to make it possible to access and analyze a large amount of data in several projects, in a timely manner, in order to provide an effective measurement for the projects and support their portfolio (Alles & Gray, 2016).

The implementation of DA in the AI project portfolio can increase the performance of audit processes in time and increase their efficiency, extension and monitoring of analytical and substantive tests (KPMG, 2019)⁵. Adopting tools of this size is ideal due to the ability to work with the large amount of data and the frequency of monitoring the tests needed in the projects in your portfolio. Second Vasarhelyi et al., (2012), automation in audit projects provides benefits such as improved efficiency and reduced workforce, consequently an increase in the quality of projects, implementation of uniform procedures, increased audit independence in relation to the management of the organization's information systems, and more consistency of audit procedures.

2. RESEARCH APPROACH

The research method of this study considered an empirical analysis, through Action Research with qualitative character proposed by (Thiollent, 1996) and (Tripp, 2005). According to Bauer and Gaskell (2017), the qualitative approach is not concerned with the representation of numbers, statistics, but aims to deepen the understanding of the phenomena it studies, such as the actions of individuals, groups or organizations in their environment or context.

The study was conducted at a leading company in the industrial paper and personal care sector in Brazil and Latin America. The choice of the analysis unit was intentional, since the organization presents the conditions for evaluating the practices and structure of projects from the perspective of implementing technological tools for DA. The data collection was based on primary data, obtained through professionals, as well as secondary data extracted from the analysis of internal company documents.

³ <https://ria.ua.pt/bitstream/10773/13337/1/57a.pdf>

⁴ <https://global.theiia.org/about/about-the-iiia/Public%20Documents/2018-Annual-Report-Final.pdf>

⁵ <https://assets.kpmg/content/dam/kpmg/sg/pdf/2019/09/agile-internal-audit.pdf>

The purpose of this report was to present how the implementation of technological Data Analytics tools positively contribute to increasing the efficiency of the internal audit project portfolios. For information, the author participated in all project alignment meetings, served as a consultant for the development of technical scripts for the proposed DA software, training, implementation and post-implementation monitoring of the project with the Internal Audit Board.

Regarding the documents, electronic documentation was analyzed containing the scope and schedule of the projects, in addition to internal documents available in an online tool in the internal audit area. For Martins & Theóphilo, (2009), documentary research uses primary sources of the most varied types of documents, allowing to obtain information and evidence of materials that have not been used for any analysis work, or that can be reexamined.

2.1 Project Context

The characterization of the organization and the analyzed project where this technical report was made will be presented below. This technical report was made at a leading company in the paper and personal care segment in Brazil and Latin America. In Brazil, it has about 2,000 employees distributed in 5 paper production and conversion plants in the national territory. It is part of a Chilean Group that has operations in 8 countries with revenues of 22.8 billion per year, according to the 2019 position.

In relation to the national audit area, it has a team of 03 auditors responsible for the annual plan to audit two branches that includes: 05 plants, 34 business processes and 517 mapped control activities.

2.2 Characterization of the analyzed project

The project lasted 6 months and started in January 2018 and ended in June 2018. It covered the company's information technology (IT) areas, the local internal audit area and the corporate team. The interaction between the project areas was supervised by the IA Directorate, who managed the stages of the project and allocated the necessary resources as needed. The scope of the project was the implementation of a Data Analytics tool called ACL Analytics in conjunction with applications that interface with the company's ERP system and server access to perform activities.

The purpose of automating its procedures contributed efficiently to the performance of audit processes, increased efficiency in the time of execution of work, extension and monitoring of analytical and substantive tests, in addition to promoting an analysis range of 100% of business transactions. Through the positive impacts of project automation and optimization, these results generated, consequently, support to CAE for the management of AI's project portfolio.

A platform was developed with the aim of providing a DA solution with automated analyzes, pre-designed and modeled to perform audit tests based on data behavior patterns. The project portfolio strategy was to cover the main business risks in key company processes, creating a standard among the projects, with automated verification which can be performed at any time and time, which generates the possibility to audit processes in cycles smaller and wider range.

This strategy allowed AI to keep its performance in line with its objective, and to solve the negative impacts that the company suffered, such as slowness in the execution of audit projects, low periodicity of the business process review cycle and limitation of analyzes of corporate transactions by sampling the occurrences. The adoption of the DA tool contributed to the area's portfolio, solving the time limitations and reach of operational resources to meet the expected demand, in addition to increasing the efficiency of the projects.

2.3 Type of Intervention and Mechanisms Adopted

The IA area noted in its annual plan that the lack of a DA tool and the operational limitation to address all projects within a year, occurred on a rotating basis, preventing the achievement of better results. This limitation

was given to the framework of available resources and analysis tools in the area, basically the use of ERP and Excel system reports, which directly impacted the time of the audits, leading teams and auditors to take more time in the process information extraction and base relationships. Consequently, greater demands for layout adjustments, parameter verification, as well as inherent factors such as staff turnover and limited knowledge of new resources.

Another important observation to consider was the objective pursued in AI's project portfolio, to increase its efficiency by expanding the capacity to reach a greater number of transactions in the business areas, which was not feasible with the limitation of the basic analysis tools that did not support such a configuration. Another aggravating factor was the procedures for sampling and selection of identified events or facts, due to the size of the volume of data generated in systemic transactions. This perception was identified in the project portfolio, since the audit tests mostly represented few automated analyzes, with scopes aimed at document analysis with too much need for face-to-face analysis, and which negatively did not cover the necessary evaluation, to mitigate the risks and objectives of business processes.

2.4 Project Planning and DA Tool Selection

The software and applications used in the project were contracted from a national company operating in the audit solutions market. Although the Data Analytics (DA) solution becomes one of the great helpers and facilitates day-to-day tasks, automating audit routines and projects, its implementation requires planning and a strategic approach. Regarding practical application, with a focus on obtaining greater benefits from its resources and optimizing its results, the company's AI area has adopted technological tools with the ability to extract, model and verify data with connectors that allow direct access to the database. data from the company's systems.

Additionally, AI resorted to the development of scripts in the adopted tools. Scripts are automatic commands or instructions to perform an operation. This transformed and altered the audit approach, making it continuous, bringing greater capacity for analysis and reducing the time spent on testing. This factor, contributed to the allocation and distribution of resources in other projects in a dynamic way, thus expanding the coverage of revised processes.

In planning, it was determined by CAE that the Systems Audit Manager would be the overall project leader. Regarding the position, his responsibility was to ensure that the implementation of the tool in the projects was developed correctly and completed successfully. The role of a project manager with technical capacity according to the nature of the project is fundamental to the result of this type of initiative and directly impacts the area's portfolio. The project leader had the local AI coordinator as the project's business consultant. Furthermore, the team of systems auditors was allocated to develop the parameters of the scripts. The defined structure allowed CAE to manage the portfolio, so that the right projects were executed to achieve the objectives, during the development and implementation of DA occurring.

2.5 Mapping of business process and objective controls

Tool licenses were obtained and connectors for data extraction were applied to all machines in the team. CAE in the management of the project portfolio, distributed the strategic objectives among the different planned projects. The IA coordinator planned the mapping of the processes, identifying their controls and related risks. He assigned each operational auditor to collect information on business processes and their respective parameters in the company's ERP system.

At this stage, to contribute to the implementation of DA tools, four important concepts were emphasized. The first is which business process would be reviewed and according to which business rules were related to these, third is the source of data extraction and finally focus on the iteration of the project scripts to be defined, as shown in Figure 1. It was important to communicate directly with the partners in the process currently, to understand and map the business rules and exposure to risks. This interaction helped the project team to adapt quickly to unpredictable situations, and to promptly act on changes in the requirements of the development project.

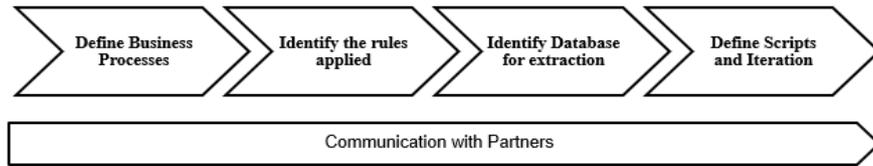


Figure 1. Mapping of business process and objective controls

The Coordinator and the operational auditors identified the areas and business processes to apply the extractions. They highlighted the corresponding systemic transactions, and as a requirement determined where the business rules were applied, to support the development of the verification scripts. In general, this step was clearly aimed at identifying the data sources of the business processes, the rules applied and defining which audit procedures should be developed to form the monitoring and tests that could be automated. This mapping was elaborated and consolidated in a matrix with a description of the controls, risks, and transactions of the system, considering recurrences of execution and parameterizations.

2.6 Extraction, Data Modeling and Analysis Tests.

The identification of the transactions and tables of all the project's processes through DA allowed the modeling of the data, allowing the generation of information bases with the extracted data, consequently the evaluation of its transactions and the presented balances. Techniques for estimating, classifying, associating, and relating systemic tables were applied, generating information and behavior patterns within the tool itself, reaching 100% of the records, eliminating the use of sampling. The purpose of data modeling is to train analytical models and algorithms to discriminate or estimate transaction data considered abnormal or exception.

In the evaluation of the test programs, the design was prepared by the IA coordinator together with the project manager and the systems AI team. The analysis was based on business rules. The systems audit team generated verification scripts that compared the rules with the actions of the system users, considering company policies. The purpose was to identify transactions with deviations from procedures, to evaluate the settings of the internal controls and to verify transaction details. A test validation phase was applied to each script, to certify the exception reports generated in the DA, to confirm that the exception really was information free from material errors, omissions, or fraud. The Figure 2 shows the dynamics of DA intervention.

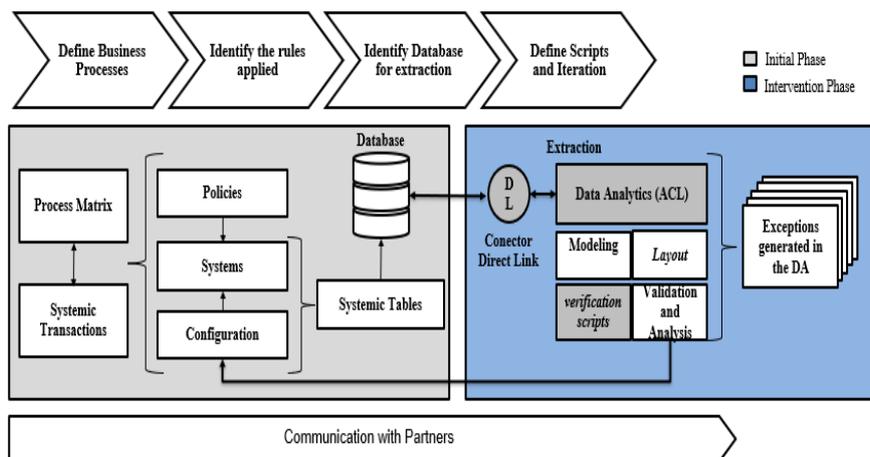


Figure 2. Extraction, Data Modeling and Analysis Tests via Scripts

The tool brought greater dexterity to the audit projects, which identified transactions involving deviations from internal control and breaking of the defined rules quickly, signaling in masse exceptions verified and

reported in real time. Full coverage of the transaction base, in appropriate time, allowing to revisit processes more frequently and optimizing the performance of operational resources.

The results were observed, as the projects for each business process were completed. The perception of the objectives achieved confirmed that the DA tools can transform the audit approach and contribute positively to the project portfolio in the area. It optimizes the execution time of projects, reaches 100% of business transactions, contributes to the performance of the audit team and allows to revisit processes more frequently. We found that the automation of analytical tests for the company's main processes and risks enhances the use of DA in AI's project portfolios.

3. RESULTS AND ANALYSIS

The results showed benefits for the project portfolio of internal audit through the implementation of DA tools. As stated by Castro & Carvalho, (2010) although the portfolio management activities are concentrated at the tactical level, which aims to achieve the strategic objectives and goals determined in the project, the strong relationship between the strategic level and the other levels was a fundamental factor in the result of the implementation of the DA. Having the objectives and goals clearly defined by CAE at the beginning of the project, was a guide for all the development carried out. This relationship has extended positively to meetings at the operational level, where projects are carried out.

The initiative to adopt an DA tool had the support and commitment of all those involved in the AI, the planning of the processes to be reviewed and the responsibilities well distributed, resulted in a continuous alignment of the executions at all levels of the project. This synergy benefited the conclusions and closings of each delivery of the implementation of the tools and optimized the execution of the projects, a real balance as commented by Cooper & Edgett (2010), which strengthens portfolio management with a focus on correct projects that add value.

The defined project structure and allocation of resources were key to the effective progress of the project, both in the implementation of the DA and in the development of the Analysis Scripts. The scripts, in fact, became a differential for the audit, based on the results, and on the premises of the collection of primary data obtained, the automation of analytical tests impacted the main macro business processes and their risks, a total of 14 audited cycles : Purchases of Services and Materials, Accounts Payable, Accounts Receivable, Inventory Management of Materials and Finished Products, Accounting, Fixed Asset Management, Investment Projects, Corporate Sales and Sales, Production and Cost, Marketing and Distribution and Freight. The project resulted in 45 scripts configured with validation of business rules and analytical summaries to support the audit,

The use of DA for the analysis of the audit, with the verification scripts, represented a gain in time in the execution of the audits of 44%, in comparison to the scenario before the implementation of the tool for the same process. Considering the amount of systemic analytical tests adopted in the projects, there was a considerable increase of 80%. Not to mention the increase in the sample size, which now considers 100% of the records in the audited period.

These results show the efficiency and effectiveness of DA tools in the AI portfolios, demonstrate that the implementation of technology during audit projects and processes can reduce the intensity of the work (Elliott, 1998) and increase production efficiency in time and coverage of audited processes (Menon & Williams, 2001). The trend points out that more and more in the coming years, the use of these tools will be continuous in the routine of the area and of the AI portfolios.

CONCLUSION

The purpose of this report was to present how the implementation of DA technological tools contributes to the increase of efficiency in the AI project portfolios. Based on the results and the existing technical literature, it sought to answer the following research question: "How can technological tools contribute to the efficiency of the Internal Audit project portfolios?"

The study revealed the positive impacts of adopting automation and data modeling tools in AI projects. The use of the tool presented advantages for the AI project portfolio and for the future of the area, such as better

project planning, greater resource management, more comprehensive scope definition, agility in the execution of audit work, traceability and registration of analyzes performed and increased team performance. It was possible to verify the advance in the performance of the hours used in projects, in the identification of deviations and opportunities for improvement identified, in the use of resources per project, in the amount of work performed according to the audit plan, consequently a higher level of quality of the reports, optimizing the results substantially.

Clearly, it has been confirmed that the use of DA contributes to standardize data collection and systemic formalization of the company's internal control policies, which benefits AI's project portfolios. Furthermore, it confirms in its essence that it is a means to overcome the limitation exposed in the introduction of this report, when considering the entire population of business transactions in the audit tests and with increasing efficiency in the identification of deviations or possible errors. In periodic audits, a non-conformity that was not detected in the sample selected by the auditor could propagate its effects, causing damage to the processes. Thus, the audit process gained speed, for the systematic analysis of the cause and taking corrective or preventive action. The use of these practices, following the implementation phases shown in Figure 3, it made it possible to comply with the area's objective and strategies, which assessed high-risk business processes and assessed its control environment, ensuring compliance with the company's business rules.

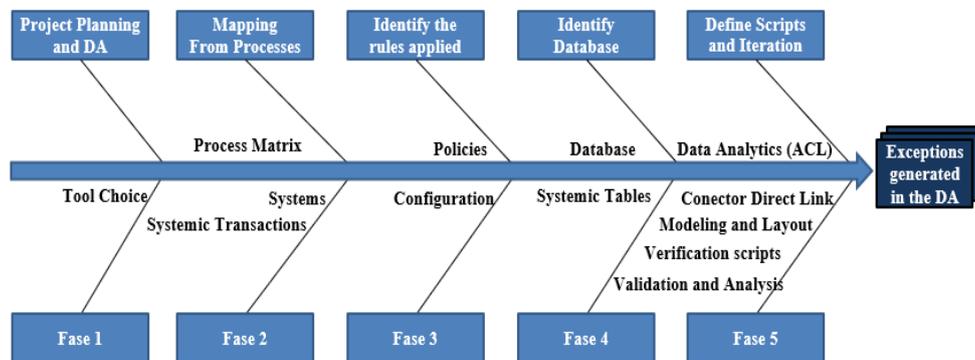


Figure 3. Concepts and Application Phase

It is worth mentioning that the study was limited to analyzing a project in a company of a specific segment, therefore the results observed here may be different when adopted in a scenario of portfolios or companies from other segments. As a suggestion for future studies, it would be important to analyze other variables that could impact or influence projects. Some of the limitations of this study are the absence of proof of the benefits in terms of the costs of adopting audit tools and the implications of developing internal audit scripts, which can be considered in future research.

Thus, recommendations for future studies may consider: Analyzing the degree of use of DA in the areas of auditing in companies in the same segment; The implications for the use of the DA tool incorporated in the ERP systems that can cover the business audit risks; Analyze the current level of knowledge of DA and Verification Scripts by internal auditors and the development of technical skills for their use.

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