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Marcelo Machado de Freitas

Acceptance and Net Benefits of Continuous Audit in the Public Administration

Florianópolis

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Acceptance and Net Benefits of Continuous Audit in the Public Administration

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This dissertation is dedicated to my wife, my daughter, my family, friends, and Professors.

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*“If we knew what it was we were doing,
it would not be called research, would it?”*
Albert Einstein

RESUMO

Esta tese tem por objetivo geral analisar como ocorre a aceitação da Auditoria Contínua e como a Auditoria Contínua reflete-se em benefícios líquidos para a auditoria interna em um Governo Estadual, na visão da Gerência de Auditoria de Pessoal (GAPES). A tese possui como base teórica a Teoria Unificada de Aceitação e Uso de Tecnologias (UTAUT) e o Modelo de Sucesso dos Sistemas de Informação. Os antecedentes da teoria são compreendidos como a expectativa de desempenho, expectativa de esforço, condições facilitadoras, influências sociais e qualidade do sistema. Já os benefícios líquidos de acordo com a literatura foram a qualidade da informação, agilidade, precisão, planejamento de auditorias, eficiência e custo x benefício. Já os fatores negativos associados estão os custos e a possível perda de independência. O estudo foi operacionalizado por meio de um estudo de caso, com dados coletados via entrevistas com aplicação de roteiro semiestruturado, documentos e observações de campo. Os dados foram tabulados e analisados por meio da técnica de Análise de Conteúdo. Foram evidenciados que a aceitação da AC é direcionada por esforços individuais (habilidades), esforços coletivos, recursos humanos, estrutura física, qualidade dos dados, estrutura organizacional e qualidade dos sistemas. O apoio da alta gestão mostrou-se importante e foi ressaltado por todos os auditores internos para que a AC seja adequadamente aceita dentro da GAPES. O apoio da alta gestão mostra-se particularmente mais significativo para o sucesso da AC quando esses gestores possuem conhecimentos, ainda que básicos, sobre análise de dados e compreendem a importância dos dados para a adequada operacionalização do modelo. Além disso, foram evidenciados efeitos positivos da AC (benefícios), como benefícios financeiros, ganhos de eficiência, controle mais abrangente, precisão de atuação. Efeitos negativos foram identificados como um elevado número de falsos positivos, sobreposição de funções entre auditoria interna e gestão, e dificuldades de tornar os apontamentos da AC em melhorias de controle interno. A presente tese conclui que a aceitação da AC e seus eventuais benefícios líquidos para a organização ocorre de maneira multidimensional, e que ao invés de uma relação direta em que a aceitação leva a mais benefícios, os benefícios líquidos da AC também são responsáveis por aumentar o uso da AC e sua satisfação.

Palavras-chave: Auditoria Contínua; Aceitação; UTAUT; D&M; Benefícios líquidos.

RESUMO EXPANDIDO

Introdução

O pioneiro projeto realizado nos laboratórios da Bell [laboratórios da AT&T] (ver Vasarhelyi e Halper, 1991) deu fruto a um dos primeiros trabalhos sobre a Auditoria Contínua (AC). A AC pode ser compreendida como uma metodologia que fornece asseguração contínua sobre determinado tópico, utilizando-se para isso de uma série de relatórios elaborados simultaneamente ou em um curto intervalo de tempo após a ocorrência de eventos relevantes (AICPA, 1999). O trabalho de Vasarhelyi e Halper (1991) elaborou sua pesquisa com base nas tecnologias existentes na época. Entretanto, os anos que se seguiram presenciaram uma revolução tecnológica, que ampliaram consideravelmente a capacidade de estruturação, coleta e análise de dados. Como muitas dessas tecnologias estudadas pela literatura encontram-se na fronteira do conhecimento, diversos *frameworks* teóricos auxiliaram no desenvolvimento da área da AC, já que eles têm a função primordial de propor soluções para problemas reais (Eulerich & Kalinichenko, 2018). Dessa forma, a literatura sobre a AC foi composta predominantemente por artigos não empíricos e por isso foram limitados em promover *insights* sobre alguns aspectos importantes, como desmonstra a literatura (Murcia et al. 2008, Brown et al., 2014, Eulerich & Kalinichenko, 2018). Dois desses aspectos merecem destaques: a aceitação da AC, analisado nesta pesquisa sob a ótica da Teoria Unificada de Aceitação e Uso de Tecnologias (UTAUT) (Venkatesh et al., 2003) e os benefícios líquidos, analisado sob a ótica do Modelo de Sucesso dos Sistemas de Informações (D&M) (DeLone & McLean, 2003). Expectativa de desempenho, expectativa de esforço (Mansour, 2016, Miranda, 2018, Nascimento, 2019), condições facilitadoras (Miranda, 2018) e influências sociais (Gonzalez et al., 2012) demonstraram ser importantes preditores do uso da AC nas organizações analisadas. Isso significa que, para ser utilizada, a AC deve ser capaz de aumentar o desempenho dos auditores, precisa ser fácil de usar, precisa possuir condições facilitadoras adequadas (por exemplo um suporte adequado de pessoal especializado em TI (Rikhardsson & Dull, 2016)), e influências sociais positivas de superiores hierárquicos ou colegas de trabalho precisam estar presentes na organização (Miranda, 2018). Todavia, a literatura anterior sobre o assunto tem compreendido a AC como uma tecnologia, e por isso foram limitados em ampliar a compreensão real sobre como a aceitação ocorre dentro das organizações, públicas ou privadas. A eficiência, eficácia (O'Reilly, 2006, Chan et al., 2018, Bradford et al., 2020), custos e fraquezas da AC, por exemplo, são alguns impactos (benefícios líquidos) que ainda precisam ser mais bem explorados por pesquisas empíricas, embora esses impactos já tenham sido teorizados pela literatura (Murcia et al. 2008, Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski, Issa & Appelbaum, 2018). Embora muito tenha sido teorizado sobre os benefícios gerados pela AC, a escassa literatura empírica sobre o assunto tem evidenciado impactos mistos nas organizações, sendo que alguns desses impactos tem se mostrado positivos, enquanto outros, negativos.

Objetivos

A presente tese possui como objetivo geral analisar como ocorre a aceitação da Auditoria Contínua e como a Auditoria Contínua reflete-se em benefícios líquidos para a auditoria interna em um Governo Estadual, na visão da Gerência de Auditoria de Pessoal (GAPES). Possui como objetivos específicos a) compreender como ocorre a aceitação da AC na Gerência de Auditoria

de Pessoal (GAPES); b) identificar quais são os benefícios líquidos da AC para a Gerência de Auditoria de Pessoal (GAPES); e c) analisar como a aceitação da AC se reflete em benefícios líquidos para a auditoria interna na Gerência de Auditoria de Pessoal (GAPES).

Metodologia

Quanto a abordagem do problema, a presente pesquisa caracteriza-se por um estudo qualitativo, operacionalizado por meio de um estudo de caso único, e com característica descritiva. A coleta dos dados foi realizada por três procedimentos: entrevistas, análises de documentos e observações de campo. Para a seleção do caso foram utilizados, os critérios elencados por Godoy (1995): i) a relevância do caso selecionado dentro do universo de casos possíveis; ii) a disponibilidade de acesso à organização em questão. O terceiro critério adotado para a seleção do caso foi de que a organização em análise estivesse utilizando a AC na sua organização. Com o auxílio do *Continuous Auditing & Reporting Lab* (CARLAB), da Universidade Estadual de Nova Jersey (Rutgers Business School), foram evidenciados dois potenciais casos a serem objeto do estudo. Para conseguir aprofundar suas análises e por conta das restrições impostas pela pandemia de COVID-19, optou-se por realizar o estudo junto à Controladoria Geral do Estado de Santa Catarina, já que naquele momento o pesquisador teria uma maior proximidade à unidade de análise. Os participantes da presente pesquisa foram os auditores internos diretamente envolvidos com a AC ao longo dos últimos 5 anos, e que poderiam de alguma forma contribuir para compreensão sobre a aceitação do modelo e sobre os benefícios líquidos gerados por ele. A validação do instrumento foi realizada com dois auditores internos de uma outra organização pública, que também já possuía uma AC em funcionamento. Ao todo, foram entrevistados oito auditores internos, que possuem ampla experiência e conhecimento sobre o modelo de AC que é executado dentro da GAPES. O roteiro é composto por questões semiestruturadas e abertas e é segmentado em quatro blocos: a) caracterização do respondente; b) estágio da AC; c) aceitação da Auditoria Contínua; e d) benefícios líquidos. Após a realização das entrevistas, estas foram transcritas e posteriormente categorizadas conforme o constructo da pesquisa elaborado conforme referencial teórico. Os documentos analisados dizem respeito às normativas, notícias, ofícios, processos, e-mails, ou quaisquer outros documentos que estivessem relacionados com a AC dentro da GAPES e que o pesquisador tivesse acesso. Por fim, técnicas de observação também foram utilizadas para evidenciar a rotina dos auditores internos nas diferentes áreas de auditoria. As observações foram devidamente registradas por meio de notas de campo, e analisadas também conforme as categorias de análise. Os documentos e observações foram triangulados com o conteúdo das entrevistas, respeitando também as categorias de análise apresentadas nos construtos da pesquisa. Ao longo de 2021 e 2022, foram coletados diversos documentos que o investigador entendeu estarem relacionados com a AC e que poderiam ser úteis para a presente investigação. Diversas observações também foram feitas quando o pesquisador visualizava que estas estavam relacionadas aos objetivos da pesquisa. Ao final da transcrição e categorização das entrevistas, o pesquisador avaliou todos os documentos e anotações, confrontando essas informações como forma de triangulação e validação dos resultados. A análise de dados foi realizada por meio da Análise de Conteúdo.

Resultados e Discussões

O uso da AC dentro da GAPES atualmente ocorre por diferentes frentes e passou por uma evolução ao longo dos últimos anos. Diversos auditores internos estiveram envolvidos no amadurecimento dessa metodologia, que é conduzida por meio de diversas Trilhas de Auditoria. Embora alguns auditores internos (mais voltado a dados) operacionalizam suas próprias trilhas de auditoria e suas próprias análises, todos os auditores internos integram o modelo geral de AC, que envolve principalmente o denominado Monitoramento da Folha (verificam variações anormais de um mês para o outro) e as Trilhas Determinísticas de Auditoria (verifica regras de negócios, principalmente com base nas legislações da folha de pagamento). Os demais modelos (Trilhas de Afastamentos e Trilhas de Óbitos) são operacionalizados exclusivamente por auditores voltado a dados. Dessa forma, pode-se dizer que a AC é utilizada tanto de maneira coletiva, como de maneira individual. A estruturação dos dados atualmente utilizados pela GAPES também ocorreu ao longo das últimas duas décadas conforme demanda/necessidade dos órgãos responsáveis pela Folha de Pagamento e da GAPES. A satisfação com o modelo de AC é visualizada de maneira mista dentro da GAPES. Embora todos compreendam o modelo como importante, existem muitos entraves que parecem influenciar a satisfação do mesmo. Pode-se dividir a satisfação com o modelo de acordo com o tipo de trilha e por tipo de auditor. De maneira geral, auditores internos demonstraram uma maior insatisfação com o modelo de Monitoramento Contínuo, principalmente pela necessidade de realização de tarefas manuais a serem executadas e o baixo número de achados encontrados (excesso de falsos positivos). Os auditores internos identificaram diferentes melhorias no desempenho dos auditores por conta da automatização da auditoria, como a liberação de tempo e agilidade na conclusão das tarefas. Todavia, existem dificuldades para que essa automatização ocorra no cenário atual que parecem ser um pouco contraditórias: mesmo cientes de que a automatização poderia gerar benefícios positivos superiores aos seus custos, e que isso resultaria em mais tempo livre para outras atividades, a GAPES tem dificuldade de alcançar essa automatização. Venkatesh et al. (2003) teorizaram uma relação unidimensional entre a expectativa de esforço e a intenção de uso e no uso de tecnologias. O que os relatos dos auditores demonstram, todavia, que ao menos na AC e sobre suas percepções, o uso no dia a dia dos sistemas utilizados pela AC potencialmente afeta a facilidade de uso dessas ferramentas. Ou seja, além da relação proposta de que expectativas de esforço levam ao comportamento de uso, a presente tese também evidencia que o próprio uso/satisfação com o uso da AC no dia a dia reduz os esforços necessários para que ela continue sendo utilizada. Ou seja, a prática do dia a dia tende a diminuir o esforço necessário para a operacionalização adequada da AC. Além disso, a UTAUT preocupou-se em analisar as expectativas de esforço somente em um nível individual. Nesta tese, esforços coletivos também foram identificados como possíveis preditores do uso e da satisfação com o uso e, portanto, esses esforços devem ser levados em consideração ao se analisar a AC. Algumas condições facilitadoras evidenciadas dizem respeito aos conhecimentos e habilidades necessárias para a AC. Todos os auditores internos entendem a importância de se ter um conhecimento mínimo do banco de dados, independentemente de serem auditores orientados a dados ou não. Esses achados vão ao encontro do que alguns artigos relatam, de que a adoção adequada dessa metodologia não é tanto um problema de falta de sistemas ou tecnologias, mas de pessoas. É praticamente unânime que existe uma carência de profissionais (incluindo auditores) tanto para a parte de tecnologia quanto para a parte de análise de achados e regras de negócios. Entretanto,

evidenciou-se também que com o conhecimento e pessoal atualmente disponíveis, já seria possível executar um modelo mais robusto do que o disponível atualmente, embora com algumas limitações. Foi evidenciado também alguns aspectos importantes sobre os dados que servem de *input* dos modelos de AC. A aceitação adequada da AC depende da disponibilidade adequada de dados. Esses dados fazem parte das condições facilitadoras que influenciam a extensão e a qualidade da AC. Embora possa parecer intuitivo que a auditoria tenha amplo acesso a todos os dados organizacionais, isso pode não ser uma realidade, pelo menos não em todos os cenários. No que tange as influências sociais é unânime a percepção de que a AC gera melhorias na imagem da auditoria interna. No entanto, não é evidente se essas melhorias de imagem são fatores motivadores para que os auditores aceitem mais a AC dentro do GAPES. Conforme os resultados, essas influências podem ser visualizadas por diferentes atores: i) divisões (setoriais e seccionais) de recursos humanos; ii) gerentes da auditoria (especialmente gerentes da alta administração); e iii) sociedade. No que tange a qualidade dos sistemas, foi possível evidenciar que, embora os diferentes sistemas atendam pelo menos parcialmente às necessidades atuais, há espaço para melhorias. Dessa forma, foram evidenciados principalmente dois elementos que podem atuar como barreiras ou impulsionar a aceitação da AC, que são as condições organizacionais (condições facilitadoras) e os esforços individuais e coletivos para operacionalização da metodologia. Pelo menos no cenário da administração pública, esses parecem ser os elementos mais importantes para entender como se dará o uso da AC. Assim, é necessário dispor de condições organizacionais adequadas, como o acesso tempestivo e de qualidade aos dados da organização. Além disso, algumas habilidades como experiência anterior em análise de dados são importantes para que pelo menos alguns auditores possam ser mais orientados a dados e possam assumir a liderança nos modelos de AC. Sobre os benefícios líquidos, foram evidenciados diferentes impactos advindos da AC, como impactos na eficiência da auditoria interna; no relacionamento dos auditores internos com os dados organizacionais; nas informações que apoiam o planejamento de auditorias; nos controles internos; na precisão dos trabalhos (incluindo potenciais problemas com falsos positivos); no controle contínuo e permanente da AC; na sobreposição de funções entre auditoria interna e controle interno e na independência do auditor. Os resultados encontrados demonstram a inter-relação entre antecedentes de aceitação, aceitação (uso e satisfação com o uso) e os diferentes benefícios líquidos da AC. Efeitos negativos associados também podem ser visualizados. A AC alcançará benefícios ou gerará efeitos negativos dependendo da maturidade do modelo e de algumas características individuais e organizacionais.

Considerações Finais

Os achados da pesquisa demonstram que a aceitação da AC no GAPES ocorre principalmente por dois fatores: condições organizacionais e esforços necessários para sua implantação. Outra característica que foi evidenciada e que não é comumente citada na literatura diz respeito ao relacionamento existente entre auditoria e auditados. Para uma maior aceitação, o modelo exige que auditores internos e auditados tenham um bom relacionamento, pois os auditados podem auxiliar na melhoria do modelo de diferentes maneiras, como por exemplo, no auxílio na criação de novas trilhas de auditoria. Embora a AC possa ser operacionalizada tanto de forma coletiva quanto individual, esta tese demonstra que esforços conjuntos e direcionados tendem a trazer maiores benefícios para a organização do que quando são operacionalizados individualmente.

Elementos mistos de aceitação de AC dentro do GAPES foram identificados, com efeitos igualmente mistos sobre os benefícios líquidos obtidos por tal metodologia. Embora todos os auditores internos entendam o potencial da metodologia, é o escopo, a tempestividade e a qualidade do modelo que impulsionam os benefícios líquidos da AC. A teoria implica que a maturidade do modelo deveria levar os trabalhos da AC a serem mais tempestivos. Entretanto, foi evidenciado o oposto: a maturidade do modelo levou os auditores internos a perceberem que nas condições atuais da organização, um modelo menos tempestivo traria mais resultados para a organização. Ao tentar tornar as recomendações da auditoria mais tempestivas, muitas vezes esses alertas/recomendações são enviados quando esses profissionais (da área de recursos humanos) já estão sobrecarregados com as atividades diárias da folha de pagamento, gerando efeitos negativos para o modelo. A literatura também teoriza que a AC tem potencial para melhorar a eficiência e eficácia das auditorias. Entretanto, foi demonstrado que a eficiência só é alcançada quando há continuidade do projeto, pois a adoção inicial de AC pode ter um custo alto, embora a automatização de seus processos e o esforço de execução mensal seja relativamente baixo. A presente pesquisa também conclui que a integração do modelo UTAUT com o D&M deve ser realizada com cautela, pois alguns dos antecedentes apresentados por Venkatesh et al. (2003) e as consequências apresentadas por DeLone & McLean (1992, 2003) não se situam exatamente no mesmo espectro temporal. Muitas das questões levantadas pela UTAUT dizem respeito às intenções futuras, principalmente quanto às expectativas de desempenho decorrentes do uso dessa tecnologia que se confundem em grande parte com a visualização dos benefícios encontrados pela D&M. A pesquisa também acrescenta um importante aspecto teórico à literatura atual: o apoio da alta gestão deve traduzir-se em melhorias na AC especialmente quando a alta gestão possui algum conhecimento técnico sobre a importância dos dados para o modelo.

Palavras-chave: Auditoria Contínua; Aceitação; UTAUT; D&M; Benefícios líquidos.

ABSTRACT

The aim of this dissertation is to understand how the acceptance of Continuous Auditing (CA) occurs and how CA is reflected in net benefits for internal audit in a State Government, in the view of the Personnel Audit Management (GAPES). We used the Unified Theory of Acceptance and Use of Technologies (UTAUT) and the Information Systems Success Model as the theoretical background. Antecedents of UTAUT are performance expectation, effort expectation, facilitating conditions, social influence, and system quality. According to the literature, CA benefits were information quality, agility, accuracy, audit planning, efficiency, and cost-effectiveness. According to the literature, the associated negative factors with CA are the costs and the possible loss of independence. The study was operationalized through a case study, with data collected through interviews, documents, and field observations. Data were tabulated and analyzed using the Content Analysis technique. We found that CA acceptance is driven by individual efforts (skills), collective efforts, human resources, physical structure, data quality, organizational structure and systems quality. Top management support proved to be important and was highlighted by all internal auditors as an important factor affecting CA acceptance. Top management support is particularly more significant for the success of the CA when these managers have knowledge, albeit basic, about data analysis and understand the importance of data for the proper operationalization of the model. We found that financial benefits, efficiency gains, more comprehensive control and precision are some of the benefits from CA acceptance. Negative effects were identified as a high number of false positives, overlapping roles between internal audit and management, and difficulties in turning CA's recommendations into internal control improvements. We conclude that the CA acceptance and its eventual net benefits to the organization occurs in a multidimensional way, that instead of a direct relationship in which acceptance leads to more benefits, the net benefits of CA are also responsible for increasing use of CA.

Keywords: Continuous Audit; Acceptance; UTAUT; D&M; Net benefits.

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LIST OF ABBREVIATIONS AND ACRONYMS

CA – Continuous Audit

CCMIAR - Centro de Controle Interno da Marinha do Brasil [Internal Control Center of the Brazilian Navy]

CGE/SC – Controladoria Geral do Estado de Santa Catarina [Comptroller General of the State of Santa Catarina]

CGU – Controladoria Geral da União [Brazilian Comptroller General]

D&M – Information Systems Success Model

GAPES – Gerência de Auditoria de Pessoal [Personnel Audit Management]

PEESC - Poder Executivo do Estado de Santa Catarina [Executive Branch of the State of Santa Catarina]

IS – Information System

AIS – Accounting Information System

IT – Information Technology

UTAUT – Unified Theory of Acceptance and Use of Technologies

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1 INTRODUCTION

1.1 CONTEXTUALIZATION

The pioneering project carried out at Bell Laboratories [AT&T Laboratories] (see Vasarhelyi and Halper, 1991), gave rise to one of the first works on Continuous Auditing (CA). CA can be understood as a methodology that provides continuous assurance on a given topic, using a series of reports prepared simultaneously or in a short period of time after the occurrence of relevant events (AICPA, 1999). Vasarhelyi and Halper (1991) developed a framework based on cutting-edge information technologies of the time, such as computers, databases and corporate networks, but not internet and other technologies that currently exist (Alles et al. al., 2008a).

The technological revolution that took place in the decades following the study by Vasashelyi and Halper (1991) markedly reshaped organizational processes (Issa et al., 2016). The production and storage of big data, the timely and automatic analysis of decisions (artificial intelligence) (Casares, 2018), the blockchain (Dai & Vasarhelyi , 2017), the Internet of Things (Lu et al., 2018), the Robotic Process Automation (RPA) (Moffitt et al., 2018), the XBRL (Debreceeny et al. 2010, Chen , 2012), and cloud management systems (Alles et al., 2006a), are some examples of technologies that have become part of the daily lives of many organizations and did not exist or were not commercially viable at the time of the work of Vasashelyi and Halper (1991). Such technologies helped in the construction of a data-based society, which by the year 2020 had already generated approximately 44 zettabytes (thousand exabytes) of information. The Google search tool alone has generated 1.2 trillion searches every year (Vuleta, 2021).

Such technological innovations directly impacted the way information is generated, organized and assured (Kozłowski et al., 2018) and led academics and professionals to reconsider the meaning of audits and the way in which they are performed (Alles et al., 2006a, Vasarhelyi et al., 2010a). This environment served as fertile ground for the emergence of studies in the area of CA focused on developing theoretical frameworks (Murcia et al., 2008, Eulerich & Kalinichenko, 2018) that presented tools, techniques or technologies with the potential to modify and reformulate the work of audit. As many of the technologies studied were (or are) at the frontier of knowledge, these theoretical frameworks are important for CA development as a field study, since they have primarily the function of proposing solutions to real problems (Eulerich & Kalinichenko, 2018). These studies usually use design science methodologies (Von

Alan et al., 2004). Examples of these frameworks can be seen in studies by Cullinan and Sutton (2002), Rezaee et al. (2002), Omoteso et al. (2008), Codesso et al. (2018), No et al. (2019), Sun (2019), Huang & Vasarhelyi (2019) and Alles & Gray (2020).

As most studies on CA are not empirical, they were limited in providing insights into some important aspects, as highlighted by different literature reviews (Murcia et al. 2008, Brown et al., 2014, Eulerich & Kalinichenko, 2018). One aspect that literature was able to empirically analyze, albeit in a limited way, were the factors preceding the use of CA (Vasarhelyi et al., 2012, Miranda, 2018, Nascimento, 2019). That is, those factors that can help or hinder technology users to accept a particular technology (Rezvani et al., 2017; Alsoub et al., 2018). As it involves a complex set of technologies and techniques, such as specialized software, databases, etc., the implementation and proper use of CA depend on a set of personal, organizational (Silver et al., 1995, Vasarhelyi et al., 2012), cultural (Im et al., 2011) and technological aspects (Silver et al., 1995). Furthermore, CA acceptance should be impacted differently depending on the type of auditor that is involved in the process (Bradford et al., 2020).

In many governmental agencies, there are cultural and structural barriers that create resistance to change. For instance, a reluctance to innovate, a preference for the *status quo*, and a lack of skilled leaders and managers who facilitate change (West, 2005). Thus, in many governmental organizations the barriers are not about technology, but about structure, operations, management and organizational culture and unless leaders of these organizations are committed to building a culture of innovation, the adoption of technologies will likely fall short of its intended benefits (West, 2005). West (2005) argues that the workforce of governmental agencies must be trained in advanced technologies. The author points out, however, that not everyone needs to become programmers, but that a reasonable number of public servants need to understand enough about algorithms, software applications and information technologies (IT) systems.

Venkatesh et al. (2003) and Davis (1989) explain that the acceptance of technologies is a determining factor for them to bring the expected results. A technology implemented, but not accepted by its users, probably does not generate the desired results, even when its use is mandatory. Therefore, different theories have been concerned with studying the elements that lead individuals to use certain technologies (Dwivedi et al., 2017). We understood in this dissertation the acceptance of CA as a construct that refers to three categories: the behavioral

intention to use, the use behavior itself (Venkatesh et al., 2003), and the satisfaction of using CA (DeLone & McLean, 2003).

The Unified Theory of Acceptance and Use of Technologies (UTAUT) presented by Venkatesh et al. (2003) has been established as one of the main theoretical models that seek to explain this phenomenon (Dwivedi et al., 2017). Venkatesh et al. (2003) proposed that four categories (performance expectation, effort expectation, facilitating conditions and social influences) explain the intention to use and use of technologies. Despite its high explanatory power, variations in significance levels have been found in the literature (Gupta et al. 2008, Ahmad et al., 2013, Rana et al., 2016, Dwivedi et al., 2017, Mansoori et al., 2018, Naranjo-Zolotov et al., 2018, Jadil et al, 2021). Several studies have confirmed the relationship between social influences and facilitating conditions with the intention to use technologies (Gupta et al., 2008, Ahmad et al., 2013, Rana et al., 2016). However, other studies have found divergent results on the subject (Dwivedi et al., 2017, Mansoori et al., 2018, Naranjo-Zolotov et al., 2018, Jadil et al, 2021). In addition to these categories, system quality has also been proposed in our research as an antecedent of CA acceptance (DeLone & McLean, 2003, Chatterjee et al., 2018, Talukder et al., 2019).

Despite being a technique studied for a long time (Vasarhelyi and Halper, 1991, Murcia et al. 2008, Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018), CA it is in the early stages of adoption in many organizations (Vasarhelyi et al., 2012, Codesso et al., 2020, Freitas et al. 2020). Furthermore, the implementation of CA techniques has enormous challenges. Dai & Vasarhelyi (2020) point out that the transition from traditional auditing to this new technological environment has as a major challenge: the lack of auditors with the skills to use currently available technologies effectively and efficiently. Organizations usually use a wide range of software and different databases, which make it difficult to integrate these systems and hinder their acceptance by users (Kogan et al., 1999, Vasarhelyi et al., 2012, Codesso et al., 2020, Jadil et al, 2021).

In addition to CA acceptance, another important aspect that requires attention from the literature is how CA is impacting organizations (Murcia et al. 2008, Eulerich & Kalinichenko, 2018). DeLone and McLean (1992, 2003) built a framework that proposes that the adoption and use of technologies can generate individual and organizational impacts. With the maturity of the model, DeLone & McLean (2003) changed the categories of “individual impacts” and “organizational impacts” to “net benefits”.

Net benefits can be understood as the net results from the benefits generated by the use or satisfaction of using a certain system (DeLone & McLean, 1992) and the negative impacts associated with that system. As summarized by DeLone and McLean (2003), the impacts generated by the implementation of systems can be both positive and negative. Although originally this was also the intention when proposing the original model, DeLone and McLean (2003) realized that it was necessary to make it more explicit that impacts can also generate negative effects on organizations (Mardiana et al., 2015). Although it is believed that the use of new technologies always generates positive results, this is not necessarily true in all contexts and therefore needs to be further explored in the literature (Petter & McLean, 2009; Ain et al., 2019). DeLone and McLean (1992, 2003) named this model as the Information Systems Success Model (identified in this thesis as D&M), which has become one of the main models in the information systems to analyze the success of information technology (Ain et al., 2019).

Although D&M also presented antecedents of technology acceptance, research criticized this part of the model, for not considering important antecedents for the use of a technology, such as the performance expectation that a given individual has (Mardiana et al. 2015). Integration of UTAUT with D&M model constructs is necessary to provide adequate antecedents for the acceptance of a technology, since UTAUT has a solid and stronger theoretical basis for predicting individual's behavioral intention (Mardiana et al., 2015).

D&M considers that the use and satisfaction with the implementation of a certain technology can generate individual and organizational impacts for the entity (DeLone & McLean, 1992). Individual impacts have indeed been of great interest to research in information systems (Goodhue & Thompson, 1995, Rocky & Meriough, 2015, Jeyaraj, 2020). Some impacts studied by literature are the increase in the effectiveness of the performed work (Etezadi-Amol & Farhoomand, 1996, Teo & Wong, 1998, Wixom & Watson, 2001, Rocky & Meriough, 2015), greater individual productivity (Torkzadeh & Doll, 1999) and a reduction in the time of tasks performed (Benbasat et al., 1981, Rocky & Meriough, 2015).

Organizational impacts presented in D&M have also already been measured by different metrics, such as organizational performance (Benbasat & Dexter, 1986, Rocky & Meriough, 2015), organizational costs reduction (Rivard & Huff, 1984), improvements in productivity, improvements in the exchange of organizational information and improvements in the competitive advantage generated (Rocky & Meriough, 2015). These impacts can also be seen in audit due to the adoption of new technologies. Examples of these impacts are i) gains

in efficiency and effectiveness, ii) identification of new audit risks, iii) identification of failures in internal controls, iii) assistance in preparing audits; and iv) easier collection of audit evidence (Eulerich et al., 2019).

New information technologies have also reduced the amount of human work needed to perform certain audit functions, especially due to the automation of several processes that were manual (Teeter & Vasarhelyi, 2015). More automated transaction reviews allowed auditors to get closer to the occurrence of relevant events (Eulerich & Kalinichenko, 2018, Moffitt et al., 2018). Eulerich et al. (2020) used survey data from 264 auditors to understand the factors associated with using the information generated by the CA for planning purpose of risk-based audits. Eulerich et al. (2020) found several factors that had a positive influence on the use of this CA information for planning the audits, such as the importance of data analytics and the collaboration between internal audit committee and external auditor. Although widely reported in theoretical terms, adequate understanding of these CA impacts still lacks further empirical exploration (Murcia et al. 2008, Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018).

Previous research on CA has proposed important frameworks for the area. However, these studies have limitations that need to be mentioned. Academia can better empirically explore the elements of CA acceptance. Although some research has answered what drives internal auditors to accept CA (performance expectations, effort expectations, facilitating conditions, and social influences), they have not been able to explore how and why these factors have occurred within organizations. Net benefits caused by the adoption of CA need also to be better explored in the literature.

1.2 RESEARCH PROBLEM

Bonsón & Borrero (2011), Vasarhelyi et al. (2012), Nascimento (2017) and Miranda (2018) identified some CA acceptance antecedents. Performance expectancy, effort expectancy (Mansour, 2016, Miranda, 2018, Nascimento, 2019), facilitating conditions (Miranda, 2018) and social influences (Gonzalez et al., 2012), for example, have been shown to be important predictors of CA usage. In order to be used, CA must be able to increase the performance of auditors, it must be easy to use, it must have adequate facilitating conditions (e.g. adequate support from specialized IT personnel (Rikhardsson & Dull, 2016)), and needs positive social influences from superiors or co-workers (Miranda, 2018).

While understanding what leads auditors to accept CA is important, these studies (Bonsón & Borrero, 2011, Vasarhelyi et al. 2012, Nascimento, 2017, Miranda, 2018) were not able to identify how and why these factors manifest themselves within an organization. Studies cited above were not able to answer how an internal auditor perceives his performance improvement with the use of CA or how facilitating conditions affect the acceptance of CA. Although the literature on UTAUT is dense when evaluating many technologies (Chauhan & Jaiswal, 2016, Khechine et al., 2016, Dwivedi et al., 2017), the lack of empirical understanding of the acceptance of CA is reinforced in several studies (Vasarhelyi and Halper, 1991, Vasarhelyi et al., 2004, Murcia et al., 2008, Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018). As it is human and economic forces that limit the adoption of CA, and no longer the offer of new technologies (Alles et al., 2002), empirical studies that create insights into these phenomena are important (Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018).

These studies (Bonsón & Borrero, 2011, Vasarhelyi et al. 2012, Miranda, 2018) have other limitations that need to be overcome. For example, Miranda (2018) applied a questionnaire to a set of internal auditors of the Court of Auditors of Brazil to understand the factors that would lead them to accept the CA. In Miranda's study (2018), the same questionnaire was applied to all internal auditors, regardless of the type of auditor and how they integrate this methodology. Bradford et al. (2020) demonstrated that the acceptance of CA and its impacts can be different, depending on the type of user (IT auditors or financial auditors). The studies by Bonsón & Borrero (2011), Vasarhelyi et al. (2012) also have limitations like Miranda (2018) and did not consider possible differences in the role of internal auditors within this methodology.

Literature that analyzes the net benefits due to the acceptance of technologies is also extensive (Petter et al, 2013, Mardiana et al, 2015, Chatterjee et al., 2018). However, the empirical literature that analyzes the net benefits of CA is still scarce (Rikhardsson & Yigitbasioglu, 2018, Codesso et al., 2020) and therefore, little is known about how individual and organizational impacts (net benefits) have occurred in organizations that use of CA (Vasarhelyi et al., 2004, Eulerich & Kalinichenko, 2018). Although many of these impacts have already been theorized by several studies, little empirical evidence has emerged in recent decades (Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018). The conclusions of Alles et al. (2006a) on these impacts, for instance, came from the authors'

own findings about a pilot project they had just implemented at Siemens. Alles et al. (2006a) found, for instance, that some degree of re-engineering of audit processes becomes inevitable when adopting CA.

Efficiency, effectiveness (O'Reilly, 2006, Chan et al., 2018, Bradford et al., 2020), costs and weaknesses of CA are also impacts that still need to be further explored by empirical research, although these impacts have already been theorized in literature (Murcia et al. 2008, Eulerich & Kalinichenko, 2018, Gonzalez & Hoffman, 2018, Kozlowski et al., 2018).

Some empirical evidence, however, contradicts what theoretical articles on CA postulate. Gonzalez & Hoffman (2018), for example, found that timely and frequent notifications to management about deviations or irregularities (i.e., an expected benefit from the CA) is not always beneficial to reduce fraud within organizations. Benefits depends on whether the internal control system is strong or weak. The influence will be neutral when the monitoring system is strong, and negative when the monitoring system is weak. In the latter case, instead of improving fraud prevention, the excess of notifications ends up harming the organization, potentially increasing the amount of deviations. Discrepancies found in literature on organizational and individual impacts may be due to the different contexts in which the technologies were analyzed (Jeyaraj, 2020).

Other impacts have also been noticed due to the implementation of new technologies. Changes in the relationship between auditors with accounting information due to the advancement of new technologies have already been evidenced in the literature (Fedorowicz & Lee, 1999, Petter et al., 2013). Fedorowicz & Lee (1999), for example, found that the use of technologies improves the quality of accounting information. Although Fedorowicz & Lee (1999) specifically addressed the information produced by accountants, changes in the auditor's relationship with the audited information may also be present in those organizations that have implemented CA (Alles & Gray, 2020).

New technologies (Arnold, 2018), such as Business Intelligence (BI) (Rikhardsson & Yigitbasioglu, 2018) and Enterprise Resource Planning (ERP), datawarehouse (Vasarhelyi & Halper, 1991) impact how information is stored, accessed and shared with its different users – including auditors. These characteristics have the potential to modify the current audit process (Vasarhelyi et al., 2010a) and interfere in how auditors can handle privacy and security concerns about data (Rikhardsson & Yigitbasioglu, 2018).

As theorized, CA can improve efficiency, effectiveness, timeliness, agility, accuracy, quality of information and can help audit planning and risk analysis (Fedorowicz & Lee, 1999, O'Reilly, 2006, Gonzalez & Hoffman, 2018, Chan et al., 2018, Eulerich & Kalinichenko, 2018, Moffitt et al., 2018, Bradford et al., 2020). CA can also be associated with negative effects, such as loss of auditor independence, increased costs, and a possible conflict between management and internal audit roles (Alles et al., 2002, Brown et al., 2006, Ahmi & Kent, 2013, Gonzalez & Hoffman 2018, Bumgarner & Vasarhelyi, 2018). CA net benefits, therefore, derive from the comparison between the benefits and its associated negative effects.

Although the existing literature provides a wide spectrum of different frameworks and models for implementing CA, experimental and/or empirical studies investigating the potential benefits or weaknesses of CA are still scarce (Eulerich & Kalinichenko, 2018). In addition, although the antecedents of the acceptance of CA have already been identified in some previous works (Bonsón & Borrero, 2011, Vasarhelyi et al. 2012, Miranda, 2018), there is still empirical deepening necessary to understand how behavioral and organizational factors interfere in the adoption of CA and how CA techniques result in net benefits, especially in public administration (Moturi & Gaitho, 2014).

In this research, a problem was highlighted that studies were unable to adequately analyze empirically the antecedents of CA acceptance and its net benefits in single research (DeLone & McLean, 2003; Vasarhelyi et al. 2012, Mardiana et al, 2015, Miranda, 2018, Eulerich & Kalinichenko, 2018). Bearing in mind that CA is a methodology that has only been used more widely in recent times and that its acceptance is a fundamental part for it to bring net benefits, the following research question was elaborated: **how does Continuous Auditing acceptance occurs and how does it reflect into net benefits for internal audit?**

1.3 OBJECTIVE

1.3.1 General Objective

The current research aims to **analyze how the acceptance of Continuous Auditing occurs and how Continuous Auditing is reflected in net benefits for the internal audit in a State Government, in the view of the Personnel Audit Management (GAPES).**

1.3.2 Specific Objectives

- a) Understand how the Acceptance of the Continuous Audit occurs in the Personnel Audit Management (GAPES);
- b) Identify which are the net benefits of the Continuous Audit for the Personnel Audit Management (GAPES);
- c) Analyze how the acceptance of CA is reflected in net benefits for internal audit within the Personnel Audit Management (GAPES).

1.4 THESIS DECLARATION

Continuous Auditing is operationalized by a set of techniques and technologies (Vasarhelyi & Halper, 1991, Alles et al., 2006b, Moffit et al., 2018, Eulerich & Kalinichenko, 2018) and its acceptance (behavioral intention to use, use behavior, and satisfaction with use) can be influenced by a set of individual and organizational characteristics (Vasarhelyi et al., 2012, Miranda, 2018). Acceptance of technologies is important for individual and organizational impacts to occur. Many studies have already reported potential impacts of CA for the organization. Furthermore, while much theoretical discussion highlights the positive benefits of CA, innovations will rarely have positive impacts without associated negative impacts (DeLone & McLean, 2003). The benefits achieved by CA minus the associated negative impacts result in net benefits.

Thus, based on the Unified Theory of Acceptance and Use of Technologies (UTAUT) and the Information Systems Success Model (D&M), the thesis is declared that the **acceptance of Continuous Auditing is influenced by individual expectations of internal auditors and by different organizational barriers and that the acceptance of Continuous Auditing is reflected in benefits for internal audit, although there are negative factors associated with its use.**

Originality of the dissertation can be seen in some respects. First, by empirically analyzing the acceptance of CA through the lens of UTAUT and D&M. Second, by analyzing in a single study the relationship between CA acceptance and net benefits to internal audit. Third, for bringing together theories and models widely used in the Information System area to the Audit area. Fourth, by analyzing CA elements in depth within an organization that has been using CA in its day-to-day for many years. Fifth, by empirically demonstrating how CA is being used in a public administration.

Next, in Figure 1, the Theoretical Model of this Dissertation can be visualized.

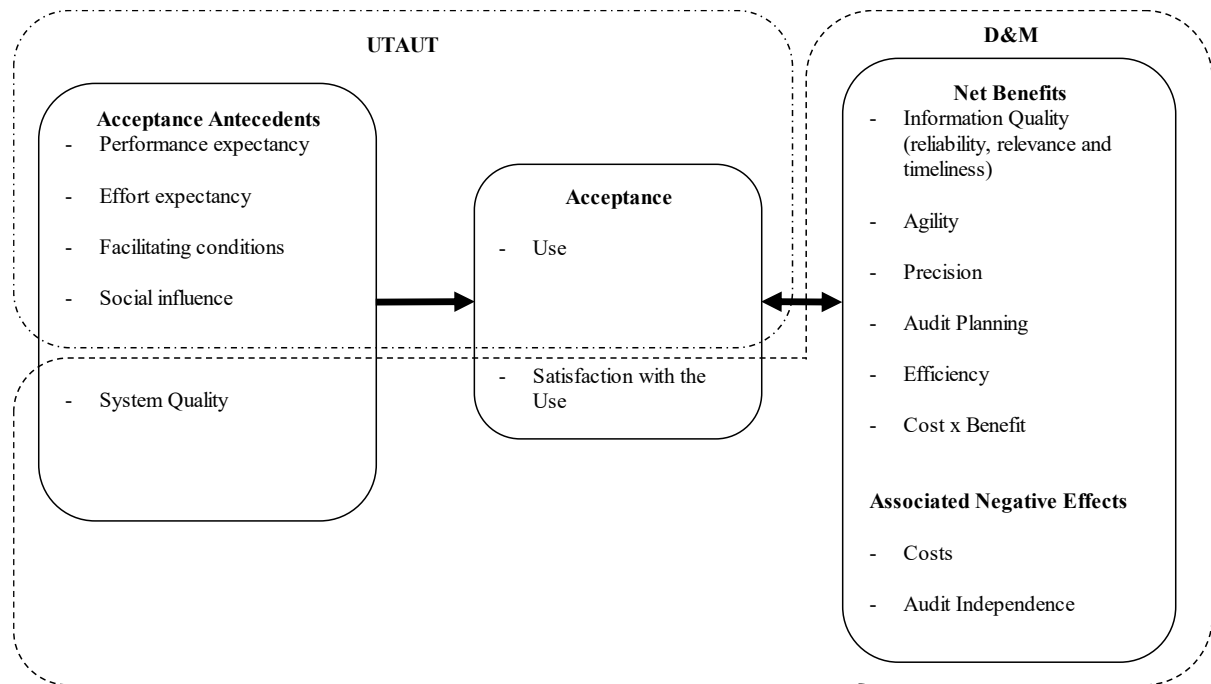


Figure 1 - Theoretical Model of the Dissertation

1.5 CONTRIBUTIONS

Results from this dissertation generated a series of contributions to the literature on Continuous Auditing (CA), and to the literature on the acceptance and success of technologies and information systems, from the audit point of view. This thesis has theoretical, practical and methodological contributions.

About the theoretical contributions, our findings have implications for UTAUT, D&M and Continuous Audit literature.

The present research found that there are overlaps between the UTAUT categories, especially the elements of Facilitating Conditions and Effort Expectation. There are aspects of these categories that are not easy to separate. For example, a system being easy to use may be related to the perceived behavioral control that the individual has, and not because of its characteristics. We also found that System Quality (from DeLone & McLean, 1992) overlaps with some characteristics of the Facilitating Conditions and Effort Expectation.

We also find that at least some of those barriers can be overcome when there is an adequate relationship with the audited human resources divisions and support from top management. We add to current literature showing that support from top management should

translate in improvements in CA specially when top management understand and have some knowledge about the importance of data for the model.

We present important contributions about the use of CA in the public administration. Although UTAUT aims to understand which elements affect use behavior, most studies are limited to understanding which elements affect the intention of use, since the use behavior itself is difficult to visualize. We demonstrate that the use of CA occurs through the interaction of different auditors, who play different roles within the model. Furthermore, the CA methodology is operationalized by a different set of audit trails. These trails have different characteristics and purposes. Data-driven auditors are part of the CA model most heavily, although the participation of non-data-driven auditors is also critical to the success of the CA. While data-oriented auditors usually have more technical and technology-oriented assignments, non-data-oriented auditors can especially assist in the validation and analysis of business rules that are likely to be automated by the CA. Thus, together they compose the CA model in GAPES.

The literature theorizes that CA has the potential to improve the efficiency and effectiveness of audits. In addition, the CA should provide for a timelier audit, in some cases, even preventing errors from occurring. Our contributions to the literature are as follows: first, it was shown that efficiency is only achieved when there is project continuity, as the initial adoption of CA can have a high cost, although the automation of its processes and the monthly execution effort is relatively low. In addition, although CA allows for greater timeliness of action than traditional models, this research has shown that a more timely audit will not always bring the best results. In the specific case of CA in the payroll, a more timely action can generate an excess of false positives for the human resources divisions. When trying to become a more timelier audit, these alerts/recommendations are often sent when these professionals are already overloaded with daily activities from payroll, generating negative effects for the model.

In addition to specific contributions to UTAUT, theoretical contributions were made to the field of Continuous Auditing. Based on theory and models, the research adds to empirical studies on the subject. We found that when combining UTAUT and D&M it is possible to use them to understand the elements of acceptance of CA and its net benefits, although the use of these theories require caution. In addition, the present research is the first to combine these two models and empirically analyze the acceptance and net benefits generated by CA.

Finally, as a theoretical contribution, the study adds to other studies that have already carried out the integration of UTAUT with D&M, such as the studies by Rana et al. (2013), AL

Athmay et al. (2016), and Almarashdeh and Alsmadi (2017). The present research adds to the literature by demonstrating that merging these two models needs to be carried out carefully, since both propose analyzes of measures that are interrelated and are not necessarily situated within the same temporal space.

Methodological contributions were also achieved in this dissertation. Especially given the lack of studies that demonstrate the practical implementation of CA, through a case study approach, the study provides insights into understanding the acceptance and net benefits of CA. Literature that evaluated the antecedents of the acceptance of CA and its net benefits were primarily based on the application of questionnaires, not qualitatively exploring the subject. As we conducted an in-depth qualitative study, we filled a research gap.

We also made some practical contributions to the CA field. The findings are useful for decision making on aspects to be taken into account when adopting these systems and what to expect from their benefits and disadvantages. While the findings are particularly useful in the area of government payroll, they are not limited to this area.

Finally, the present study also contributes to internal auditing in the public administration, as it demonstrates in detail how the CA model is operationalized, acceptance characteristics and associated net benefits.

1.6 DISSERTATION STRUCTURE

The dissertation is structured in five chapters, this being the first chapter, where the theme is introduced, the objectives of the thesis, the thesis statement and the contributions are presented.

In chapter two, we highlight the theoretical background of the research, which is divided into three sections: Continuous Auditing, Unified Theory of Acceptance and Use of Technologies (UTAUT) and the Information Systems Success Model (D&M). In addition, the research propositions are also presented in this chapter.

Chapter three presents the methodological aspects of the research. We present how it was operationalized, how got to the unit of analysis (GAPES), and how the data were treated (interviews, documents, and observation) and analyzed (content analysis).

Chapter four show the results achieved, and the research propositions are discussed.

In chapter five we do our final considerations and present the implications of our research to the field. Suggestions of future research are also presented.

2 THEORETICAL BACKGROUND

2.1 CONTINUOUS AUDIT

Internal audit's main attribution is to add value to the organization to which it is inserted when it certifies the veracity of accounting information, verifies the quality of internal controls, or verifies the organization's compliance with the various sets of laws, standards and procedures (Chun, 1997, IIA, 2017). Although the attribution of adding value has persisted in recent decades, the technological development of the modern world has changed the perception of the efficiency and effectiveness of the methods used by auditing (Vasrhelyi & Halper, 1991, Earley, 2015, Appelbaum et al., 2018, Eulerich et al., 2019, Eulerich et al., 2020).

The sheer amount of available data has expanded internal audit's capabilities, although it has also brought numerous challenges. New Enterprise Resource Planning (ERPs) and more timely data have modified the scope, methods and procedures used by the audit (Issa et al., 2016, Appelbaum et al., 2018, Eulerich & Kalinichenko, 2018). ERPs, for example, allowed information, previously stored on paper, to be available only digitally, whose content and form was completely different from what auditors had to deal with until then (Vasrhelyi & Halper, 1991, Kogan et al., 1999). The way in which the data were stored until then limited the auditor's performance, removing him from the possibility of timely analyzing relevant events. Furthermore, data stored on paper forced auditors to carry out sampling procedures, since analyzing the entire population of a given subject was unfeasible (Vasrhelyi & Halper, 1991, Kogan et al., 1999). A unique and unprecedented feature of ERP is that it integrates and automates business processes to obtain real-time information flows (Vasarhelyi et al., 2004).

Continuous Auditing (CA) emerged as a natural evolution of the integration between technology and the audit area (Woodroof & Searcy, 2001, Vasarhelyi et al., 2004, O'Reilly, 2006, Eulerich & Kalinichenko, 2018). Although CA implementations have been witnessed most strongly in internal audit (Eulerich et al., 2019), its theoretical concepts are not limited to it (Vasarhelyi et al., 2012, Eulerich & Kalinichenko, 2018).

According to the American Institute of Certified Public Accountants (AICPA), CA can be understood as a methodology that allows auditors to continuously provide assurance on a given matter, using a series of reports created simultaneously or in a short period after the occurrence of relevant events (AICPA, 1999). The Institute of Internal Auditors (IIA) summarizes that CA is a method used by the auditor to carry out audit-related activities on an ongoing (or more continuous than traditional) basis (IIA, 2005). According to Teeter and

Vasarhelyi (2015) CA is a methodology that allows the auditor to approach the events, in contrast to the traditional audit, which usually occurs after long periods of information having been generated.

In this process, the data flowing through the system is continuously monitored and analyzed based on a set of pre-defined rules (Wang, 2018). Alarms to call auditors' attention are then triggered when exceptions to these rules occur (Vasarhelyi & Halper, 1991, Alles et al., 2006a). Although the concept of CA has existed for at least thirty years, the aspects surrounding its implementation (demands and how it can be implemented), its operationalization (existing applications and technologies) and the effects within the organization are still of interest to academia (Eulerich & Kalinichenko, 2018). Many authors argue that the implementation of an CA not only has direct effects on the procedures already performed by the auditors, but also generates a reengineering of the audit itself (Alles et al., 2004, Issa et al., 2016).

The first automated control tests began in the 1960s, with the installation and implementation of embedded audit modules (EAM) (Coderre, 2005). EAMs are software applications embedded within or connected to accounting/management information systems, with the aim of externally and continuously monitoring such systems (Groomer & Murthy 1989, Debreceny et al., 2005, Wang, 2018). Although it proved to be an important continuous monitoring tool, building and maintaining these modules was quite complex (Coderre, 2005).

In the 1980s, early adopters began to use some Computer-Assisted Audit Tools (CAATs). At that time, the first academic research on the subject also began to appear (Coderre, 2005), such as the works of Vasarhelyi (1983) and Vasarhelyi and Halper (1991).

In the 1980s, as described by Vasarhelyi (1983), the audit process was still highly manual and required intense labor. Even with the advent of computers, auditors often used manual methods to examine and understand highly technological accounting systems. Furthermore, the CAATs that were used were often merely the replication of manual auditing techniques on computers. Vasarhelyi (1983) adds that audit processes could not evolve as a natural consequence of an environment highly resistant to change. In addition, technological modernization in this area would necessarily involve the reformulation and complete redesign of the audit process. This would also lead to a number of educational and cost-effective audit implications, such as the need to integrate accounting and computer science knowledge and

empower auditors with this knowledge. The work of Vasarhelyi (1983) was one of the first to describe a framework that allowed the automation of audit processes.

Vasarhelyi's (1983) theoretical framework presented a set of elements that were being modified (or could be modified) because of new technologies available at the time (mainly computers and ERP systems). Vasarhelyi's (1983) also raised several questions about the elements of the audit and how they would be modified. Vasarhelyi (1983) questioned, for example, how the auditor would behave in the face of the new way of recording and capturing data (how often they should be analyzed, how they should be aggregated, how the records should be kept) and how the interactions between the audit and its auditees would take place. The author also mentions that behavioral reactions would be different in each individual, reflecting the different psychological defenses that people have when they are in the presence of computers.

The practical application of Vasarhelyi's framework (1983), which demonstrated its applicability and feasibility, was presented by Vasarhelyi and Halper (1991), being considered one of the first applications of a CA model. The implementation was carried out by AT&T Bell Laboratories (AT&T Laboratory) at the largest telecommunications company at the time (AT&T). This was a particularly favorable scenario for the application of this new methodology, since the company had a high flow of information (Debreceeny et al., 2005). The model was named Continuous Process Auditing System (CPAS) and was developed by researchers Miklos Vasarhelyi and Fer Halper, in cooperation with the organization's internal auditors, with the aim of measuring, monitoring, and evaluating the company's revenue. The entire theoretical and practical discussion about its implementation, including the differences between traditional auditing and this new methodology, can be seen in the work of Vasarhelyi & Halper (1991). According to Vasarhelyi & Halper (1991), CPAS was designed to measure and monitor large systems. The system was designed to take into account a set of key metrics and analyses, within the auditors' own workstations.

From the work of Vasarhelyi & Halper (1991) to the present day, the world has seen an unprecedented technological revolution. Computers became cheaper and more powerful, the internet became popular and many technologies that did not exist or were not commercially viable emerged. As a result, CA became popular and today its concepts are already used by different organizations around the world (e.g., Vasarhelyi et al., 2012, Codesso et al., 2020, Freitas et al. 2020).

Bumgarner and Vasarhelyi (2015) reinforce that the implementation of new technologies has reformulated some important aspects in assurance services, including audit services. The storage, collection and retrieval of information are undergoing a process of greater automation and reporting costs are decreasing. Bumgarner and Vasarhelyi (2015) also emphasize that the gradual increase in the use of different technologies has enhanced real-time data collection (the authors cite RFID [Radio-Frequency IDentification] and the Internet of Things as an example) and that artificial intelligence has gradually replaced procedures that were manual.

Although discussions between academic and professional circles has occurred with great intensity in the last 30 years, until 2010, only 36% of companies said they had already implemented a CA model, while 39% had a plan to implement it in their organizations, according to research carried out by the IAA and ACL (software developer) (Alles et al., 2008). Similar results can be seen in the research by Gonzalez et al. (2012). When asked about the current state of CA in their organizations, 21% of respondents stated that CA was fully operational on one or more of their organization's systems; 22% said it was in place but not yet fully developed; 16% stated that it was not implemented, but there was an implementation schedule in the future; and 40% had not implemented and did not have plans for future implementation. More recent research has shown that the use of CA has been varied in organizations (Protiviti, 2017).

CA was conceptually presented as a continuous monitoring system of organizational data (Continuous Data Audit – CDA) (Alles et al., 2006a). As highlighted by Vasarhelyi (1983), errors in databases occur due to i) computational problems (errors occurring within the system itself); ii) integrity (unauthorized deletion of transactions, for example; iii) temporal errors (incorrect period or date); iv) irregularities (deliberate fraud); or v) legal errors (transactions that violate clauses or legislations). All above mentioned situations need to be verified on a continuous basis, as they can generate errors and losses for organizations (Codesso et al., 2020).

De Freitas et al. (2020) described the adoption of CA by the internal auditors of the Internal Control Center of the Brazilian Navy (CCIMAR). In CCIMAR, CA is mainly focused on crossing data from different databases in order to identify possible deviations (exceptions). For instance, CA is used to cross data extracted from the Federal Death System (SISOBI) with the Navy's internal data (payroll data) to identify if any public servant is dead yet is still receiving any kind of remuneration.

Another approach focused on the specific monitoring of errors in organizational data was presented by Codesso et al. (2020). Codesso et al. (2020) demonstrated that Cia Hering uses a CA system that, among other things, compare and analysis different databases to find and confirm exceptions or mismatches. CA compares information about incoming invoices, which are in government databases (data from Treasury Departments), with information from Cia Herring's internal accounting system. As a result, internal auditors are able to daily check invoices that are not yet properly booked in their systems, thereby avoiding possible tax risks. Although the entire system was developed by the internal auditors, it evolved over time and eventually came to be run by the tax department, thus constituting a layer of control. Internal auditors now use the information provided by the CA as analysis of tax risks on an ongoing basis.

Key Process Indicators (KPIs) can be used in different ways within the organization and for different purposes in the audit (Nigrini & Johnson, 2008). Nigrini and Johnson (2008), for example, proposed a set of indicators to monitor the sales reports of a restaurant franchise. These KPIs are continuously presented to stakeholders (auditors, those responsible for internal controls or risk management, etc.) so that eventual deviations could be timely verified. The use of KPIs can be useful both for tracking possible errors in organizational data and for more complex problems such as fraud detection (Nigrini & Johnson, 2008, Moon & Krahel, 2020).

Krass (2002) and Vasarhelyi et al. (2002) discussed how CA could have detected the anomalies that occurred in Enron's case. The authors realized that an integrated CA model, which was able to capture financial information in a timely manner and analyze it through key indicators, would have potentially avoided the scandal, or perhaps minimized its impacts.

The original theoretical concept of CA was expanded as new ways of exploring organizational data emerged (Alles et al., 2006a). As a reaction to Sarbanes Oxley and the need to give an opinion on the adequacy of internal controls, an expansion of CA emerged as a Continuous Control Monitoring (CCM) (Bumgarner & Vasarhelyi, 2018).

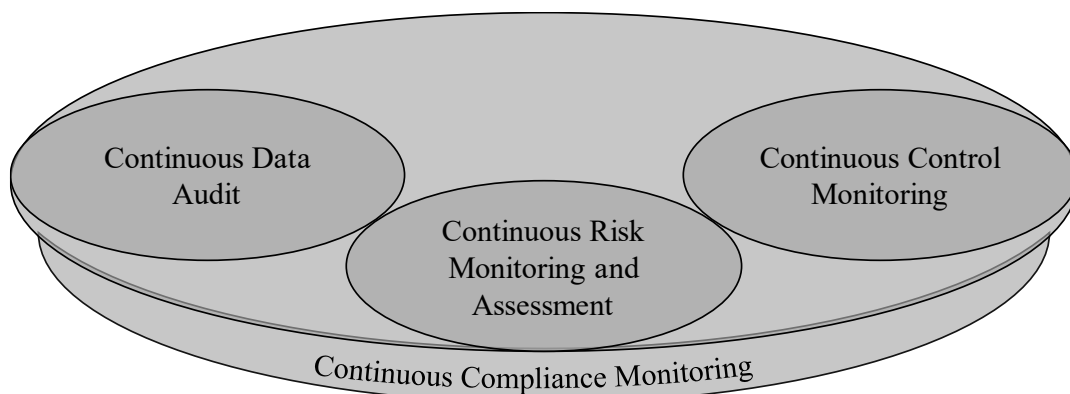
Alles et al. (2006a) presented a framework on how business process controls, which today are already within the management systems themselves, could be continuously monitored in order to warn auditors about possible deviations. The framework proposed by Alles et al. (2006a) was implemented at Siemens, using the company's real data. The authors argue that even in good management systems, monitoring systems can identify violations of organizational controls. An example of these deviations would be the use of default passwords

(passwords like 1234) of super users (like a top executive, for example). Alles et al. (2006a), together with the internal auditors, ranked this situation as a high-risk violation. The proposed framework helps to identify how possible deviations can be prioritized by auditors, since one of the possible problems of CA is related with a high number of false positives (Dai & Vasarhelyi, 2020).

Other techniques such as process mining are useful for the continuous assessment of the organization's internal controls. Initially proposed in the work by Agrawal et al. (1999), the technique allows the continuous evaluation of the logs generated by the management systems as a way of generating audit evidence that allows the analysis of failures or violations of internal controls. Chiu and Jans (2019) highlight that by classifying business processes into normal and abnormal variations, the effectiveness of internal control assessment can be improved. Logs are automatically extracted from the systems and the expected process flows are compared with the flows actually executed, taking into account the information extracted from these logs.

Furthermore, with the evolution of technologies and the theoretical concept of CA, studies began to visualize the potential to continuously analyze risks and aspects of organizational compliance. This was called Continuous Risk Monitoring and Assessment (CRMA), (Gonzalez et al., 2012) and Continuous Compliance Monitoring (COMO) (Cheng et al., 2018).

Thus, CA can be understood as the junction of four main parts, as shown in Figure 2.



Source: Bumgarner and Vasarhelyi (2015)
Figure 2 - The Umbrella of Continuous Auditing

Bumgarner and Vasarhelyi (2015) places Continuous Monitoring of Compliance as an external layer to represent precisely the fact that compliance-related events occur on the threshold between the organization and the outside world. Usually, organizations need to meet

a set of obligations that occur due to external demands, such as requirements from regulatory or various regulatory bodies. The process of monitoring these rules, often in large volume and extremely complex, is often quite manual (Cheng et al., 2018).

Although the literature has presented these CA differentiations (CDA, CRMA CCM, COMO), the findings of the studies are merely theoretical, and in practice, the distinction between where a model begins and another model ends is quite difficult to visualize (Bumgarner & Vasarhelyi, 2018).

Kogan et al. (2014) developed a framework composed of two monitoring layers. A first layer for compliance monitoring, based on deterministic rules, and a second layer for analytical monitoring of business processes. Audit findings from the first layer was called exceptions, and from the second layer was called anomalies. One of the conclusions presented by Kogan et al. (2014) was that improvements in the use of these layers would only occur if audit practices were modified, reflecting the new reality of data availability. In other words, the new way in which data is available needs to modify auditing practices so that improvements in these layers of control can effectively have an effect within organizations.

Kogan et al. (2014) adds that an exception demands evaluation and immediate response, as a rule was not followed. Depending on the explanations for this exception, a correction of data entry may be required. On the other hand, an alert creates a flag for any transaction that may be of interest to the owners of that information (payroll manager, accounting manager, cost manager, and so on). The Federal Comptroller General (CGU) names these deterministic tests as Audit Trails. Thus, audit trails in our context is a sequence of steps that need to be verified usually based usually on legislations rules and are designed by internal auditors (CGU, 2015).

The work by Kogan et al. (2014) helps to understand how the different layers of CA can be developed within an organization. Each of them has its strengths and weaknesses, which must be considered when evaluating how to implement a CA model.

As seen, CA literature has developed in recent years, advancing along with new technologies. As highlighted by Alles et al. (2008), unlike other areas of knowledge, CA is one of the rare cases in which an innovation in accounting practice has been developed and driven by the academic community, contrary to the usual model in which researchers use archival data to investigate practices originating from the industry.

2.1.1 Continuous Audit Techniques and Technologies

Alles and Gray (2020) argue that as the capacity of technology in the audit process increases, technology-driven assurance will become technology-based assurance, which means that technology is no longer an input in the audit process to become its own source of assurance. Operationalization of CA is based on a different set of techniques and technologies, as will be presented in this section (Dull et al., 2006, Alles et al., 2008, No et al., 2019).

Initially, it is important to differentiate between Computer Assisted Audit Techniques (CAATS) and CA (Aksoy & Gurol, 2021). CAATS refers to the use of some technologies (software, systems, computers, etc.) that assist in analysis throughout an audit (Aksoy & Gurol, 2021). CA, on the other hand, also uses a varied set of systems and technologies, but does so permanently and continuously. With this, the CA aims not only to assist in the automation of audit activities through the use of technologies, but to bring auditors closer to relevant events (Bumgarner & Vasarhelyi, 2018).

Eulerich and Kalinichenko (2018) highlights some of the main tools, techniques and technologies analyzed in studies on CA. Examples listed in Eulerich and Kalinichenko (2018) works are Artificial Intelligence, XBRL/XML, Intelligent Systems, Robotic Process Automation (RPA), process and text mining, intelligent auditing systems, among others.

The use of new technologies and more sophisticated data analysis techniques has, for example, reduced the need for sampling. Screening the entire population can increase audit quality, as this process provides audit evidence on a broader and more complete scale (International Accounting, Auditing & Ethics [IAAE] 2016). In addition to the usual data that auditors already worked with, today's society has an even larger set of data available for auditing purposes (big data). This data refers to a set of various types of data, which may include some combination of structured financial and non-financial data, logistical data, sensor data, emails, electronic calls, social media data, blogs, as well as other internal and external data (Alles & Gray, 2014). Analyzing the entire population and this new set of available data brings a series of challenges for the audit (No et al., 2019). Many studies propose frameworks exploiting potential techniques to be implemented by auditors (Eulerich and Kalinichenko, 2018).

Alles et al. (2006a) presented how a Continuous Monitoring of Business Process Controls (CMBP) can be implemented and operationalized within an organization. According to the authors CMBP can be based on two different architectures: i) as an independent system,

known as a Monitoring and Control Layer (MCL) (Vasarhelyi et al., 2004) or; ii) as a module of the ERP, generally called the Embedded Audit Model (EAM) (Groomer and Murthy, 1989).

According to Alles et al. (2006a), although in theory, the CMBPC system can use a combination of these two approaches, to understand their relative advantages and disadvantages, it is necessary to analyze them separately. MCL is implemented on a computer system separate from the organization, which is generally owned and operated by the auditor. In many cases, the MCL system does not share facilities with the enterprise system and relies on remote (read-only) access to the enterprise system at the application layer. Because of that, data extracted with MCL can be more secure (less susceptible of manipulation – even by those who have superusers privileges) than EAM. On the other hand, MCL does not allow you to query the corporate system very often and therefore you may miss suspicious corporate events. MCL can query the enterprise database using SQL through ODBC. While in principle this approach is more versatile than querying the application layer as it is not constrained by the structure of corporate business objects, in reality corporate database schemas are so complex and huge (many databases contain more than 20,000 tables) that mining anything that isn't a well-documented business object is next to impossible. Similarly, EAM can be implemented as a trigger (written in SQL) stored in the database. However, the use of triggers on transactional databases has an adverse effect on database performance, and in some cases, can cripple (or slow down) the enterprise transaction processing system.

Allles et al. (2006a) comment that EAMs, by their nature, are tightly coupled to the corporate system. In some cases these modules are provided by ERP system vendors as standard parts of the system. A key advantage is that EAMs can be implemented as triggers triggered by suspicious business events, thus eliminating the need for large or high frequency queries to assure that such event is captured and analyzed in real time. Internal audit can thus avoid the possibility for someone to cover up between the queries. However, EAMs are inherently more vulnerable to manipulation, especially by company personnel who have superuser privileges.

Allles et al. (2006a) framework helps to visualize how CA can be operationalized within an organization and discusses some technical issues necessary for its operationalization. One of the great issues of CA is precisely to understand how internal auditors can benefit from the organization's data to create effective and efficient methodologies that can analyze the entire data population (No et al., 2019). Audit all the data requires the development of techniques and the use of technologies that enables outlier detections. However, a large number of outliers can

emerge if techniques are not properly implemented. Some studies like No et al. (2019) propose solutions to this problem.

No et al. (2019) presented a Multidimensional Audit Data Selection (MADS) framework to try to solve this issue. MADS is a systematic methodology for auditors to use data analysis techniques in the audit data selection process. MADS is divided into four stages: i) performing filters to identify significant risk factors; ii) application of analytical techniques; iii) prioritization of findings; iv) sampling techniques to assess the model's quality.

No et al. (2019) research also helps to understand the differences between the simple use of analytical audit techniques in the day-to-day of organizations and the CA methodology. While many of the procedures used by the CA are a set of these analytical techniques, an auditor may also use analytical techniques in traditional engagements. If MADS model is implemented and used continuously in the audit, it can be considered a CA methodology. No et al. (2019) reinforces that these models need to be periodically evaluated after implementation, as structural changes in data and organization can affect the performance of the model.

The studies by No et al. (2019) and Alles et al. (2006a) exemplify how the area of CA is concern in elaborating theoretical frameworks and innovations that are usually incorporated in organizations as the studies develop. After implementation, the scenario is studied to identify positive impacts, bottlenecks, improvement situations, etc. Some studies are theoretical frameworks without a simultaneous application in an organization, such as the studies by Codesso et al. (2018) and Alles and Gray (2020), others propose the framework and use public data, such as No et al., (2019) and other studies use real data from companies, such as Alles et al (2006a) ensuring feedback from the auditors or from those involved in the implementation.

To be effective and efficient CA needs to use proper technologies and techniques. We can mention XML, RPA, artificial intelligence, among other technologies. Next we present some concepts and explanations about some technologies that can benefit CA.

According to IEEE (Institute of Electrical and Electronics Engineers), Robotic Process Automation (RPA) can be understood as a preconfigured software instance that uses business rules and predefined activity flows to autonomously execute a combination of processes, activities, transactions and tasks in one or more systems with the aim of delivering an outcome or a service (IEEE Corporate Advisory Group 2017). Its application, although still incipient (Bakarich and O'Brien, 2021), offers many opportunities to the audit field.

RPA allows the automatization of tasks that are based on audit rules, and are specific, repetitive and manual (Moffit et al., 2018). In RPA, robots conduct tasks in the same way as a human, through a computer system. Logging into a system, sending emails, building reports, inputting data into a system are some examples of tasks that can be automated (Moffit et al., 2018). Vasarhelyi and Halper (1991) already showed that the CA should be designed as an automated system. Vasarhelyi et al. (2004) comment that although the extent of CA application clearly decreases with the increase in the complexity of the audit object, the authors hypothesized that some audit procedures can still be formalized and automated even in more complex situations.

The use of Artificial Intelligence in the accounting and auditing area, although presented as a watershed for the area, is still very incipient. The study by Bakarich and O'Brien (2021), for example, demonstrated that Robotic Process Automation (RPA) and the use of Machine Learning by accounting professionals is practically non-existent, although many believe in the disruptive potential of these technologies in the future (Cho et al., 2020). Professionals from the so-called Big Four, however, are the ones who most use such technologies in their daily activities.

According to Aksoy & Gurol (2021), Artificial Intelligence (AI), as an automated system that can generate algorithms, occupies a central place in potential developments in auditing. AI concepts revolve around four pillars: i) act like a human, ii) think like a human, iii) think rationally and iv) have a rational behavior. In general, it is considered that the technology applied to the audit allows the activities to be carried out more effectively, however, there are contradictions about the use of AI in audit activities (Aksoy & Gurol 2021).

As highlighted by Aksoy & Gurol (2021), some researchers support the use of this new technology in the audit process, while others are skeptical. Those who view the use of AI with skepticism say that the auditor's professional judgment can be overridden with the use of AI. For this reason, it is discussed how to limit the use of AI in audit activities. The study by Aksoy & Gurol (2021) explains how AI is included in accounting and auditing activities. The study also identifies the advantages and disadvantages of using AI in audit processes. Some of the advantages identified are the ability to analyze more complex data in a more understandable way and still achieve better results.

In addition, AI allows the auditor to reach audit findings using a set of variables that were not previously analyzed and from a broader perspective Aksoy & Gurol (2021). On the

other hand, errors in the model can lead to critical consequences. Additionally, AI can be used for cheating purposes or in an unethical way. The difficulty of understanding the algorithms, which are often complex, can make it difficult for auditors to effectively understand how the results are being generated. Thus, the findings of Aksoy & Gurol (2021) suggest that the technical competence of auditors in this environment needs to be increased so that they can understand by themselves the different and possible AI algorithms.

As pointed out by West (2021), although there are different AI tools for fraud detection and financial supervision, it is not always easy to implement them operationally or integrate them into the organization's mission. There are several barriers to AI and RPA (Chan et al., 2018), especially in public administration. West (2021) comments that many choose to develop their own applications, although the presence of specialized personnel for this is usually a very common problem. However, even when acquiring ready-made software, the presence of people who understand algorithms is still a deficiency to be overcome.

Zhang (2019) proposed the use of AI with RPA to improve audit work. The study presented a theoretical framework called Intelligent Process Automation (IPA). According to Zhang (2019) IPA can improve CA in two ways: i) promoting automation over audit manual work, helping to coordinate and control audit processes, potentially increasing audit efficiency and effectiveness; and ii) as the IPA can access the auditee's system without breaking into application layers or databases, near real-time data acquisition will be more accessible, resulting in more timely and frequent audits.

Another very common technology used in audit is the Generalized Audit Software (GAS), which can be understood as specialized auditing software that helps in the analysis of data that support the audit work. These software's allow auditors to import, organize and create a series of routines with data from their auditees. These automatic routines include analyses, classifications, stratifications and calculations/recalculations, in addition to allowing a 100% analysis of the population (Ahmi and Kent, 2013). Although these systems can be used by both people with good IT knowledge and people with less knowledge, the impact of using these systems in organizations has shown to be different, depending on the user of the system (Bradford et al., 2020).

Other tools used for auditing purposes concern the use of dashboards and analytical charts, usually prepared via Business Intelligence tools (Shuhidan et al., 2020). Although the use of these tools is reasonably common for managerial purposes, there is still much to be

understood how they can be applied in the day-to-day of CA, to make the auditor's work more timely and agile (Shuhidan et al., 2020).

In summary, there are different alternative technologies and several characteristics of organizations that will determine the best tool or technique for that organization (Vasarhelyi et al., 2009). A simple change of focus of the audit may influence which techniques or tools best suit that reality. The tax area, for example (Codesso et al., 2020) may have different needs than an audit focused on payroll (de Freitas et al., 2020).

The disruptive technologies presented in this chapter have modified organizational methods and processes related to the audit area. This phenomenon was called Technological Process Reframing (TPR) (Issa et al., 2016) which can be defined as the reconsideration of methods and processes in an area of effort resulting from the advent of a disruptive technology. Although the authors specifically referred to the impacts generated by the use of AI in audit work, the restructuring of audit processes due to the implementation of CA is visible in different organizations (de Freitas et al., 2020, Codesso et al., 2020).

CA implementation and adoption are explained in the next chapter.

2.1.2 Continuous Audit Implementaton and Adoption

Although the automated use of auditing techniques, taking advantage of more timely information, has its discussions origins in the late 1980s (Vasarhelyi and Halper, 1991) and evolved in the last 30 years (Alles et al., 2013; Eulerich & Kalinichenko, 2018), the proper implementation of CA continues to be a challenge for organizations (Vasarhelyi et al., 2012). In the meantime, several studies have already argued that CA has the potential to be widely implemented in the future (Byrnes et al., 2012). The implementation of a CA system largely depends on proper adoption at the institutional and individual levels (Goldfnch, 2007), which does not always lead to the expected results (Davis et al., 1989, Lois et al., 2020). Proper implementation of these techniques requires knowledge that is often not common to audit professionals (Issa et al., 2016).

Preliminary findings (Kogan et al., 1999) indicated that a model such as the CA would only be viable if it were implemented as: i) a completely automated process; and ii) a process that was able to instantly access relevant events and their results (Kogan et al., 1999). With these prepositions, Kogan et al. (1999) explained that the only way to satisfy these two requirements was to build a methodology in an online computerized system. It should be noted

that cloud computing technology had been preliminarily mentioned in an internal memorandum of Compaq Computer Corporation in 1996 (Regalado, 2011) but only became commercially viable in more recent years Mendelson et al. (2012).

However, more recent studies have shown that the CA implementation process can (and naturally does) occur more gradually (de Freitas et al., 2020, Codesso et al., 2020), starting first with automation of parts of the audit (Alles et al., 2006a), before becoming a fully automated model, which could be called full CA (Vasarhelyi, Alles & Williams 2010, Vasarhelyi et al., 2012).

Evidence from Alles et al. (2006a) demonstrate that although cost reduction and organizational convenience are catalysts for implementing a CA model, and that this model will primarily seek to automate procedures previously performed by traditional audits, a certain audit reengineering is essential so that the CA can be effectively implemented and enforced. In addition, the demands of CA usually occur due to internal factors (Decker, 2004, Vasarhelyi et al., 2004).

As highlighted by Vasarhelyi et al. (2012), the process of implementing a CA must occur gradually and it is possible that even within organizations, there are different stages of the use of CA techniques in their most varied internal audit departments. These stages were summarized by the authors and can be seen in Table 1.

Table 1 - Continuous Audit Stages

	Stage 1: Traditional audit	Stage 2: Emerging CA audit	Stage 3: Maturing CA audit	Stage 4: Full CA
Audit Objectives	<ul style="list-style-type: none"> Assurance on the financial reports presented by management 	<ul style="list-style-type: none"> Effective control monitoring 	<ul style="list-style-type: none"> Verification of the quality of controls and operational results 	<ul style="list-style-type: none"> Improvements in the quality of data Creation of a critical meta-control structure
Tooling	<ul style="list-style-type: none"> Manual process and separate IT audit 	<ul style="list-style-type: none"> Integration between IT audit and financial audit 	<ul style="list-style-type: none"> Audit makes the connection between financial and operational processes 	<ul style="list-style-type: none"> Most automated auditing

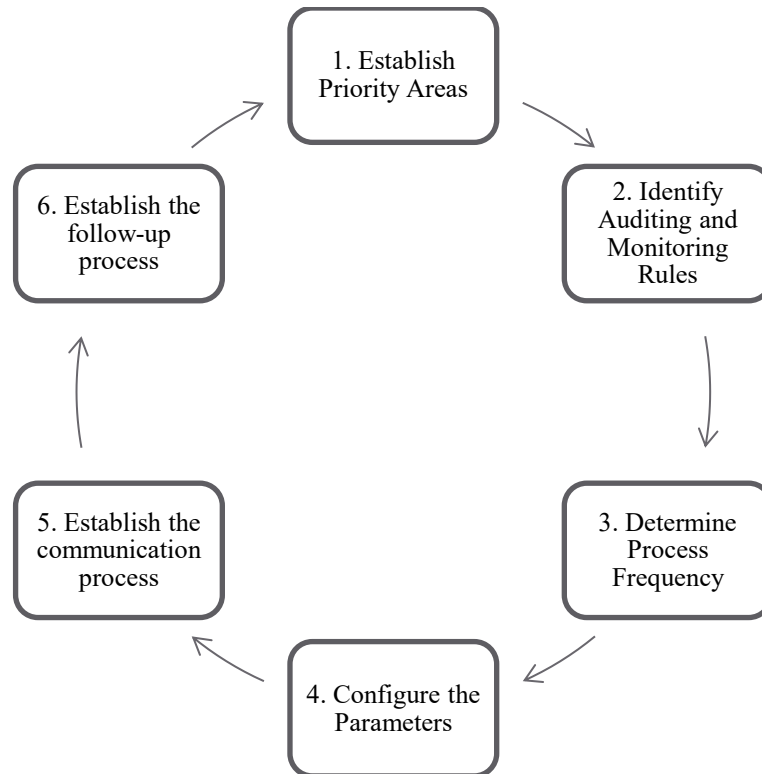
	Stage 1: Traditional audit	Stage 2: Emerging CA audit	Stage 3: Maturing CA audit	Stage 4: Full CA
Audit approach	<ul style="list-style-type: none"> Traditional interim and year-end audit 	<ul style="list-style-type: none"> Traditional plus some key monitoring processes 	<ul style="list-style-type: none"> Usage of alarms as evidence Continuous control monitoring 	<ul style="list-style-type: none"> Audit by exception
Data access	<ul style="list-style-type: none"> Case by case basis Data is captured during the audit process 	<ul style="list-style-type: none"> Repeating key extractions on cycles 	<ul style="list-style-type: none"> Systematic monitoring of processes with data capture 	<ul style="list-style-type: none"> Complete data access Audit data warehouse, production, finance, benchmarking and error history
Audit automation	<ul style="list-style-type: none"> Manual processes & separate IT audit 	<ul style="list-style-type: none"> Audit management software Work paper preparation software 	<ul style="list-style-type: none"> Automated monitoring module Alarm and follow-up process-up 	<ul style="list-style-type: none"> Continuous monitoring and immediate response Most of audit automated
Audit and management	<ul style="list-style-type: none"> Independent and Adversarial 	<ul style="list-style-type: none"> Independent with some core monitoring shared 	<ul style="list-style-type: none"> Shared systems and resources where natural process synergies allow 	<ul style="list-style-type: none"> Purposeful Parallel systems and common infrastructures
Management of audit function	<ul style="list-style-type: none"> Financial organization supervises audit 	<ul style="list-style-type: none"> IT audit works independently Some degree of coordination between the areas of risk, auditing and compliance 	<ul style="list-style-type: none"> IA and IT audit coordinate risk management and share automatic audit processes Auditing links financial to operational processes 	<ul style="list-style-type: none"> Centralized and integrates with risk management and compliance layer with external audit.
Analytical methods	<ul style="list-style-type: none"> Financial ratios 	<ul style="list-style-type: none"> Financial ratios at sector level/account level 	<ul style="list-style-type: none"> Structural continuity equations Monitoring at transaction level KPI level monitoring 	<ul style="list-style-type: none"> Corporate models of the main sectors of the business Early warning system

Source: adapted from Vasarhelyi et al. (2009), Vasarhelyi et al. (2010) and Vasarhelyi et al. (2012).

The evolution of auditing can be visualized in four successive stages of CA capability and the extent to which these new practices have changed audit process (Vasarhelyi et al., 2012). Each of these stages can be classified according to eight criteria, as defined by Vasarhelyi et al. (2009):

1. Audit objective: refers to the scope of audit tasks that are performed by an CA system;
2. Tooling: degree of audit automation and integration between financial/operational audit and IT audit;
3. Audit approach: refers to the extent to which audit results move from periodic to an ongoing manner;
4. Access to data: the level of access of internal auditors to the firm's database;
5. Audit automation: the degree to which the audit process is automated;
6. Audit and management overlap: the extent to which internal auditors rely on IT systems intended for management use;
7. Management of the audit function: shared management of monitoring and control aspects;
8. Analytical methods: the degree of sophistication of the analytical procedures performed by the internal audit.

The CA implementation process may vary depending on the type of organization, although the same process has been relatively similar in both public administration (de Freitas et al., 2020) and private organizations (Codesso et al., 2020). The flow of implementation of a CA model can be seen in Figure 3.



Source: adapted from Shuhidan et al. (2020), Codesso et al. (2020) and de Freitas et al. (2020)

Figure 3 - Implementation Steps for CA

As can be seen, it is important that there is adequate planning and a methodologically structured implementation so that the CA can be properly implemented. Steps 2 and 3 are particularly important for the success of CA (Codesso et al., 2020, de Freitas et al., 2020). A preliminary mapping of which rules can be turned into scripts must be done with caution and respect some criteria pre-established by the audit team. The frequency of this process depends mainly on the timeliness with which auditors have access to data and is a relevant factor (Codesso et al., 2020). CA audit can be run daily (Codesso et al., 2020) or monthly (de Freitas et al., 2020), for example, and still not impair the proper functioning of the CA.

Alles et al. (2006a) reinforces that regardless of the scope, frequency or nature of data retention requirements in a CA process, it is advisable that a robust relational database be used to manage the potential for storing and handling large amounts of data. The database should serve as a support for the CA analysis model, or even be used directly by auditors to perform this methodology. Brown et al. (2007) adds that the second essential component for the proper functioning of CA is some kind of analytical monitoring methodology.

It should be noted that there may be some implementation challenges and potential restrictions to CA. Alles et al. (2002) highlights that the biggest constraint for the adoption of

CA has not been the supply of technologies, but the demand for it, and by extension, human and economic forces that formulate its implementation. People and the economic interest of the organization are more important than technologies for the proper implementation of CA (Eulerich et al., 2020). Dai & Vasarhelyi (2020) reinforce that one of the biggest challenges with the current transition of the auditing profession is the lack of qualified and experienced auditors who can use technologies effectively and efficiently. Other restrictions on the use of CA may occur due to budgetary and regulatory matters (Alles et al., 2008).

2.2 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGIES (UTAUT) AND STUDIES ON CONTINUOUS AUDIT ACCEPTANCE

Technology is an umbrella term that deals with the use and knowledge of the tools and crafts of humanity and a single definition for the word is difficult to determine (Oye et al., 2014). Technology can refer to material objects of use to humanity, such as machines, hardware, or utensils, but it can also encompass broader topics, including systems, methods of organization, and techniques. Most people, however, think of technology in terms of its artifacts: computers and software, airplanes, pesticides, water treatment plants, etc. (Oye et al., 2014). But technology is more than these tangible products and includes all the infrastructure necessary for the design, manufacture, operation and repair of technological artifacts, from company headquarters and engineering schools to factories and maintenance facilities. The knowledge and processes used to create and operate technological artifacts, engineering know-how and various other technical skills are an equally important part of technology (Oye et al., 2014).

Research that are concerned with understanding human behavior have applied theories that explain and predict the phenomenon related to the acquisition, implementation, management and use of these technologies and there are several models and theories that help researchers in the area to understand their implementation in organizations (Davis, 1989, Venkatesh et al., 2003, Turnip et al., 2018). The reason for this interest is diverse, but the predominant notion is that the adoption and acceptance of a certain technology is a fundamental element for it to generate the expected benefits for its users and for the organization (DeLone & McLean, 1992, Venkatesh et al., 2003, Olasina, 2014, Dwivedi et al., 2017).

The basic idea of adoption is supported by the Technology Acceptance Model (TAM) (Davis, 1989) which is still widely used in the literature to address the subject. Davis (1989)

showed that the behavioral intention of an individual depends on the perceived usefulness and perceived ease of use by its users. When users expect a technology to be useful and easy to use, they are more likely to use that technology.

Davis' model (1989) was modified by different researchers, and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) became very popular in academic studies of area (Rana et al., 2013, Dwivedi et al., 2017, Chatterjee et al., 2018). In addition to bringing two new elements, this theory came to be widely used mainly because of its high explanatory power (Venkatesh et al., 2003; Dwivedi et al. 2017). UTAUT unified a series of models that proposed, directly or indirectly, to understand human behavior in the face of technology acceptance. The model was able to outperform the other eight previous models that until then were used concurrently in the Information Systems (IS) and Information Technologies (IT) areas (Venkatesh et al., 2003; Dwivedi et al. 2017). Over time, UTAUT has gained popularity and today has already been applied in other areas beyond the information technologies field (Turnip et al., 2018).

Other important model still widely used to understand the technology acceptance is the TAM model and its update TAM 2 (Venkatesh & Davis, 2000). TAM is a well-established model in the SI area, although it is simpler in explanatory terms than UTAUT. As already mentioned, TAM has two behavioral antecedents: perceived usefulness and perceived ease of use (Davis, 1989). TAM 2 has characteristics like UTAUT, although it differs mainly when it theorizes that social influences are predecessors of perceived usefulness, rather than direct predecessors of intention and use of technologies (Venkatesh & Davis, 2000, Venkatesh et al., 2003). Although TAM 2 is a model widely used in the literature, UTAUT is still the most cited model when comparing the two models (Turnip et al., 2018). Using Google Scholar, we found that in June 2022, the original UTAUT article had 41779 citations, while the TAM 2 study had 26701 citations. In addition, literature reviews have identified that UTAUT studies are more related to the business area (Turnip et al., 2018). than studies on TAM 2, usually more related to the health area (Rahimi et al., 2018, Tao et al., 2020). Thus, we use UTAUT as a theoretical model to understand the acceptance of CA, since it allows a wide spectrum of theoretical discussions on the subject, has relevance within the business area and is one of the most current models.

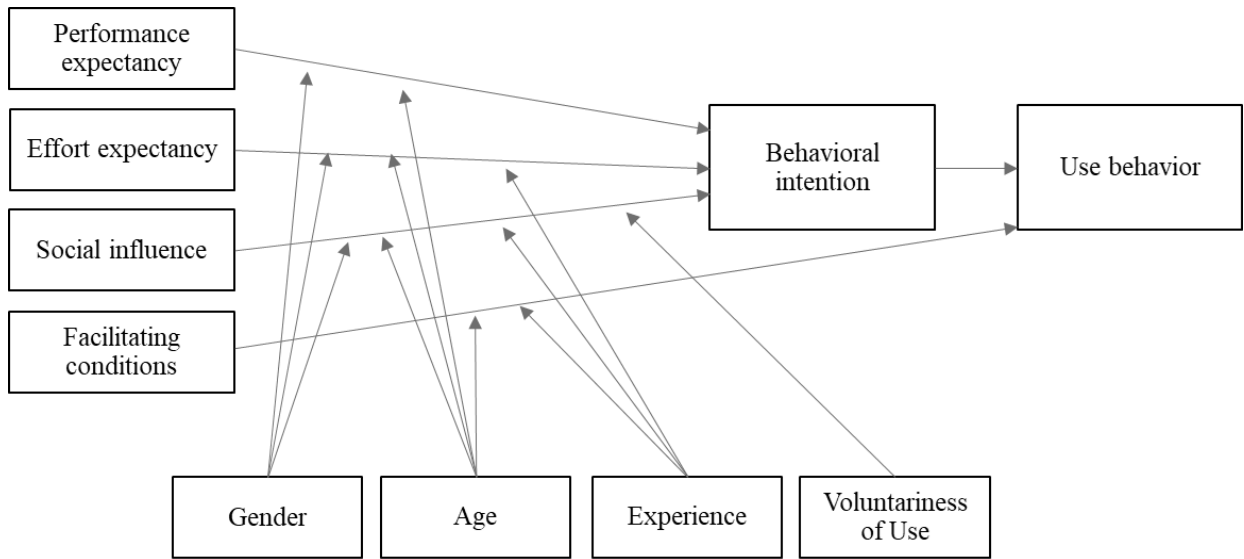
By carefully analyzing the literature that has applied the UTAUT since its creation, in 2003, from a universe of 1529 surveys in English found in the Web of Science, Scopus, Science

Direct and Emerald databases, only 122 sought to analyze this subject under the accounting and/or financial perspective. Only 8 studies analyzed the implementation of technologies and systems specifically related to the accounting area. Some of the exceptions are Curtis & Payne (2008), Lee et al. (2010) and Gonzalez et al. (2012). UTAUT theory also lack qualitative studies that help to explore how and why certain behaviors occur. In an extensive review of articles that used UTAUT to accept Electronic Governments and their technologies, it was found that out of 70 articles on the subject, less than ten used a qualitative approach. Some exceptions can be seen in Banker et al. (2002), AlAwadhi and Morris (2009), Olasina (2014); Olasina and Mutula (2015), Mosweu et al. (2016), Sharma and Mishra (2017).

UTAUT model is synthesis of eight different theories used to measure the acceptance, diffusion and use of technologies: (i) the Theory of Rational Action (TRA) (Fishbein & Ajzen, 1975); (ii) the Technology Acceptance Model (TAM) (Davis, 1989); (iii) the Motivational Model (MM) (Davis et al., 1992); (iv) the Theory of Planned Behavior (TPB) (Ajzen, 1991); (v) the Combined Theory of the Technology Acceptance Model / Planned Behavior (C-TPB-TAM) (Taylor & Todd, 1995); (vi) the Personal Computer Use Model (MPCU) (Thompson et al., 1991); (vii) the Diffusion of Innovation Theory (DOI) (Rogers, 1995); and (viii) Social Cognitive Theory (SCT) (Compeau & Higgins, 1995).

According to Venkatesh et al., (2003), three behavioral antecedents can predict the intention to use a technology: (i) performance expectation; (ii) effort expectation; and (iii) social influences. The usage behavior itself is explained by the facilitating conditions and by the usage intention itself (Venkatesh et al., 2003): that is, if an individual intends to use a certain technology, it is because he/she will use it in a near future (Olasina, 2014). UTAUT also considers the effect of some moderating variables, such as age, gender, experience and willingness to use (Dwivedi et al, 2017). These moderations, however, are based on empirical observations of correlation, rather than theoretical aspects (Sun et al., 2009).

UTAUT model can be seen in Figure 4.



Source: Venkatesh et al. (2003).

Figure 4 – UTAUT Model

Dwivedi et. al (2017) comments that UTAUT has been widely used by researchers to explain the acceptance and use of IS/IT. However, although the original UTAUT model explained considerable variation in behavioral intention and usage behavior, according to Dwivedi et. al (2017), the model theorized some relationships that might not be applicable to all contexts, omitted some relationships that might be potentially important, and excluded some constructs that might be crucial in explaining IS/IT acceptance and use. It is argued that the moderators specified in the original UTAUT model may not be applicable in all contexts, the path from facilitating conditions to behavioral intention, absent in the original model, should be included, and individual characteristics such as attitude, not theorized in the original UTAUT's model should be introduced. A similar observation was made by Venkatesh et al. (2012), who observed that most studies employed only a subset of the model and that moderators were usually discarded.

As already highlighted, performance expectancy proved to be the best predictor of behavioral intention (Venkatesh et al., 2003, Dwivedi et al., 2011, Olasina, 2014, Dwivedi et al. 2017). Venkatesh et al. (2003) summarized this expectation as the degree to which an individual believes that using the system will help them to obtain performance gains in their work. In other words, the authors understood that the extent to which individuals believe that a particular technology will help them do their work directly influences whether they will use that technology (Davis, 1989).

Performance expectation can be visualized when an employee perceives that a new technology is seen as advantageous over its predecessor or some similar technology (Rogers, 1983, 1995) or if it is considered better than its predecessor (Rogers, 1983). Agarwal and Prasad (1997) define this characteristic as the extent to which a potential user sees the innovation as beneficial in relation to others that have already been used to perform the same task. Venkatesh et al. (2003) named this attribute relative advantage.

An auditor may perceive that the CA has a relative advantage over traditional audits or the use of more technologies within the CA may be seen as more advantageous. The theoretical defense of the advantage of CA in relation to traditional audits is highlighted by numerous studies, such as the one by Vasarhelyi et al. (2010b) and Acar et al. (2021). Acar et al. (2021) argue that CA has advantages over traditional auditing as it allows the creation of a series of new controls. Authors mentions, for example, the possibility of continuously analyzing the number of hours used by each machine or monitoring in real time employee turnover or the number of sick leaves. By creating the rules or criteria that need to be verified, auditors can continually be aware of these violations and act if they think it's necessary.

Effort expectancy is related to the degree that a system is to be used (Venkatesh et al., 2003). Effort expectancy was constructed as perceived ease of use, ease of use, and complexity (Venkatesh et al., 2003). Davis (1989) found that even if potential users believe that a particular system is useful (i.e., meets their performance expectation), they may believe that the system is too difficult to use and that the benefits in the performance do not outweigh the effort of using that system.

Perceived ease of use can be understood as the degree to which an individual believes that the use of a system will be effortless. It should be emphasized that perceived ease of use is a subjective assessment of people's effort, and does not necessarily reflect objective reality (Davis, 1989). Ease of use, on the other hand, refers to the degree to which a given innovation or technology is perceived as being easy to use (Moore & Benbasat, 1991). Complexity refers to the difficulty that individuals have in understanding and using a particular innovation or technology. Less complex systems have a greater chance of being accepted and used by potential users (Agarwal & Prasad, 1997). When using technologies in the face of complex innovations, users may need additional training (Gatignon and Robertson, 1985).

The relationship between effort expectancy and intention to use was strongly supported only in the meta-analysis by Dwivedi et al. (2011). This means that effort expectancy

does not appear to be a strong predictor of behavioral intention (Mardiana et al., 2015). These results are, however, still limited, and inconclusive (Dwivedi et al., 2011, Mardiana et al., 2015).

This is another variable that usually shows statistical significance in studies on the subject, as demonstrated by the meta-analyses performed by Faaeq et al. (2013), Taiwo and Downe (2013) and Khechine et al. (2016). It is expected that the easier (and therefore less effort) to use a given technology, the greater its use.

According to Vasarhelyi & Halper (1991) CA involves major changes in software, hardware, in the control environment, in the behavior of managers and auditors, and its implementation requires a careful and progressive approach. This approach requires, among other things, adequate knowledge about the conditions that lead users to use or not certain technologies.

Alles et al. (2006a) developed a system that allowed business rules to be easily modified by users (auditors), allowing rule changes to be made without programmer intervention. Having the system agility to create or change business rules without the cost and inflexibility of programming code changes is a critical component of a successful continuous audit system. Writing flexible scripting software is difficult, and while there are many software solutions that have flexible modules for analyzing business rules, most are specialized software for selected applications. Regardless of the system used, whether internally developed or a system ready to use, there is always a trade-off between flexibility and complexity that needs to be considered (Alles et al., 2006a).

The efforts necessary for the operationalization of the CA are presented in the literature. Often, the primary challenge for the audit area is the lack of skilled professionals related with IT and difficult to train them. The perceived ease of use and the system's complexity can drive users away as found by some research on the subject (Alles et al., 2006a, Vasarhelyi et al., 2012).

Social influence as a predictor of intention to use and use behavior is highlighted in different models of adoption (Fishbein & Ajzen, 1975; Venkatesh et al., 2003). However, some studies show mixed results regarding the effect of social influence on behavioral intention (Ramayah et al., 2009). While some studies have found significant effects on intention (Yang et al., 2012), others have found only non-significant or weak influences (Riffai et al., 2012). This discrepancy is attributable to the complex and ambiguous nature of the concept of social

influence (Cho, 2011) and its most used conceptualization derives from the TRA (Fishbein & Ajzen, 1975), which is limited to the idea of approval or disapproval of others to perform a specific task (Chaouali et al., 2016).

The relationship between social influences and intention to use received strong support only in the meta-analysis by Dwivedi et al. (2011). Other studies have presented mixed results on the subject (Mardiana et al., 2015). According to Venkatesh et al. (2003), social influence is the degree to which an individual perceives that important others believe he should use the new system. Venkatesh et al. (2003) constructed social influence based on three categories: subjective norms, social factors and image.

According to Venkatesh et al. (2003), social influence is the degree to which an individual perceives that important others believe he should use the new system. Venkatesh et al. (2003) constructed social influence based on three categories: subjective norms, social factors and image.

According to Ajzen (1991), subjective norms refer to the perceived social pressure to perform or not a certain behavior. At the most basic level of explanation, the theory posits that behavior is a function of salient information, or beliefs relevant to the behavior. People can have many beliefs about any given behavior, but they can cater to a relatively small number at any given time. It is these salient beliefs that are the predominant determinants of a person's intentions and actions. Of the three types of salient beliefs postulated by Ajzen (1991), Venkatesh et al. (2003) was specifically concerned with one, which are the normative beliefs that constitute the underlying determinants of subjective norms. Normative beliefs concern the probability that individuals or important reference groups will approve or disapprove of the performance of a certain behavior. A global measure of subjective norms is usually obtained by asking respondents to rate the extent to which “important others” would approve or disapprove of the performance of a particular behavior (Ajzen, 1991).

These beliefs may be rooted in the culture of the public administration and may positively or negatively affect (West, 2021) the use and satisfaction with the use of CA (Vasarhelyi et al., 2012, Miranda, 2018, Nascimento, 2019). A comparison between the studies by Freitas et al. (2020) and Codesso et al. (2020) (the first analyzed CA in the government environment and the second in a private organization) did not highlight any particular difference between the governmental and private areas regarding potential social influences on the adoption of CA. Since the results Vasarhelyi et al. (2012), Miranda (2018), Nascimento (2019)

were not conclusive on the subject, understanding who are these “important others” (Ajzen, 1991) and how they influence CA acceptance it’s from a critical value.

Chaouali et al. (2016) use the expression injunctive norms as equivalent to subjective norms and define them as the word-of-mouth influence of friends, colleagues, superiors and other previous adopters known by potential adopters. They reflect the pressure of the person's significant peers, which is like Fishbein and Ajzen's (1975) concept of subjective norm. Hsu and Chiu (2004) provide strong evidence of a positive and significant impact of injunctive norms on behavioral intention. In this sense, it is suggested that a public servant has a greater intention to adopt information technologies when he believes that his family, friends and colleagues think he should use the system (Chaouli et al., 2016), although exactly who are these important people who can affect the adoption of CA has not been well explored in the literature (Vasarhelyi et al., 2012, Miranda, 2018, Nascimento, 2019).

According to Thompson et al. (1991), social factors refer to the individual's internalization of the subjective culture of the reference group and the specific interpersonal agreements that the individual has made with others in specific social situations. Subjective culture consists of norms (self-instructions to do what is perceived as correct and appropriate by members of a culture in certain situations); roles (which are also concerned with behaviors that are considered right but relate to people who occupy a certain position in a group, society, or social system); and values (abstract categories with strong affective components) (Thompson et al., 1991).

Triandis (1980) distinct between beliefs that link emotions to the act (occurring in the moment of the action) and beliefs that link the act to future consequences. He argues that behavioral intentions are determined by how people feel about the behavior (affect), what they think they should do (social factors), and the expected consequences of the behavior. Behavior (use of a technique, for example), in turn, is influenced by what people usually do (habits), by their behavioral intentions, and by facilitating conditions (Thompson et al., 1991). Venkatesh et al. (2003) was concerned to bring social factors into the construct of social influences. The present research does not intend to explore how feelings (affections) and habits can influence the adoption of CA, but to focus on the social elements involved, especially how internal auditors see possible social pressures (which can be positive or negative) in the adoption of CA.

Another category of social influences concerns image, which can be defined as the degree to which the use of an innovation is perceived as having the potential to improve its

image or status within its social system (Moore & Benbasat, 1991). According to Rogers (1983), the desire to obtain social status is one of the most important motivations for almost every individual to adopt an innovation.

Descriptive norms refer to what is usually done, and which motivate by providing evidence of what is likely to be effective and adaptive action. By recording what the majority are doing, it is often possible to choose efficiently and appropriately. In other words, people are encouraged to perform a specific behavior by imitating important others (Cho, 2011). Even the media can have an impact on the use of innovations, as highlighted by Chaouali et al. (2016). Media influence refers to the influence of mass media (TV, radio and newspapers) and expert reports or criticisms (Bhattacharjee, 2015).

Another factor that affects the acceptance of technologies is the conditions in the organization's environment. Venkatesh et al. (2003) defined this variable as Facilitating Conditions based on three categories: perceived behavioral control, resource facilitation conditions and compatibility.

According to the UTAUT model, perceived facilitating conditions are like the perceived behavioral control of TAM. However, there is a fundamental difference. Perceived behavioral control is defined globally, while conditions are more specific, such as organizational and IT infrastructure support (Seo & Bersen, 2016).

Facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003). Although the original model indicated a direct relationship only with use behavior, later studies have also recommended studying the relationship between facilitating conditions and behavioral intention (Foon and Fah 2011; Chaouali et al., 2016, Venkatesh et al., 2012, 2012).

Taylor and Todd (1995) argue that the lack of some resources constitutes barriers to the performance of behaviors. Consequently, availability of time, hardware, software, internet access, training and support are required to properly use the systems (Lu et al., 2008, Chaouali et al., 2016).

Facilitating conditions include aspects of the technological and/or organizational environment that are designed to remove barriers to use (which positively influence), such as compatibility, from the Diffusion Theory of Innovation (Rogers, 1983). Rogers (1983, 1995) define that compatibility measures the perception of a given innovation in terms of values,

needs and previous experiences of potential users. Although not explored by Venkatesh et al. (2003), the complexity of the system (how difficult it is to understand and use a given innovation) is also a factor that can mitigate organizational efforts to adopt a given innovation (Rogers, 1983).

A behavior cannot occur if objective conditions in the environment prevent it. Thompson et al. (1991) defines facilitating conditions as objective factors in the environment that judges or observers can agree to make an act easy to do. Some of these barriers can be reduced or eliminated if organizations train and assist users of these technologies. According to Thompson et al. (1991), top management support, technical support, implementation support, organizational support and undue resistance from employees are factors that influence the adoption of a system.

Regarding CA literature, we identified a few studies that theoretically comments or empirically found some potential barriers for CA acceptance, such as the studies of Kogan et al. (1999), Zhang et al. (2012) and Gray and Debreceeny (2014), No et al. (2019).

Gray and Debreceeny (2014) identify that some facilitating conditions are important for the proper acceptance of CA. The authors explain that lack of access to auditee data is a potential drawback to adapting data mining for fraud detection. Data is a fundamental input for CA adoption and acceptance. Zhang et al. (2012) also points out that auditors have enormous difficulty in accessing organizational data. One of the problems listed by the authors is the lack of a standard for making this data available. In addition, the authors reinforce that auditors have difficulty accessing data even when they are already in a digital format. In addition, No et al. (2019) reinforces that CA models need to be periodically evaluated after being implemented, as structural changes in data can affect the performance of the model.

Furthermore, CA is viable only if it is constructed as a fully automated process and a process that has instant access to relevant events and their possible impacts (Kogan et al. 1999). Thus, process automation and timely access to data are two characteristics that have the potential to limit the acceptance and use of CA in organizations.

The challenges in public administration are also like those in the private industry, as pointed out by West (2005). If the data is in a non-standardized and unstructured format, it becomes difficult to make effective use of this information. Non-standard and non-integrated information can generate more noise than proper evidence, obscuring the analysis of relevant

material and making it impossible for investigators to proceed with analysis of fraud cases (West, 2005).

Although widely used in the literature, UTAUT is not exempt from criticism. Dwivedi et al. (2017), reinforces that some relationships, such as the relationship between facilitating conditions and intention to use, not theorized in the original model, should be included in future research, in addition to stressing that other constructs should be used to explain this acceptance. Freitas & Silva (2019) showed that the existing relationships tested in the literature go beyond the original models. Constructs such as culture, trust, system quality, information quality, attitude, among others, could also explain the acceptance of technologies. Freitas & Silva (2019) also found that the integration if UTAUT with other models, such as D&M, is widely used in the literature.

In addition to the original UTUAT constructs (performance expectation, effort expectation, social influences and facilitating conditions), other important factors studied that sought to understand the acceptance of technologies in the governmental area are perception of utility, awareness, trust, quality of service, ease of use, information quality, system quality, and perceived effectiveness (AL Athmay et al., 2016, Mansoori et al., 2018, Naranjo-Zolotov et al., 2018).

Originally presented by DeLone & McLean (1992), System Quality is also theorized as an antecedent of usage behavior and satisfaction with the use of a certain technology. However, in a more recent work, DeLone & McLean (2003), when analyzing the studies that followed their original proposal, showed that the relationship between System Quality and intention to use it is also important and should be tested. Petter et al. (2003) comment that individuals who have positive expectations about an information system tend to be more satisfied with those systems. Therefore, it is important that project managers manage these expectations during the implementation of these systems.

According to AL Athmay et al. (2016), System Quality can be understood as the ability of a technology to provide accurate, reliable, relevant, and easy to understand information. The relationship between system quality and intended use was tested by Petter & Mc Lean (2009), Mardiana et al. (2015), Andriani et al. (2017), Chatterjee et al. (2018), Talukder et al. (2019).

Hamilton and Chervany (1981) identify some elements of a successful system: a system must have an agile response time, the information produced should be reliable and complete, the system also must be flexible and easy to use. Seddon (1997) is also concerned

with system bugs, user interface, ease of use, quality of documentation, and maintenance required for the program code.

Depending on different technologies for its operationalization, technical elements can be decisive factors in the proper adoption of CA. Proper data structure, for example, is one of them. Reaching technical agreements between different governmental agencies would be extremely valuable so that this data could be standardized and exchanged, strengthening predictive models based on artificial intelligence (West, 2021). Public administration should have a channel to transmit and connect data systems so that the information is available and can be used to improve real-time decision making (West, 2021). Thus, the following research proposition is formulated:

Proposition 1: the impact on performance (relative advantage), the effort required, the facilitating conditions, the social influences and the quality of the system, drives the use and individual satisfaction of CA.

Finally, as suggested by Davis (1989), the usage behavior construct is often operationalized by participants self-reporting their current use of the system. Participants are often asked how many times they have logged into the system over a period or how much time they spend on the system on average. Behavioral intention is the willingness of individuals to use the system (Davis, 1989). Another metric used by Venkatesh et al. (2003) was the intensity of use of the systems by the individuals studied, measured through the logs of that system. In addition to intention to use (Venkatesh et al., 2003), DeLone & McLean (1992) also theorized that satisfaction with use leads to greater use of systems.

UTAUT has also proposed moderating effects of gender, age, experience, and voluntariness to use, but these associations were based on empirically observed correlations rather than theory (Sun et al., 2009), and for this reason it is common that literature not use such moderators in their models (Venkatesh et al., 2012). Some exceptions are the works by Gupta et al. (2008) and Decman (2015). In this context, the following research proposal is presented:

Proposition 2: Individual characteristics, such as gender, age, experience and voluntariness of use, drives the use and satisfaction with the use of Continuous Auditing.

Thus, it is observed that the intention to use, use and satisfaction with use (or acceptance of the CA) can be affected by different characteristics. Analyzing them in depth will

help to better understand how this is affecting the implementation of modern auditing techniques.

Although studies on the acceptance of systems more related to the accounting area are not so common, studies such as those by Bandyopadhyay & Barnes (2012), Chauhan & Jaiswal (2016), Costa et al. (2016), Rezvani et al. (2017), Alsoub et al. (2018), are some papers that study the acceptance of ERPs.

The AIS literature has shown that the acceptance of GAS by auditors is lower than expected (Debreceeny et al., 2005; Curtis et al., 2009). These findings are consistent with Janvrin et al. (2008, 2009) and Kim et al. (2009), who find that advanced IT functionalities were not fully explored in the audit.

Studies on CA have focused on the elaboration of conceptual frameworks on how tools, techniques and methodologies can be implemented within organizations. Empirical case study studies are rare Eulerich & Kalinichenko (2018). From the 57 articles reviewed by Murcia et al. (2008) in a literature review, only one of the studies was considered empirical by the authors. The other 56 articles were theoretical, with the vast majority being conceptual articles, that is, articles that define models and theories. The review by Eulerich & Kalinichenko (2018), although it has identified an increase in the number of studies on CA since 2004, also reinforces that most articles still consist of conceptual frameworks. Thus, CA literature is more focused on generating innovative models and working with the frontier of knowledge. Curtis (2012) comments that until the study by Gonzalez et al. (2012), which evidenced the antecedents of the intention to use continuous auditing in the accounting literature, UTAUT had been basically ignored by AIS researchers. On the other hand, UTAUT has been widely used in the governmental area (Williams et al, 2015).

However, in addition to the studies by Curtis (2012) and Gonzalez et al. (2012), there are some other articles that used UTAUT or D&M as a theoretical model to understand the acceptance of CA or its benefits within the audit (e.g. Bonsón & Borrero, 2011). The difficulty of finding auditors who are already effectively using these techniques and who are willing to participate in this type of research makes its results limited. The study by Bonsón & Borrero (2011), for example, applied only 43 questionnaires with auditors (30 were auditors from private organizations and 13 were auditors from public administration). Besides, most of these auditors were not CAATS users, making the results potentially conflicting and difficult to interpret.

Similar evidence was found in other researches that applied the UTAUT in the CA area. Although Miranda's (2018) research has obtained a greater number of respondents and a more homogeneous sample (66 auditors from the Federal Court of Auditors), the research evaluated the intention to use Continuous Auditing in broad terms. For example, respondents were asked whether "Learning to operate the [Continuous Audit] system would be easy for me" or "Using the system in my work would allow me to get things done faster". Interpreting the results of this work is difficult, as these questions disregard that CA is a technique operated by different technologies, and that different auditors can be part of the methodology in different ways. Bradford et al. (2020) studies, for example, focused their analysis on self-identified users of GAS because the issue may not be about acceptance versus non-acceptance, but rather about the level and type of use. Thus, the type of CA user and the intensity that he uses CA are important characteristics that should be analyzed.

Nascimento (2019), applied 103 questionnaires (internal auditors mostly from private sector), who held different positions (from Chief Audit Executive to staff). Like Miranda's work (2018), Nascimento (2019) used questions such as "I can complete audit tasks in less time using continuous audit technology" or "Using continuous audit technology improves my job performance". Understanding CA as a technology (apparently a common mistake in research that sought to understand its acceptance with internal auditors) can hamper the analysis, as CA is in fact rooted in several technologies, and its proper operationalization is only effective when an extensive set of procedures are automated (Vasarhelyi & Halper, 1991, Earley, 2015, Appelbaum et al., 2018, Eulerich et al., 2019). However, CA can be understood much more as a technique, or a methodology, or even a framework, than a technology by itself. Thus, standard questionnaires adapted from the original application of the UTAUT are not able to fully capture the reality of CA. Therefore, qualitative studies that seek to understand how and why the CA acceptance is affected by facilitating conditions, individual efforts or social influences are fundamental to build better instruments such as the applied by Miranda (2018) and Nascimento (2019).

The comparative study carried out by Bonsón & Borrero (2011) allowed us to visualize differences and peculiarities between the acceptance of innovations in CA techniques between the public administration and the private sector. These same differences were also seen when comparing the types of auditors (CATS users versus non-users). While in the private sector the most important acceptance factor for CATS users was related to perceived relative advantage,

for non-CATS users, the perceived ease of use was the most critical factor for the adoption of these tools in the near future (Bonsón & Borrero, 2011). For the public administration, one of the most important factors for both CATS users and non CATS users was the perceived relative advantage. A prior test period of the technology was also found as a relevant element of CATS acceptance (Bonsón & Borrero, 2011). Although the study by Bonsón & Borrero (2011) is subject to the same criticisms of Miranda (2018) and Nascimento (2019), Bonsón & Borrero (2011) demonstrated how the role of the auditor in the CA can be fundamental to highlight differences in the perception of possible facilitating conditions or social influences. In other words, different perceptions can be expected depending on the auditor's role in the CA model.

Through a qualitative study, Vasarhelyi et al (2009) sought to understand how the adoption of CA is affected within the organization and at what level of maturity different organizations were. Its study made it possible to identify some important factors that interfere with adoption: i) support from the management; ii) auditors' knowledge, including ease of use; iii) costs involved and iv) regulatory environment. The study identified that most organizations were at early levels of CA maturity (very close to traditional auditing, but with some procedures and tasks already automated). Furthermore, the study demonstrated that auditors would need to specialize in modern auditing techniques and technologies for CA models to evolve. Although Vasarhelyi et al (2009) have also identified that implementation costs have reduced dramatically in more recent times, the authors still comment that perceived costs are important to be analyzed, as CA will only be functional if the perceived costs outweigh the perceived benefits. Finally, the study also identified that to perform CA efficiently, auditors need a certain level of access to the system and organizational data via the IT department.

The issue of costs as a limiting factor is also a feature pointed out by other studies, such as Ahmi & Kent (2013). Ahmi & Kent (2013) found that the use of specialized auditing software is unusually low among UK audit firms. About 73 percent of external auditors do not use GAS, due to the limited perceived benefit of using these systems to audit small clients. While some respondents recognized the advantages of specialized auditing software, they were discouraged by what they believed to be high implementation costs; significant learning curve and adoption process; and lack of ease of use – showed a preference for using traditional manual audit methods (Ahmi & Kent, 2013).

In summary, the literature on AIS has shown that the acceptance of specialized auditing software by auditors has been lower than expected, even with great advances in CA

and technological developments (Debreceeny et al., 2005; Curtis et al., 2009, Kotb et al., 2012). More recent studies such as Miranda (2018) and Nascimento (2019) have tried to highlight which characteristics affect the intention and use of CA.

It is possible that this low acceptance is also related to the different net benefits generated by CA, which are still little explored empirically by the specialized literature (Eulerich et al., 2019). To better explore this gap, the Information Systems Success Model by DeLone & McLean (1992, 2003) is presented next.

2.3 SUCCESSFUL MODEL OF INFORMATION SYSTEMS AND NET BENEFITS OF CONTINUOUS AUDIT

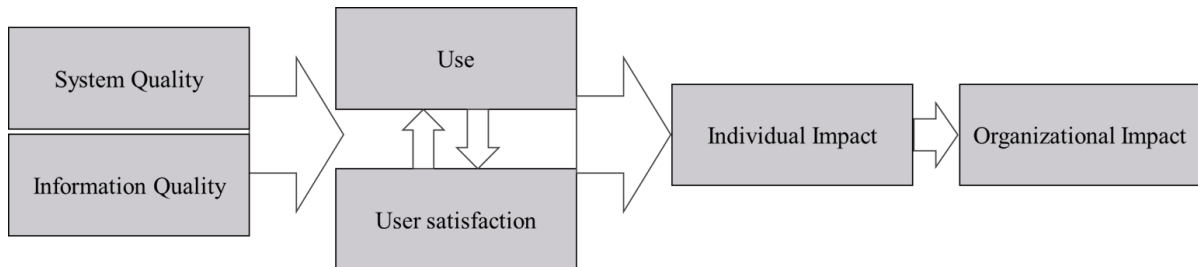
Although UTAUT is an important theoretical lens for this research because it is currently the most recent and most used model to understand the acceptance of technologies (Schaupp et al., 2010) and has been able to surpass the eight previous models (Olasina & Mutula, 2015, AL Athmay et al., 2016), their mixed results (Faaeq et al., 2013, Taiwo & Downe, 2013 and Khechine et al., 2016) reiterate the findings of Turnip et al. (2018), that more studies need to explore this lens and, if possible, integrate other constructs into their studies (Taiwo & Downe, 2013). Thus, the present research integrates UTAUT with D&M, trying to fill some research gaps.

Despite the distinct objectives of UTAUT, DeLone & McLean's (1992) model has a similar epistemological position. D&M is derived from three basic theories which are communication theory (Shannon and Weaver, 1949), the extension of communication theory (Mason, 1978) and the Servqual model, which proposed a scale to measure consumers' perceptions of service quality (Parasuraman et al., 1988) and has been widely used in the IS area to understand the interrelationships between the use of the system and its effects on organizations.

D&M is considered one of the most influential theoretical models in contemporary research on the success of IS's and is primarily useful for exploring the individual and organizational impacts related to the use of IS (Nguyen et al., 2015). It is also the most cited model in the analysis of the success of the implementation of business intelligence (Ain et al. 2019) and similar technologies.

According to DeLone & McLean (1992), the success of an information system can be measured in different ways: its use, its satisfaction with its use, the individual impacts they generate, and finally, the organizational impacts they generate. One of the purposes of DeLone

& McLean (1992) when presenting their model was to demonstrate the different dimensions of success of an IS. The Information Systems Success Model, proposed by DeLone & McLean (1992) can be seen in Figure 5.



Source: DeLone & McLean (1992, 2003)

Figure 5 - Information Systems Success Model

The six dimensions of D&M are interrelated and not independent. This is important for measuring, analyzing and reporting SIs in empirical studies. The D&M model suggests that at first, a system is created containing several resources. Then users and managers experience these features using the system and whether or not they are satisfied with their use. Use and satisfaction, in turn, can be reflected in individual or organizational impacts (DeLone & McLean, 2003). In addition, the D&M model also suggests causal relationships between them, such as: greater use and greater satisfaction with a given system will lead to greater individual and organizational impacts (DeLone & McLean, 2003).

DeLone and McLean (2003) emphasize that while many articles justify their empirical measurement of IS success citing D&M, some did not heed the authors' caveats. Some researchers have used the model to support their chosen success variable, rather than informing the development of a more comprehensive success construct. DeLone & McLean (2003) also point out some care in the use of this model:

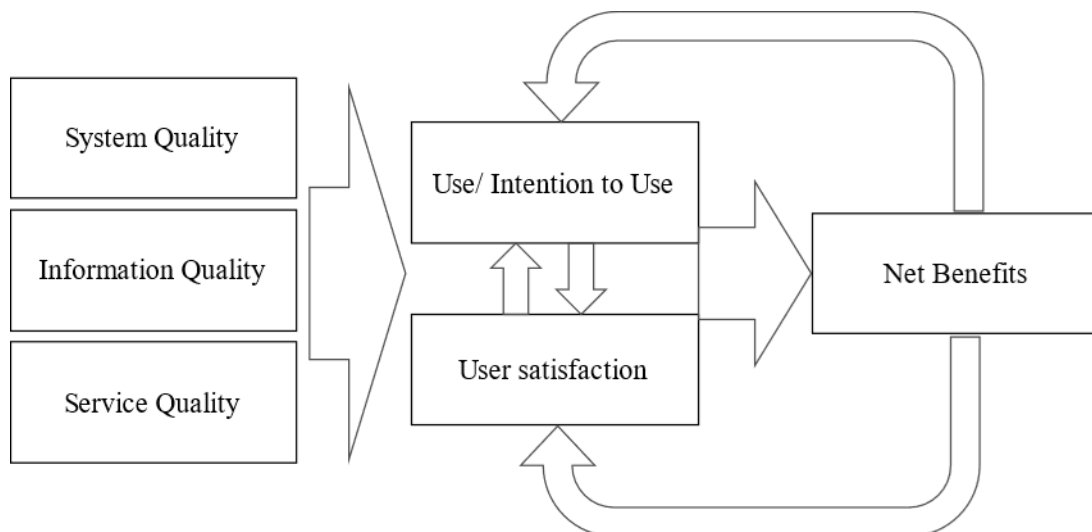
1. The multidimensional and interdependent nature of IS success requires careful attention to defining and measuring each aspect of this dependent variable. It is important to measure potential interactions between dimensions of success to isolate the effect of multiple independent variables with one or more of these dimensions of success (DeLone & McLean, 2003).

2. More field studies should investigate and incorporate organizational impact measures (DeLone & McLean, 2003).

The second point is specifically important for this dissertation, since, as demonstrated, there is a lack of studies that used the D&M model from an accounting point of view and in audit field. Accounting and auditing use information systems to carry out their work, although accountants or auditors are not the end user of the information produced by those information systems. Therefore, important theoretical contributions can emerge from researches that uses D&M in accounting or auditing.

When evaluating, for example, the impact of IT on the productivity of accounting firms, Banker et al. (2002) showed that although IT has different impacts on professionals at different levels, the impacts were all in the positive direction. In other words, the results showed that implementing and using ITs can improve the productivity of accounting organizations.

DeLone and McLean (2003) emphasize that previous research has neglected the main conclusion of the D&M model: that the success of ISs is a multidimensional and interdependent construct - and that, therefore, it is necessary to study more closely the interrelationships between these dimensions. Therefore, the authors proposed an update of the DeLone & McLean (1992) model, which occurred with the work of DeLone & McLean (2003) and can be seen in Figure 6.



Source: DeLone & McLean (2003)

Figure 6 - DeLone & McLean's Information Systems Success Model (2003)

DeLone & McLean (2003) model brings relevant updates when it replaces the constructs of individual impacts and organizational impacts by the construct of net benefits. DeLone & McLean (2003) explains that as individual and organizational impacts are difficult to measure separated, these elements were reformulated and called net benefits. Net benefits

are understood as the net results from the benefits generated by a particular system or technology, when the negative impacts associated with the use and satisfaction of using these systems are also considered (DeLone and McLean, 2003).

DeLone & McLean (2003) point out that they prefer the term net benefits, as the impacts generated by certain ISs can be positive or negative. The inclusion of the term “liquid” is important as no result is entirely positive without negative consequences. DeLone & McLean (2003) explain that believing that the use of a certain technology will bring more benefits, without considering the nature of this use, is inappropriate and quite simplistic. It is necessary to consider the nature, extent, quality and whether the use of the system is appropriate. The nature of the system can be assessed by determining where all the functionality of the system is being used considering its intended purpose

DeLone & McLean (2003) also brought a new antecedent of use and satisfaction of use, which would be the quality of service. When reformulating the model, the authors clarified that there is no single direction between use/satisfaction and net benefits, but an interrelationship between these two elements: that is, use can generate net benefits, and net benefits can affect the use and satisfaction.

In addition to the intention of use and use behavior, present in the UTAUT (Venkatesh et al, 2003), satisfaction (DeLone & McLean, 1992, 2003) with the use of CA can also be understood as an element that modifies the performance of auditors. As user satisfaction is widely recognized as a key metric of IS success (e.g. DeLone and McLean, 1992), understanding the factors, including system usage expectations and experiences, that influence user satisfaction has important implications for organizations (Brown et al., 2008).

As reported by DeLone and McLean (1992), many researchers have used the variable “use” as an objective measure of system success. The implication is that if a system is to be used, it must be useful and therefore successful. However, as explained by Seddon and Kiew (1996), non-use does not necessarily mean that a system is not useful: it may simply mean that the user has other, more urgent things to do. Furthermore, as DeLone and McLean (1992) emphasize that “use” as a success metric is only relevant when this use is voluntary. When use is mandated, the number of hours a system is used conveys little information about the system's usefulness and therefore its eventual success (Brown et al., 2002; Brown et al., 2008; Chan et al., 2010).

Chan et al. (2010) indicated that the traditional notion of “use” is not the appropriate dependent variable in mandatory use settings because in these cases employees have no alternative but to use that technology. The authors observed that the intention to use a technology may be more related to other beliefs, such as rewards and punishments, than to beliefs about the technology itself. Thus, examining intent and its antecedents can cause organizations to focus on less relevant factors. Rather, user satisfaction rather than behavioral intention to use the system is the most appropriate dependent variable when the system in question is large-scale and integrated, and its use is mandatory.

Freitas and Silva (2019) highlight that many studies in the public administration tried to understand the satisfaction with use of technologies, such as the works of AL Athmay et al. (2016), Andriani et al. (2017) and Chatterjee et al. (2018). Understanding user satisfaction seems to be even more important when the use of the system used in question is optional (Chatterjee et al., 2018).

As Goodhue and Thompson (1995) emphasize, the mere fact that a technology is used does not mean that it will necessarily bring benefit to organizations. Impacts on user performance, according to the authors, should occur when a technology provides features and support that “meet” the requirements of a task, otherwise there will be no performance improvements.

According to Seddon et al. (1999), the article by DeLone and McLean (1992) is an important contribution to the literature on IS success measurement, because it was the first study that attempted to impose some order on researchers' choices about IS success measures. However, while distinguishing between individual impact and organizational impact, the document does not explicitly recognize that different stakeholders in an organization may come to different conclusions about the success of the same information system.

Malaescu and Sutton's (2015) experiment investigate the trust of external auditors in the internal audit work when the CA is presented by the internal auditor. The study indicates that external auditors are willing to rely more on work in an organization with a CA than organizations that only rely on traditional auditing. Evidence from Malaescu and Sutton (2015) also indicated positive impacts on audit costs.

DeLone & McLean (2003) show that future research should clearly define for whom the benefits will be evaluated. For example, they cite benefits for a potential investor, or for the system user himself. Different actors may have different opinions about what constitutes a

benefit for them. Therefore, it is impossible to define these benefits without first identifying the context or frame of reference. Finally, DeLone & McLean (2003) comment that the level of analysis needs to be defined, that is, whether the benefits will be measured with individual perspectives, their employers, the organization as a whole or according to other perspectives. This leads to the following research proposition:

Proposition 3: The use and satisfaction with the use of CA generate benefits and associated negative impacts for internal audit, and these benefits and associated negative impacts driven the extent, frequency, and quality of CA.

2.3.1 Continuous Audit Benefits

Metrics used to identify individual performance impacts of IS users vary. Based on a literature review, Torkzadeh and Doll (1999) developed a survey instrument to measure the individual impact of ISs. A survey of 409 end users from 18 different organizations tested and validated the measurement instrument. Dimensions of individual impact were measured through task productivity (extent to which a technology increases user output per unit of time), task innovation (extent to which an application helps a user to create and try new ideas at work), customer satisfaction, and management control (the extent to which an application helps regulate workflow and performance). DeLone and McLean (1992) theorized that improvements in individual performance could be understood as a success of an IS: that is, if a system is able to improve individual performance, it means that it was successful in its function. However, although it may seem intuitive that new technologies improve the individual performance of their users, this does not always seem to be evidenced (Sun et al., 2009). The impact of technologies on improving user performance has already been analyzed in different studies (Etezadi-Amol & Farhoomand, 1996, Teo and Wong, 1998, Wixom & Watson, 2001).

A study of IRS auditors, for example, found that although they had positive attitudes toward the use of personal computers and used them extensively, their use had little positive impact on performance and possibly had negative impacts for those auditors (Pentland, 1989). These phenomena can occur when users are using innovative technologies: that is, the impact will not always occur in the expected direction (DeLone & McLean, 2003). Other authors point out that only when there is satisfaction with the use of a certain technology it will bring improvements in the performance of its users (Chan et al., 2010).

On the other hand, the D&M assumptions came to be validated in later studies, such as Banker et al. (2002), Sun et al. (2009) and Petter and McLean (2009). For this reason, it continues to be understood as a valid assumption: that is, the use of certain systems usually causes positive impacts on the organization and its users. The work by Banker et al. (2002), for example, evaluated the impact of information technologies on the productivity of an audit firm. Qualitative evidence from the study by Bankert et al. (2002) demonstrate that ITs positively impact different hierarchical levels in the organization (efficiency improvements at the individual auditor level, business processes and work in audit groups). Until Banker's et al. (2002) work, no empirical research had evaluated the impact of ITs on audit firms. Improvements in the efficiency of audit procedures were also evidenced in the study by Bradford et al., (2020).

Sun et al. (2009) analyzed the impact of ERPs on the organization. Sun et al. (2009) concludes that in circumstances where the use of ERP depends on voluntary user control, it is usually the extent of use of this system that determines performance. Users cannot achieve significant productivity or performance gains if they do not use ERP properly. On the other hand, its use will not always translate into better performance, suggesting that although the use of ERP is a necessary condition, it is not always sufficient to improve user performance. Specialized auditing systems are often used to automate and improve the performance of internal auditors (Eulerich et al., 2019) and are often integrated into the CA model, but there is still little empirical evidence of how this occurs within organizations (Eulerich & Kalinichenko, 2018).

Etezadi-Amol and Farhoomand (1996), Teo and Wong (1998) and Wixom and Watson (2001) identified some individual impacts that may arise from the use of technologies, such as: a) increased work efficiency and b) improvements in the quality of work. Similarly, accounting and finance literature like the study of Rocky & Meriouh (2015), found that ERPs make the job easier to be performed, help the organization to save time, increase the organization's productivity and competitiveness.

Many authors highlight the potential benefits of CA implementation within organizations. Vasarhelyi (1991) already reinforced that the CA would directly affect the quality of the auditor's work, and despite not making it explicit that the performance of this auditor could be improved, this can be implied from its explanation. Even so, these statements

need to be further empirically validated, especially given that only now some of these technologies have become more used by auditors (Eulerich & Kalinichenko, 2018).

Individual benefits from information systems usage can also be measured in terms of gains in time to complete a task or to make a decision (Benbasat et al., 1981, Belardo et al., 1982, Benbasat & Dexter, 1985, 1986). Because of that, information systems should help users to complete tasks faster (Benbasat et al., 1981, Belardo et al., 1982, Benbasat & Dexter, 1985, 1986).

CA, in addition to assisting in the automation of tests and analytical procedures, also provides continuous assurance and continuous monitoring of financial reporting and internal controls (Wang, 2018). As a result, CA promotes a more timely, efficient (Gonzalez et al., 2012), effective (Gonzalez et al., 2012) and lower cost audit. Previous research has also indicated that the use of GAS improves audit efficiency, effectiveness and quality (Brown-Liburd et al., 2015; Braun and Davis, 2003). According to Alles et al. (2006), expectations about efficiency improvements were the main element that led internal auditors to engage in CA implementation.

A process is considered technically efficient when, from a certain amount of input, it can extract as many outputs as possible, reducing waste (Diniz, 2012) or if, for a number of services provided or products produced, fewer inputs are used (Fonchamnyo & Sama, 2014). Cuellar (2014) emphasizes that a central objective of governments is to find mechanisms that enhance the impacts of public goods and services, at the lowest possible cost, in the face of possible existing restrictions. This objective is also true for governmental auditing and internal control.

Results found by Eulerich et al. (2019), based on a survey of nearly 300 internal auditors, demonstrate that auditors believe that technology-based auditing techniques help to improve the effectiveness and efficiency of their work, identify new risks, identify significant risks, identify internal control weaknesses, prepare the audit, gather evidence and facilitate your work. Results from Eulerich et al. (2019) also pointed out that the more technology-based auditing techniques are used in the audit, the more the auditee, senior management and the Audit Board trust the audit findings.

In addition, CA allows reducing the time of audit cycles and increasing the scope of action, since its use allows analyzing the entire population of transactions under analysis (O'Reilly, 2006, No et al., 2019). Zhang (2019) also theorizes that Intelligent Process

Automation (IPA) can impact audit efficiency and effectiveness in several ways: i) decreasing time spent on repetitive tasks; ii) releasing auditors from mechanical tasks so that auditors can spend more time on high-risk, judgment-requiring activities; iii) reducing human errors in repetitive and structured tasks because robots can do these tasks faster and more accurately than auditors; iv) helping auditors to make better decisions with the assistance of cognitive computing; v) scaling up of predictive analytics because data created and collected via RPA can be sent directly to a data analytics or machine learning model to help predict future customer behavior.

Alles et al. (2006) highlight that the essence of CA is that it reduces the latency between management operations and the provision of assurance. In the past, management had access to much more detailed and timely data than the auditor, who usually came on the scene only at the end of the year. But the technologies underlying CA, especially ERP systems, allow auditors to see the same data as management and at the same time or even earlier given their experience in process monitoring (Alles et al., 2006b). This has profound implications for whether auditing is seen as a device for ex post verification or as a means of real-time monitoring. Alles et al. (2006b) demonstrates that CA leads auditors to access data streams that they previously could not obtain economically, and audit methodologies need to adapt to this magnitude, level of disaggregated detail and timeliness of the data.

Banket et al. (2002) also evidenced that implementing auditing software reduces the preparation time of audit working papers and improve the quality of the decision making of senior auditors. Rocky & Meriough (2015) also identified that ISs can improve users' decision making. According to Bumgarner and Vasarhelyi (2018), CA is suitable for historical analysis, mainly due to the speed with which it provides information on attributes such as the accuracy of the information. Gonzalez et al. (2012) identified that one of the benefits evidenced by CA is a timelier and a higher quality organizational analyzes and communications (Rocky & Meriough, 2015).

Bumgarner and Vasarhelyi (2018) also comment that auditors who provide assurance on historical information are likely to be primarily interested in the CA's ability to be used in order to increase the accuracy of their work. The results of a well-structured CA can be more accurate than traditional sampling processes (Bumgarner and Vasarhelyi, 2018). Other IS studies have also measured individual impact in terms of completeness and accuracy (Grudnitski, 1981, DeSanctis & Jarvenpaa, 1985, Lee et al., 1986, Abdel-Rahim & Stevens,

2018). In this sense, Gonzalez et al. (2012) identified that the reduction of accounting errors can be one of the benefits of CA and with that, more accurate data are generated by CA.

Access to sophisticated ERPs and complex datasets creates an opportunity for CA to be used for diagnostic purposes (Bumgarner and Vasarhelyi, 2018). Where an error or anomaly has been identified, the CA can perform a retrospective diagnosis of the situation, providing useful insights and analysis for managing these findings. In terms of diagnosis, CA can also be linked to the effective assessment of an organization's operational and structural strengths and weaknesses, allowing strategic decisions to be made in a timely manner and with sufficient context. By increasing auditors' predictive and diagnostic capacity (Bumgarner & Vasarhelyi, 2018), internal auditors will have more time to use their efforts in aspects that need greater judgment (Teeter & Vasarhelyi, 2015). Banker et al. (2002) showed that auditors reported a reduction in the time to prepare working papers with the support of new technologies.

Kogan et al. (2014) identified that their proposed framework would only generate improvements if audit practices were modified, reflecting the new reality of data availability. To achieve CA's success, organizations should change not only individual behaviors, but organizational and audit processes too. Codesso et al. (2018) also proposed a framework to deal with the issue of this new reality of data availability and their conclusions are like those of Kogan et al. (2014).

Bradford et al. (2020) found that specialized audit systems are already in a state of maturity where it is possible to identify users from different groups of auditors (55 percent have been using GAS for more than two years). Bradford et al. (2020) found differences in the use of technology related to the benefits of auditing, depending on the type of user of this system. Thus, it is necessary to study auditors in their different types of functions, instead of understanding them as a single group of GAS users (as a procedure adopted by Nascimento (2017) and Miranda (2018), for example). The results show that there are differences based on the type of auditor and this should be considered by studies that intend to analyze the impacts of CA.

According to Bradford et al. (2020), for auditors in the financial area, detection of material misstatements is the only variable that influences the perception of the utility of GAS. Thus, the usefulness of GAS depends more on the system's ability to detect these distortions than on detecting failures in internal controls or organizational fraud. For IT auditors, this perception is different and detecting control deficiencies and fraud significantly affects the

perception of this usefulness. In addition, the perceived usefulness of the GAS directly influences the use of the system for both types of auditors, but only influences the satisfaction with its use for financial auditors. System quality affects GAS satisfaction only for IT auditors. Service quality influences the use of GAS for financial auditors, but not for IT auditors. For both groups, service quality has no impact on satisfaction with GAS. Use of GAS and satisfaction with GAS positively increase internal auditors' perceptions of the net benefits to the audit (measured in the survey as performing audit procedures more efficiently and overall greater effectiveness for the audit). In summary, the results of Bradford et al. (2020) help in the perception that the role that the auditor plays within the organization can influence their views on CA and on its net benefits. In view of this, the following research proposal is formulated:

Proposition 4: the perception of the net benefits generated by the CA will be different depending on the type of participation that a certain auditor has within the CA.

Another impact to be analyzed is the role of automation adjacent to the CA methodology in the net benefits. According to Codesso (2018), CA can improve the efficiency of audit work, through automation and the adoption of an audit-by-exception approach. In this approach, the entire population is analyzed and only exceptions are investigated. In this way, exceptions are identified, and alarms are sent to those responsible to correct these errors. If auditees fail to correct errors in a timely manner, internal audit can be notified to act and take necessary action (Alles, Kogan & Vasarhelyi, 2008).

In the study by Kogan et al. (2014), the implementation of the CA transaction verification component is based on the identification of business process rules. Each recorded transaction is checked against all formal rules, and if there is any violation of one of the rules, the transaction is flagged as an exception. Each exception generates an alarm in the CA, which is sent to the appropriate parties for resolution. Since the alarm specifies which formal business process rules are violated, resolving these exceptions should be a fairly straightforward task. Once these transactions are verified, the data is in an acceptable form to be tracked for anomalies by the analytical monitoring component (the second layer of the Monitoring System).

According to Eulerich & Kalinichenko (2018), there are many arguments that demonstrate the importance of implementing an automatic and continuous audit system. Automatic reviews of organizational transactions allow auditors to get closer to the occurrence of an event, something that is in contrast to traditional ex post auditing. Thus, these support

systems help to allocate resources more efficiently and ensure a higher quality of information for internal audit.

Table 2 presents some theoretical and empirical studies and their main findings on the impacts generated by CA.

Table 2 - Literature on CA Net Benefits

Theoretical discussions or Empirical findings	Impacts on Continuous Audit	Studies
Theoretical discussions	Cost; Reduction of personnel costs; Reduction of monitoring cost	Pathak et al. (2005); Rezaee et al. (2002); Searcy & Woodroof (2003)
Theoretical discussions	Audit quality; Shorter periods for data acquisition/delivery; Reduction of inefficiency resulting from interruption of the audit process	Searcy and Woodroof (2003)
Theoretical discussions	Fraud detection	Cullinan and Sutton (2002); Omoteso et al. (2008)
Theoretical discussions	Error detection	Omoteso et al. (2008)
Empirical finding	Lower material weaknesses; Reduction in audit fees; Reduction in audit delays	Masli et al. (2010)
Empirical finding	Greater trust in the work of internal auditors	Malaescu and Sutton (2015)
Empirical finding (GAS)	Efficiency and efficacy gains	Brown-Liburd et al., (2015); Braun and Davis (2003)
Empirical finding CAATs or GAS	Audit quality	Braun and Davis (2003); Stoel et al. (2012); Brown-Liburd et al., (2015)
Empirical finding (GAS)	Positive relation between GAS and audit benefits	Braun and Davis, 2003; Rosli et al., (2013)

Source: compiled by the author and adapted from Eulerich (2018)

In addition to the efficiency and effectiveness reported by several studies, Issa et al., (2016) point out that current technologies have the potential to completely change the procedures of the audit. Internal audit is the one that has benefited most from these techniques. Many internal audit procedures can be automated, saving costs, allowing for more frequent audits, and freeing the audit team for other tasks that require more human judgment (Vasarhelyi, 1983; Vasarhelyi, 1985; Alles et al., 2002, Teeter and Vasarhelyi, 2015).

In essence, improvements were noticed in the following points, as presented by Teeter and Vasarhelyi (2015): a) information storage and retrieval are being progressively automated; b) the cost of creating reports is being reduced, since once established and standardized, no incremental costs are incurred for each report issued; c) robots assume an increasing role in organizational processes (Brynjolfsson & McAfee, 2014) and d) systems with artificial intelligence will be progressively integrated into the manual performance of tasks.

In Brazilian scenario, Alles et al (2006b) argue that the government can be one of the most benefited from new technologies and from the implementation of CA practices. This is because it is the government that dominates much of the economy, through its numerous organizations, including the armed forces, which involve millions of transactions annually. Freitas et al. (2020) demonstrate the feasibility of CA for the public administration. Authors found improvements in the quality of the audit and that CA allowed for a more timely execution of the audit. Thus, we have the following proposition:

Proposition 5: The extension (use), frequency (use) and quality (satisfaction) of the CA driven results with greater accuracy and agility and affect the cost-effectiveness and efficiency of the audit.

2.3.2 Continuous Audit Acceptance and the Relation with Information Quality

As antecedents of the use and user satisfaction of the model by DeLone & McLean (1992) are the quality of the information and the quality of the system used. From DeLone & McLean (1992) perspective, the quality of information has an impact on the intention and satisfaction of users of certain ISs. This is because if the quality of information is transparent, accurate, comprehensive and explicit, it would motivate the intention of potential users and also the level of satisfaction with its use (Mohammadi & Hossein, 2015, Chatterjee et al., 2018). Information quality was positively associated with the use of systems and their net benefits (Bailey & Pearson, 1983; DeLone & McLean, 1992, Weill, 1999, Rai et al., 2002). Information quality measures include aspects such as accuracy, relevance and completeness (Bailey & Pearson, 1983, Molla & Licker, 2001).

However, the literature on DeLone & McLean (1992, 2003) was not analyzed from the auditing point of view, and precisely because of that, academia did not consider some characteristics of this field. Some studies in accounting have already theorized the impact of

the use of technologies on accounting information (Varsahelyi et al., 2004, Earley, 2015, Fitrios, 2016). Petter et al. (2013) emphasize that more studies are needed to analyze the interactions between the different variables of the success of D&M systems, including user acceptance, information quality and organizational impacts. Studies such as Drum et al. (2017) have empirically demonstrated that some systems can improve the accounting information quality.

Placing information quality as a result of the use of technologies, that is, as a benefit arising from the use of information systems, differs from models that have worked with the subject, such as the DeLone & McLean (1992) and its eventual update (DeLone & McLean, 2003). However, accounting and auditing have as their final result the creation, transformation or assurance of the information itself, that is, this is their product, and it is on it that a positive impact is expected when using a certain technology.

The Financial Accounting Standard Board (FASB) recognizes some qualitative characteristics of useful accounting information. First, the information must be relevant for decision making, and second, it must be reliable (faithful representation), that is, represent what it purports to represent. According to the FASB (2018), these are fundamental characteristics of accounting information quality. However, these characteristics can be improved if the information can be comparable, verifiable, timely and understandable.

What makes accounting information particularly important is that it is a type of information that encompasses economic, financial, physical and/or productive dimensions and can change the state of the art of the information receiver's knowledge in relation to the firm. The consequence of accounting information is the ratification or modification of the receiver's opinion on the organization's activities (Checon, 2018).

From a technological point of view, information quality refers to a (end) user's assessment of a system's performance in providing information based on their experience of using the system (McKinney et al., 2002; Veeramootoo et al., 2018). This assessment is based on the content of a system structure that is required to be personalized, complete, relevant, easy to use, and provide security to encourage transactions (DeLone & McLean, 2003). The quality of information, therefore, incorporates the objective and subjective perspective of the information consumed. Low quality information distracts users and leads to higher information processing costs (Veeramootoo et al., 2018). Thus, it is a central concern of organizations that they produce and have high quality information available. Table 3 shows different

characteristics that information can or should have, according to previous studies that have already addressed the subject.

Table 3 - Measures of Information Quality in literature

Authors	Measures Descriptions	
Bailey and Pearson (1983)	a) Faithfull representation b) Precision c) Currency d) Timeliness	e) Reliability f) Concision d) Format e) Relevance
Mahmood (1987)	a) Report accuracy b) Timeliness of the report	
Srinivasan (1985)	a) Faithfull representation b) Report relevance	c) Comprehensibility d) Timeliness of the report
FASB (1980, 2018) and Gelinas & Oram (1996)	a) Cost vs Benefits c) Comprehensibility c) Reliability d) Faithfull representation e) Precision f) Completeness g) Validity h) Neutrality	i) Verifiability j) Relevance k) Timeliness l) Predictive value m) Feedback value n) Comparability o) Materiality
Wang & Strong (1996)	a) Accessibility b) Adequate amount of information c) Credibility d) Completeness e) Concise Representation f) Consistent Representation g) Ease of Handling h) Free of errors	i) Interpretability j) Objectivity k) Relevance l) Reputation m) Safety n) Timeliness o) Comprehensibility p) Added value
FASB (2018)	a) Relevance b) Materiality c) Faithful representation	d) Comparability e) Timeliness f) Understandability

Source: adapted from DeLone & McLean (1992), Fedorowicz & Lee (1999) and FASB (2018).

It is possible to notice that both studies in accounting and in information systems are particularly interested in having an adequate metric to measure the quality of information. Therefore, both carried out several studies with this purpose. The characteristics listed by the FASB are also found in several studies in the IS area, as can be seen in Table 3.

Although studies have already discussed the various dimensions of information quality, such as Fedorowicz & Lee (1998), Wang & Strong (1996), it is difficult to find in the literature studies that have been concerned with understanding how accounting can achieve this quality of information from an operational point of view, that is, what conditions (technological and personal) are necessary to achieve this quality (Petter et al., 2013). Particularly in the public administration, Errichetti and Roohani (2018) add that few studies have been concerned with the low quality of the accounting data produced and how this can be overcome. In addition, there is a perception that the low quality of government data reduces transparency, as it is only achieved when financial information provides an accurate, timely and understandable representation of an organization's activities and conditions (Errichetti & Roohani, 2018).

Technologies inherent to CA model can, for example, impact the auditors' relationship with organizational data and information. This is because it is already known that some technologies in the accounting and auditing can positively affect the quality of the information (Fedorowicz & Lee, 1999; Petter et al., 2013, Drum et al., 2017). Rocky & Meriouh (2015) demonstrate that technologies such as ERPs improve the exchange of organizational information, thus impacting and modifying the relationship of users with the organization's data.

The CA needs a dataset to be operationalized, but it can also generate a dataset that can assist in various internal audit functions. Examples are providing data for risk assessment within the organization (Bumgarner & Vasarhelyi, 2018) and for audit planning (Eulerich et al., 2020). Bumgarner & Vasarhelyi (2018) point out that the automation inherent in CA (audit by exception) can complement audit planning. Eulerich et al. (2020) was one of the studies that examined factors associated with the use of CA information in risk-based audit planning. Despite these studies, little is empirically known about how CA impacts the routine of auditors and the quality of information (Teeter & Vasarhelyi, 2015).

Audit planning usually includes the establishment of the overall audit strategy, which includes the elaboration of the audit plan. This includes planning procedures for assessing risks and for responding to those risks (of material misstatement). Planning is not an isolated phase, but rather an ongoing process that can begin shortly after (or in connection with) the completion of previous audits, continuing until the completion of the current audit (PCAOB, 2010).

A possible argument for using CA information as input to the audit plan could be the dynamics in the risk assessment process (Coderre, 2005). From this point of view, the auditor

becomes the user of the information and results presented by the CA. Eulerich et al. (2020) identified some elements that lead internal auditors to use more information from the CA for risk-based audit planning. Eulerich et al. (2020) found that a) when there is a strong focus by auditors on the use of data analytics in preparing an audit engagement, these auditors are more likely to use the information generated by the CA; b) when internal auditors realize that the CA is important, they will use more intensively the information generated by the CA when planning their audit; and c) auditors with a focus on fraud tend to use more information coming from the CA. Protiviti (2017) showed that 61% of organizations that use CA techniques in their daily lives, for example, use information acquired from CA in order to plan their audits. As a result, the following proposition is formulated:

Proposition 6: the extent, frequency and quality of CA changes the way auditors use data to plan their audits, directing them towards a risk-based audit.

The essence in which data is recorded today allows for total assurance of the population, in contrast to the sampling processes of traditional auditing. This ensures greater reliability of the data, as there is no sampling risk. In addition, to ensure timely surveillance of risk-vulnerable entities, auditors are shifting from the traditional approach to timelier, computer-based auditing practices. These new techniques have increased the potential for detecting, reducing, and even eliminating fraud by using CA techniques (Eulerich & Kalinichenko, 2018). Omoteso et al. (2008) concluded that CA can help in the investigation of errors and fraud in a timely manner, improving the effectiveness of internal auditing and making information more reliable. Despite this, the potential of CA to ensure reliable and fraud-free information is not a consensus in the literature (Cullinan and Sutton, 2002).

New technologies allowed the automation of numerous audit procedures, supporting more timely information for its users (Chan & Vasarhelyi, 2011). The new ITs not only reformulated information flows (Issa et al., 2016), but also changed the essence and nature of how this information is obtained, measured, evaluated and assured. While some previous research has highlighted the general nature of IT usage intensity on business performance (eg, Han and Mithas 2013; Tafti et al. 2013) and has examined the effect of the quality of accounting systems on information quality (e.g. Bell et al., 1998; Messier et al., 2004; Brazel and Dang 2008; Chen et al., 2014), there is a lack of empirical studies on the relationship between overall

IT intensity and the timeliness of financial reports or the quality of accounting information (Petter et al., 2013; Johnston & Zhang, 2018).

Public administration literature on the subject has practically ignored the impacts of these new technologies (Issa, 2018), even with important structural reforms that have taken place in recent decades (Osborne, 2006). Innovations in the public area have allowed citizens to approach the public administration and offer its various services via the internet (Zuiderwijk et al., 2015; Chaouali et al., 2016; Zuiderwijk et al. (2015); Naranjo-Zolotov et al., 2018), making more transparent, efficient and effective government processes (Saxena & Janssen, 2017). These technologies were able to improve good public governance practices (Teo et al., 2008; Lee & Lio, 2016; Kamolov, 2017) and thereby improve the quality of information produced by these organizations, both externally and internally (Janssen & Dwivedi, 2015; Chaouali et al., 2016; Zuiderwijk et al., 2015; Naranjo-Zolotov et al., 2018).

Veeramootoo et al. (2018) highlights that the relationship between information quality and continued use of systems has been validated in several studies (e.g. Chiu et al., 2007; DeLone and McLean, 2003; Zheng et al., 2013). The study by Drum et al. (2017), for example, was based on D&M to understand the quality of information as dependent on the adequacy of the use of technologies.

Data and information are important inputs of the CA model and can be related to the success or failure of this methodology. In addition, the CA is expected to modify this organizational information and data as the model evolves within organizations. As CA is operationalized by a set of technologies, like specialized systems, data mining, artificial intelligence, etc., they can also affect accounting information. According to Teeter and Vasarhelyi (2015) CA has modified traditional auditing in the following ways: a) more automated data collection has changed the way data is extracted (technologies such as GPS, RFIDs, are able to capture information in predefined time intervals (Moffitt and Vasarhelyi, 2013) b) cloud technology has allowed constant access to company systems, in addition to ensuring a more robust backup (Mendelson et al., 2012); c) a progressive incorporation of some forms of artificial intelligence into business functions is changing organizational rule sets; d) the Internet of Things has allowed the provision of substantive data of particular value for more timely assurance engagements.

According to Banker & Kauffman (2004) IS researchers have improved managerial knowledge about the value of information as IT changes the availability and granularity of information (e.g. online and real-time data mining).

Drum et al. (2017) evaluated the perception of an organization's employees about the creation of transaction monitoring mechanisms, including data mining techniques, whose main objective was to allow the timely detection of errors. The results showed that employees believe that these techniques increase operational efficiency and effectiveness, in addition to providing better quality financial information. The findings by Drum et al. (2017) are in line with what has been postulating in the literature (Jans et al., 2011, Alles et al., 2012). Data and process mining are among the technologies that help CA.

Rikhardsson and Dull (2016) showed that although technologies are usually implemented to increase resource efficiency, it is often seen as a tool to correct problems in data quality. Key impacts visualized include a shift from corrective controls to preventive and detective controls, an increase in the perception of value created by the finance department, and an increase in data management confidence.

When systems are used according to their purpose and to the extent and frequency with which they are designed (Petter et al., 2013), the use of this system usually generates high quality information; that is, the use of systems and the quality of information are interdependent factors in the success of an information system (Drum et al. 2017).

The referenced studies demonstrate that there are implicit and explicit relationships between the acceptance of CA and the quality of information. Although other organizational impacts can be seen, the present research also focuses on understanding how the reflexes of CA on the quality of information (understood in this research as an organizational impact) have occurred. In this way, the following proposition is presented:

Proposition 7: the extent (use), frequency (use) and quality (satisfaction) of CA modifies the relationship of internal auditors with the information generated by internal audit, boosting their perceptions regarding relevance, timeliness, and reliability.

2.3.3 Negative Impacts Associated with the Acceptance of the Continuous Audit

Eulerich & Kalinichenko (2018) suggest that future empirical research should focus on the possible cost/benefit ratios of CA in relation to traditional audits. According to the authors, these types of empirical studies can have important implications for organizations

regarding the problems of implementation and adoption of CA. The reduction of operational costs (Rivard & Huff, 1984) are some of the impacts expected from the implementation of technologies.

According to Teeter and Vasarhelyi (2015), the costs of more timely assurance engagements and their benefits have changed considerably with technological innovations. In essence, there is a more automated collection of data, often with constant access to information (in the cloud), artificial intelligence techniques capable of modeling the set of organizational rules and the gradual advancement of the Internet of Things. Although positive, Teeter & Vasarhelyi (2015) highlight that these innovations need a robust and sometimes expensive technological framework.

Kogan et al. (1999) point out that CA can save auditors substantial costs (eg travel costs, on-site visits for inventory counts, manual collection of evidence, etc.). Empirical evidence on the subject has already been found with the use of other technologies, such as the study by Drury (1982) and Banker et al. (2002) and show that in fact new technologies potentially reduce audit costs. Although theoretical findings are usually quite positive about CA, there is already some empirical evidence that this may not be entirely adequate, at least in some scenarios.

Studies have raised questions about the possible cost reduction due to CA. Ahmi & Kent (2013), for example, showed that auditors believe that there is a high cost associated with the implementation of specialized auditing software and that this can negatively interfere with the adoption of these systems in the organization. Vasarhelyi et al (2009) point out that although implementation costs have drastically reduced in more recent times, the costs perceived by the audit related to CA are important to be analyzed.

Brown et al. (2006) also raised the question of who should bear the costs of the CA and who would own the CA. This is because CA analysis are interrelated with parts of the internal control, and that is why the authors comment that the costs could be shared between internal audit and management.

Other possible negative effects of CA on the organization were evidenced in the literature. The experiment carried out by Gonzalez & Hoffman (2018), for example, found that timely and frequent notifications about possible fraud is not always beneficial to reduce fraud within organizations. This benefit depends on whether the capacity of the monitoring system is strong or weak.

Vessey (1991) emphasize that incompatibilities between the way data is represented (a characteristic of the technology) and the tasks to be performed reduce the performance of decision making, requiring additional efforts to reconcile data representations and decision processes. Alles et al. (2006a) also shows that the proper management of audit alarms and preventing auditors from being inundated with alarms are critical points for the success of this methodology. Thus, we have the following research proposition:

Proposition 8: The inherent agility of CA has negative effects on the organization and these effects are mitigated or accentuated depending on the way in which audit alarms are managed within internal audit.

CA literature is not conflict-free about what part the auditor should play in this new model. As highlighted by Bumgarner & Vasarhelyi (2018), traditional auditing argues that if the auditor acts as a “monitor”, he may end up becoming part of the internal control system and therefore lose independence. However, traditional auditing can be viewed as a tertiary control that acts as a post-facto detective control. Bumgarner & Vasarhelyi (2018) reinforces that the set of layers that are progressively being created (with the emergence of ERPs and other data layers), in addition to the massive nature of the data that are currently used by organizations, requires the existence of reporting layers and monitoring. Potential problems of CA in audit independence are also reported by Alles et al. (2002).

Although there may be some overlaps of functions between internal audit and the organization's management, as shown in Table 4, Vasarhelyi & Halper (2002) argue that four important characteristics distinguish CA from other management functions: i) the data structure; ii) the independent nature of audit; iii) the nature of the analyses; iv) and the nature of the alarms. According to Vasarhelyi & Halper (2002), in CA, data structures tend to focus on cross-process metrics and time series evaluation data. The activity is carried out on an independent basis, usually under the control of third parties. Its analysis focus is on the integrity of cross processes and on the probity of internal control. Alarms are independently sent to auditors (or other interested parties) and are defined, reviewed and tested by assurance professionals (Vasarhelyi & Halper, 2002).

Table 4 - Continuous Audit x Continuous Monitoring

Continuous Audit managed by Internal Auditors	Continuous Monitoring managed by the management
<ul style="list-style-type: none"> • Audit evidence acquired more effectively and efficiently; • More timely reaction to business risks; • Use of technologies to perform more efficient audits; • Improved compliance monitoring of policies, procedures and regulations. 	<ul style="list-style-type: none"> • Improved governance, aligning business risks or compliance risks with the internal control; • Increased transparency and more timely reaction to make better day-to-day decisions; • Reduction of monitoring costs; • Use of technology to create efficiencies and opportunities for performance improvements.

Source: adapted from Littlely & Costello (2012)

O'Leary (2020) comments that while a continuous audit model aims to find exceptions, anomalies, fraud or weaknesses in controls, continuous monitoring carried out by management aims to find trends in key metrics, analyze the company's reputation, its weaknesses, strengths, opportunities, threats, etc. Furthermore, continuous auditing usually uses structured data that is frequently audited, while continuous monitoring can benefit more from unstructured data that does not necessarily need to be audited.

Thus, there is a risk that the auditor's task overlaps with the internal control task, and thus generates a loss of independence of internal auditor's work. Auditor's independence is linked to the principles of objectivity and integrity (in carrying out their work and issuing their opinion). This independence comprises independence of thought (a stance that allows for a conclusion without the effects of influences and compromising professional judgment) and the appearance of independence (facts and circumstances that are significant to the point that a knowledgeable third party would conclude that integrity and auditor's objectivity or skepticism may be questioned) (CFC, 2019). Thus, we have the last research proposition:

Proposition 9: CA brings auditors closer to relevant events, and consequently brings the auditor closer to the internal control function, generating potential risks to the independence of internal auditors.

3 RESEARCH METHOD

In this chapter the following topics are presented: research design; case selection; data collection procedures; data analysis procedures; research constructs; procedures adopted for data analysis; limitations of the study and finally the trajectory of the research.

3.1 RESEARCH DESIGN

Regarding the approach to the problem, the present research is characterized by a qualitative study, operationalized through a single case study, and with a descriptive characteristic (Creswell, 2010).

As highlighted by Yin (2014, p. 2), case study research would be the preferred method compared to others in situations where (1) the main research questions are “how?” or “why?”; (2) a researcher has little or no control over behavioral events; and (3) the focus of study is a contemporary phenomenon (rather than a completely historical phenomenon).”

Although qualitative studies that use UTAUT or D&M are not common (Williams et al., 2015), a qualitative study for this dissertation is important mainly for two reasons: a) the lack of data from organizations who are already widely applying CA techniques; b) the existence of theoretical gaps that can be improved by the use of c) the existence of many quantitative studies by UTAUT and D&M that were not able to adequately deal with some human aspects and frequently reported inconsistent results (Olasina, 2014).

Although UTAUT and D&M are already quite solid, little is known about how and why such characteristics affect the adoption of CA in public administration, that is, a contemporary event in which it is not possible to obtain behavioral control over internal auditors. Furthermore, although much is theorized about how and why CA generates individual and organizational impacts (net benefits), empirical knowledge on the subject is still scarce.

Hartley (2004) also emphasizes that case studies have been used when it is necessary to understand processes of innovation and organizational change from the interactions between the various existing forces. In our dissertation, the qualitative study allows us to analyze, among other aspects, the acceptance of the CA and its organizational impacts. The CA running within GAPES goes through a process of constant improvement, thus allowing to understand how this innovation process occurs and what are the organizational changes arising from this phenomenon - that is, how the CA is reflected in net benefits for the internal audit. The present

research is not concerned with finding causal relationships, but with capturing the analyzed subjectivity (Klein et al., 2015) of the elements that make up the CA within the organization.

We describe the analyzed phenomenon, based on the perception of the internal auditors, on fields observations and on the documents collected that are related to the CA.

3.2 CASE AND PARTICIPANTS OF THE STUDY

The selection of the case in qualitative studies is very important, as the selection of an inappropriate case can interfere with the collection and analysis of data, especially if a particular phenomenon that one wants to observe does not exist within the organization.

We used Godoy's (1995) criteria to select our case: i) the relevance of the selected case within the universe of possible cases; and ii) the availability of access to the organization in question. In addition to the two criteria mentioned above, it would be vital to the success of the research that the organization under review was carrying out CA in its organization, thus adding a third criterion to the case selection. Thus, the selection of the case was based on three criteria: i) relevance; ii) access and iii) an organization with a running CA model.

To select the unit of analysis, respecting the criteria mentioned above, empirical evidence was sought from organizations that were implementing or using CA techniques. To reach these organizations, we used the assistance of the Continuous Auditing & Reporting Lab (CARLAB), from the State University of New Jersey (Rutgers Business School) to highlight possible candidate organizations for the research. CARLab has already carried out several projects with public administration and private organizations in Brazil in audit analytics and CA.

Two possible organizations emerged from this previous analysis: the Comptroller General of the State of Santa Catarina (CGE) and the Internal Control Center of the Brazilian Navy (CCIMAR). In both organizations, CA was being carried out mainly on the payroll and they already had some years of experience with a CA model. Thus, both organizations met the criterion of relevance and the criterion of using CA in their daily activities.

Thus, negotiations were initiated with the two organizations to verify the feasibility of carrying out this dissertation and, through preliminary meetings, it was found that both were available to carry out this research.

Firstly, mainly for the proximity between the researcher and the organization, it was decided to conduct our study with the Brazilian Navy. However, due to the restrictions imposed

by the COVID-19 pandemic and the need for the researcher to be close to the day-to-day activities of the organization to be able to deepen their analyses, we decided to conduct out the study with the CGE, since at that moment the researcher would be closer to the unit of analysis. In addition, during the negotiations for the realization of this dissertation, the opportunity arose for the researcher to join a project at *Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina* (FAPESC), to work with the internal auditors of the Personnel Audit Management (GAPES), which had been running a CA model for at least ten years.

A meeting was held with one of the internal auditors and with the manager of the GAPES, where the objectives of the dissertation were presented, and it was asked if it would be possible to carry out the dissertation. The General Controller and the Auditor General were also in the meeting, who also showed their willingness in enabling the dissertation to be carried in CGE. After this meeting, the Study Presentation Letter (APPENDIX A) was sent to the Auditor General and to the GAPES internal audit manager. As it was the only management that was using a CA model, the unit of analysis for this research was GAPES. The choice of this unit met the three criteria previous listed in this section.

As UTAUT and D&M are models that are concerned with the individual who is a user of the analyzed technology or technique, the research participants would need to be CA users. This means that they would need to be part of and use the technologies used by this methodology. Thus, the participants selected for this research were the internal auditors who were involved directly or indirectly with the CA model.

Participants of this research were internal auditors involved with CA over the last 10 years, and who could somehow contribute to understanding the acceptance of the model and the net benefits generated by it. It was essential that these auditors had full understanding over how the model worked within the organization.

To validate the semi-structured interview questions, a pilot study was carried out with CCIMAR. Specifically, we interviewed two internal auditors who integrated the CA model in that organization's payroll. According to Yin (2010), a pilot study is important to empirically validate the interview questions and verify if it captures the necessary elements to achieve the research objectives. In addition, a Case Study Protocol was also developed (APPENDIX B), with the aim of increasing the reliability of the research (Yin, 2010). To preserve the confidentiality of respondents and demonstrate important questions about the research, a Free

and Clarified Consent Term (APPENDIX D) was also prepared, which was signed by all participating interviewees.

After the first validation, question two (internal auditors' difficulties) and three (organizational barriers) of interview were combined into a single question. As a result, interview questions became shorter, allowing internal auditors to better describe these situations in a more directly way. Question six, which concerned the issue of the impact of CA on improve internal audit appreciation from others was also reorganized, for better understanding of the interviewees. After adjusting interview questions, it was decided to carry out a second internal validation with a CGE internal auditor who already had experience with the CA. The second validation was important to highlight other elements not brought by the auditors of the Brazilian Navy. The analysis category "intent to use" was discarded during this validation with the CGE's internal auditor, as it became evident that all the internal auditors who would be interviewed used CA in GAPES.

The pilot project also served to highlight some aspects in the following interviews that could raise reflections on CA model. During the second validation all the internal auditors that could be interviewed in the present research were mapped.

After this second validation stage, it was perceived that the responses were sufficient to capture the elements of CA acceptance and its net benefits. This means that the interview questions were able to extract information from the auditors (both from the Brazilian Navy and from the CGE) on how CA acceptance and its net benefits occur.

3.3 DATA COLLECTION

Aiming at greater quality in the data collection procedure, this research followed three principles (Yin, 2015): a) use of multiple sources of evidence (interviews, documents and field observations); b) development of a case study database; c) maintenance of the evidence chain. These principles help to address the issues of construct validity and reliability (Yin, 2015).

Thus, data collection was carried out through three procedures: semi-structured interviews, document analysis and field observations, which were all carried out within GAPES/CGE.

3.3.1 Documents

The analysis of the organization's documents is important and can be useful to confront or confirm information's about the case study. We collected documents relate to regulations,

official letters, processes, E-mails, or any other documents that were related to the CA within GAPES and to which the researcher had access. The objective of evaluating these documents was to analyze when GAPES started to discuss CA implementation, and how the organization has been recognizing CA. Documents analysis also helped to reveal the intensity with which each internal auditor uses the CA. Another set of documents that were analyzed are those produced by the internal auditors themselves (such as Audit Notes, working papers, CA reports, audit planning reports, among others).

Considering that these documents are within a certain context, the researcher sought to interpret them and, whenever possible, make inferences for their understanding, within the theoretical context of this research (May, 2004). This means that in addition to the content of the documents, the context in which these documents were created was also taken into account.

At first, documents that were already public were analyzed, mainly on the CGE-SC website. In a second moment, other documents that were useful and related to the CA were requested to GAPES audit manager. We analyzed all documents inside GAPES physical dependencies, over the years 2021 and 2022.

3.3.2 Interviews

Interviews are very relevant sources for qualitative research in case studies (Yin, 2010). With the objective of evaluating the elements of acceptance of the CA and the net benefits for the internal audit, interviews were carried out with the internal auditors of GAPES. The interviews aimed to highlight the perceptions of internal auditors regarding the antecedents of CA acceptance (performance expectation, effort expectation, facilitating conditions, social influences and system quality), their relationship with the use and satisfaction with CA techniques and how these elements interact with CA's net benefits.

Interviews were carried out with all current GAPES internal auditors, or with internal auditors who had contact with the CA techniques used in GAPES for a maximum of 5 years, if they were still accessible. The interviews were preferably carried out in person, but due to the COVID-19 pandemic, some interviews had to be carried out virtually. The invitations were made remotely (via Whatsapp) and in person.

In total eight internal auditors were interviewed, who have extensive experience and knowledge of the CA model that is executed within GAPES. The eight interviews were enough to identify the case and answer the research objectives. To preserve the anonymity of the

interviewees, we didn't specify the gender, and their work experience within the organization. However, they all have very similar work experience in CGE and in GAPES. Respondents are presented in the text as "the interviewee" and codes E1, E2, E3 and so on were assigned to each of the interviewees.

The interviews were carried out from February to May 2022. Duration of each interview is shown in Table 5, which totaled 8 hours and 43 minutes. To ensure the reliability of the information, the interviews were always recorded with the consent of the interviewees. In addition, it was explained that all information would be anonymized so that the respondents could not be identified. Subsequently, the interviews were transcribed and forwarded to the auditors for validation.

Table 5 - Research Interviewees

Interviewee	Position	Time
E1	Internal Auditor of Payroll	1h50min
E2	Internal Auditor of Payroll	1h10min
E3	Internal Auditor of Payroll	1h40min
E4	Internal Auditor of Payroll	52min
E5	Internal Auditor of Payroll	52min
E6	Internal Auditor of Payroll	41min
E7	Internal Auditor of Payroll	42min
E8	Internal Auditor of Payroll	56min

Table 6 presents the summary of the interviewees' profile. As already mentioned, the length of experience in Internal Audit is quite similar, except for one auditor who had more experience (25 years). This is because all the auditors interviewed joined Santa Catarina's Government at the same public tender, while this auditor with more experience had entered a previous public tender.

Table 6 - Interviewees Profile

Maximum Age	57 years
Minimum Age	39 years
Average Age	49 years
Internal Auditors Background	Accounting, Business Administration and Law School
Time working in the Public Administration (average)	20 years
Time working as Internal Auditor from Santa Catarina Government (maximum)	25 years
Time working as Internal Auditor from Santa Catarina Government (minimum)	10 years
Time working as Internal Auditor from Santa Catarina Government (average)	14 years

All respondents have at least 10 years of experience in internal auditing, especially in Payroll auditing. With this, it is ensured that all respondents have extensive knowledge about the CA that is performed within GAPES.

For reasons of logistics and availability of the auditors, four interviews were carried out at GAPES itself, in a meeting room located next to GAPES' premises, and three interviews were carried out remotely, using Zoom Software®.

Throughout the interviews, auditors often cited colleagues to comment on some attribution or characteristic. To maintain the confidentiality of these auditors, the names of the interviewees were replaced by expressions that represented that situation. For example [data-driven auditor] or [non-data-driven auditor] was substituted in the interview not to mention directly which auditor was cited. This was also carried out when the interviewees mentioned a specific State Department of the Executive Power of the State of Santa Catarina. Expressions such as [central human resource] or [human resources division] were used in these situations to guarantee the confidentiality of this information.

Interview questions can be viewed in APPENDIX C. The interview is composed of semi-structured and open questions and is divided into four sections: a) characterization of the respondent; b) stage of CA; c) acceptance of the Continuous Audit; and d) net benefits.

3.3.3 Field Observation

Finally, observation techniques are also used to highlight the routine of internal auditors in different audit areas. The observations were recorded in field notes and analyzed according to the theoretical categories. Observation techniques were also used to identify possible differences in the work of those auditors who use CA techniques more deeply (data-driven auditors), from those who do not (not data driven auditors).

Some notes were taken in a physical notebook, which the researcher could always carry around the organization. When important observations were made, the researcher always transcribed them into a digital document until the end of the week in which the observation was carried out.

3.4 RESEARCH CONSTRUCTS

The research construct is organized according to the three objectives of this research. Thus: the first part of the construct explores the characteristics and antecedents of CA acceptance; the second highlights the categories of CA acceptance; and finally, the net benefits of CA. The construct makes it possible to identify the observable elements and point out how such manifestations can be captured by the constitutive definitions.

Antecedents of CA acceptance and CA acceptance itself are based on Venkatesh et al. (2003), for the categories of performance expectation, effort expectancy, facilitating conditions, social influences, intention to use and use. We also used DeLone & McLean (1992) for category of system quality and satisfaction with use. Later studies used these categories to analyze the acceptance of different technologies, including the acceptance of CA (González et al, 2012, Miranda, 2018, Nascimento, 2019). The construct can be seen in Table 7.

Table 7 - Acceptance Antecedents Construct

Acceptance Antecedents: performance and effort expectations, facilitating conditions, social influences (Venkatesh et al., 2003) and system quality (DeLone & McLean, 1992) determine the acceptance of technologies			
Category	Subcategory	Constitutive Definition	Authors
Performance Expectancy	Perceived Usefulness	The degree to which a person believes that using a particular system will improve their job performance.	Davis (1989); Davis et al. (1989); Moore and Benbasat (1991); Compeau and Higgins (1995); González et al (2012); Nascimento (2017); Miranda (2018).
	Relative Advantage	The degree to which using an innovation is perceived as better than its predecessor or similar technology/technique.	
	Expectation of results	Expected results (outcomes) as a consequence of a behavior (like using a technology).	
Effort Expectation	Ease of Use	The degree to which using an innovation /system is perceived as difficult to use.	Davis (1989); Davis et al (1989); Moore and Benbasat (1991); González et al (2012); Nascimento (2017); Miranda (2018).

Acceptance Antecedents: performance and effort expectations, facilitating conditions, social influences (Venkatesh et al., 2003) and system quality (DeLone & McLean, 1992) determine the acceptance of technologies

Category	Subcategory	Constitutive Definition	Authors
	Complexity	The degree to which a system is perceived as difficult to understand and use.	Thompson et al. (1991); Nascimento (2017); Miranda (2018).
Facilitating Conditions	Perceived Behavioral Control	Perceptions about the existence of internal and external constraints on behavior. It covers self-efficacy in the use of a certain technology.	Ajzen (1991); Taylor and Todd (1995a, 1995b); Thompson et al. (1991); González et al. (2012); Nascimento (2017); Miranda (2018).
	Facilitating Conditions	Objective factors in the environment that observers agree make an act easy to do, including providing adequate IT support.	
Social Influence	Subjective Norm	The person's perception that most people important to him think he should or should not use that system.	Ajzen (1991); Davis (1989); Fishbein & Ajzen, (1975); Mathieson (1991); Taylor and Todd (1995); (Thompson et al. (1991); Venkatesh (2000), González et al. (2012); Nascimento (2017); Miranda (2018).
	Social Factors	The individual's internalization of the subjective culture of the reference group and the specific interpersonal agreements that the individual has made with others in specific social situations.	
	Image	The degree to which using the innovation will improve one's image or status within a social system or belief in social status improvements when performing certain behavior towards important people.	

Acceptance Antecedents: performance and effort expectations, facilitating conditions, social influences (Venkatesh et al., 2003) and system quality (DeLone & McLean, 1992) determine the acceptance of technologies

Category	Subcategory	Constitutive Definition	Authors
System Quality (Datawarehouse/BoaVista /Extrator /ACL /SIGRH /SGPE /Communications)	Simplicity	The simplicity of a system.	DeLone and McLean (1992); AL Athmay et al. (2016); Mardiana et al. (2015), Andriani et al. (2017), Chatterjee et al. (2018).
	Reliability and Integrity	A system is reliable when users can trust that it will perform according to its specifications. Integrity of a system is related to its ability to function properly.	Grudnitski (1981), DeSanctis and Jarvenpaa, (1985), Lee et al., (1986), DeLone and McLean (1992, 2003).

Source: compiled by author.

The acceptance construct can be seen in Table 8.

Table 8 - Acceptance Construct

Acceptance: refers to the intention, use and satisfaction with the use of CA.			
Category	Subcategory	Constitutive Definition	Authors
Intention to Use	Not applicable	Internal auditors' intention to use Continuous Auditing for the foreseeable future	Davis (1989); Venkatesh et al. (2003) González et al (2012), AL Athmay et al. (2016).
Use	Not applicable	The actual use of a given technology, both in its extent and in its frequency of use.	Davis (1989); Venkatesh et al. (2003); González et al (2012); Oye et al. (2014).
Satisfaction with the Use	Not applicable	Levels of experience/satisfaction and achievement that individuals gain from the use of technologies in terms of content, speed, quality and security	DeLone & McLean (1992, 2003).

Source: compiled by author.

The third part, referring to the construct of net benefits, was built based on the perspective of DeLone & McLean (1992, 2003). As DeLone & McLean (2003) do not delimit the constituting categories of these net benefits, the perspectives of the information systems literature (DeLone & McLean, 1992, 2003) and the CA and audit literature were adopted for the elaboration and definition of the categories of analysis (PCAOB, 2010; Bumgarner & Vasarhelyi, 2018; CFC, 2019).

Table 9 - Net Benefits Construct

Net Benefits: benefits caused by the adoption/use of a certain technology and negative impacts associated with this adoption/use (DeLone & McLean, 2003).			
Category	Subcategory	Constitutive Definition	Authors
Benefits	Cost x Benefit	The cost-effectiveness of performing certain tasks. The cost-benefit in the audit is verified by the reduction of necessary on-site visits, or the reduction of printing of materials.	DeLone & McLean (1992, 2003), Drury (1982).
	Efficiency	A process is considered technically efficient when, from a certain amount of input, it can extract as many products as possible, reducing waste.	Diniz (2012), Gonzalez et al. (2012).
	Precision of work	The precision which a job is performed. Accuracy can affect decision making. In CA, precision is related with possible false positives.	Grudnitski, (1981), DeSanctis & Jarvenpaa, (1985), Lee et al., (1986), DeLone & McLean (1992, 2003).
	Work agility	The speed with which a job can be performed. It can be viewed as reporting more quickly.	Benbasat et al. (1981), Belardo et al. (1982), Benbasat and Dexter (1985, 1986), Vasarhelyi (1991), DeLone & McLean (1992, 2003), Gonzalez and Hoffman (2018).
	Information Quality (relevance, timeliness, reliability)	Information quality can be understood as the ability of information to “make a difference” in a decision (relevance), to have information available to decision makers in time to influence their decisions (timeliness), and to ensure that the information is error-free or biases and faithfully represents what it purports to represent (reliability)	DeLone & McLean (1992, 2003), Bailey and Pearson (1983), Fedorowicz & Lee (1999), O'Reilly (2006), FASB (2018); Chatterjee et al. (2018), Yang et al (2018), Fitrios (2016).
	Audit Planning	Audit planning usually includes the establishment of the overall audit strategy, which includes the elaboration of the audit plan. This includes planning procedures for assessing risks and for responding to those risks. Planning is not a stand-alone phase, but an ongoing process that can begin shortly after (or in connection with)	PCAOB (2010), Bumgarner and Vasarhelyi (2018), Eulerich et al. (2020).

Net Benefits: benefits caused by the adoption/use of a certain technology and negative impacts associated with this adoption/use (DeLone & McLean, 2003).

Category	Subcategory	Constitutive Definition	Authors
		the completion of previous audits, continuing until the completion of the current audit.	
Associated Negative Factors	Auditor Independence	The auditor's independence is linked to the principles of objectivity and integrity (in carrying out their work and issuing their opinion). This independence comprises independence of thought and the appearance of independence.	Alles et al. (2002), Bumgarner and Vasarhelyi (2018), (CFC, 2019).
	Costs	Audit costs involve on-site visits, systems, software, people, physical structure and other elements that are necessary for the audit to be carried out.	Kogan et al. (1999), Drury (1982), Banker et al. (2002), Vasarhelyi et al (2009), Kent (2013), Eulerich and Kalinichenko (2018).

Source: compiled by author.

3.5 DATA ANALYSIS

We used Content Analysis to analyze the content of interviews, observations and documents. The interviews were transcribed, and the tabulation was performed according to the constructs and categories and was organized in an Excel spreadsheet. According to Bardin (2011), Content Analysis is a set of communication techniques analysis that aim to understand and study “the word”. This technique is concerned with the context in which the word is used and thus allows making inferences from the reading of texts and other materials. The steps of the Content Analysis that we conduct in our dissertation are shown in Table 10.

Table 10 - Content Analysis Phases

Content Analysis Phases	Explanation
Phase 1: pre-analysis	It's the action planning. In this phase, the organization object of study and which procedures need to be developed, respecting the necessary flexibility of qualitative studies, are defined. During Phase 1, propositions and objectives are formulated and how the results will be interpreted. It serves to systematize and allow the analyzes to be carried out properly.
Phase 2: exploring the collected data	In this phase the encoding units are chosen. For this phase, it is recommended that the following procedures be carried out: choice of record units, selection of counting rules and identification of categories (they bring together sets of common elements). In addition, semantic classification is carried out, by themes, adjectives, verbs, etc. Finally, researchers need to categorize the data, allowing the largest set of information to be schematized, relating classes that identify facts and events in an orderly manner
Phase 3: treatment of results and interpretation	In this phase, the researcher must strive to identify the meanings of the data, going beyond what is manifested textually.

Source: adapted from Bardin (2011).

Dissertation categories in this dissertation describes broader situations, such as facilitating conditions or social influences. During the disassembly of the interviews, we realize that we need to further delimit the constructs, respecting the nature with which they appeared and were mentioned in the interviews. For example, the Facilitating Conditions construct does not explain exactly what these conditions are. Throughout the interviews, these Conditions became clearer, such as human resources or technological resources. In the categorization phase, the interviews were transcribed and organized (tabulated) in Microsoft Excel®, respecting the categories presented in the research construct.

We also elaborated a word cloud to understand the words most used by internal auditors. According to Yin (2010), the word cloud is an analytical resource widely used by qualitative research that employs interviews in their data collection. It helps to search for multiple and converging sources in the analysis of evidence. Words used by auditors as prepositions and other words that do not add value to the content were excluded from the texts.

As a strategy to analyze a set of different sources (documents, interviews and observation) and interpret them properly, an analytical strategy was chosen based on the theoretical propositions developed throughout the work.

The documents and observations were triangulated with the content of the interviews, also respecting the categories of analysis presented in the research constructs. Throughout 2021 and 2022, several documents that the researcher understood were related to CA and could be useful for the present research were collected, whenever possible. Several observations were also made when the researcher understood that these were related to the research objectives. At the end of the transcription and categorization of the interviews, the researcher evaluated all the documents and observations notes, confronting this information as a way of triangulating and validating the results.

3.6 STUDY LIMITATIONS

The limitations of the study originate from the characteristics of the present research (theoretical, epistemological positioning and research design).

As it focuses on a single case and on the view of an audit management and its internal auditors (GAPES), the results of this research are not generalizable to other organizations. The study is also limited to analyzing the CA model carried out within the payroll. This means that

other areas may have other characteristics not captured by the current survey. An example to be cited would be the analysis of a company's revenues. SC payroll rules are based on regulations, which allows internal auditors to develop deterministic CA trails, and this has implications for the format of the model used.

The use of interviews to understand the phenomenon studied can also be considered a limitation of this research, because interviews capture the perception of internal auditors, and these perceptions can be influenced by several aspects, and can be more or less positive. Also, the researcher has no control over the motivation of the interviewees, and this factor may also influence the responses.

We intended to overcome these limitations by triangulating the data, specifically using internal and external documents of the organization, in addition to the careful observation of the researcher in the daily lives of the interviewees.

The researcher of this dissertation worked with the organization studied as a researcher from March 2021 to March 2023. Thus, he had a daily relationship with the interviewees (internal auditors). To overcome limitations that this could cause, the author adopted the following procedures:

- i. Elaboration of research propositions and research constructs, based on literature;
- ii. Elaboration of the semi-structured interview script, based on the literature;
- iii. Validation of the semi-structured interview script and the constructs with two internal auditors from another governmental organization who were in a very similar situation to GAPES;
- iv. Elaboration of the study protocol, which was rigorously followed throughout the process;
- v. Presentation of the Free and Clarified Consent Term to the interviewees; and
- vi. Prior explanation to all respondents of the scientific nature of the research, and the importance of the researcher being impartial in relation to the questions asked and the necessary analyses.

Another existing limitation is related to the possible bias of the researcher in the categorization of data and interpretation of the results found, since this analysis has several subjective elements that need to be considered. Finally, the possible influence of the researcher on the interviewee is highlighted as a factor that creates limitations to the present study.

3.7 RESEARCH TRAJECTORY

Figure 7 shows the five stages of this research (context, theoretical foundations, research strategy, analysis of results and research results).

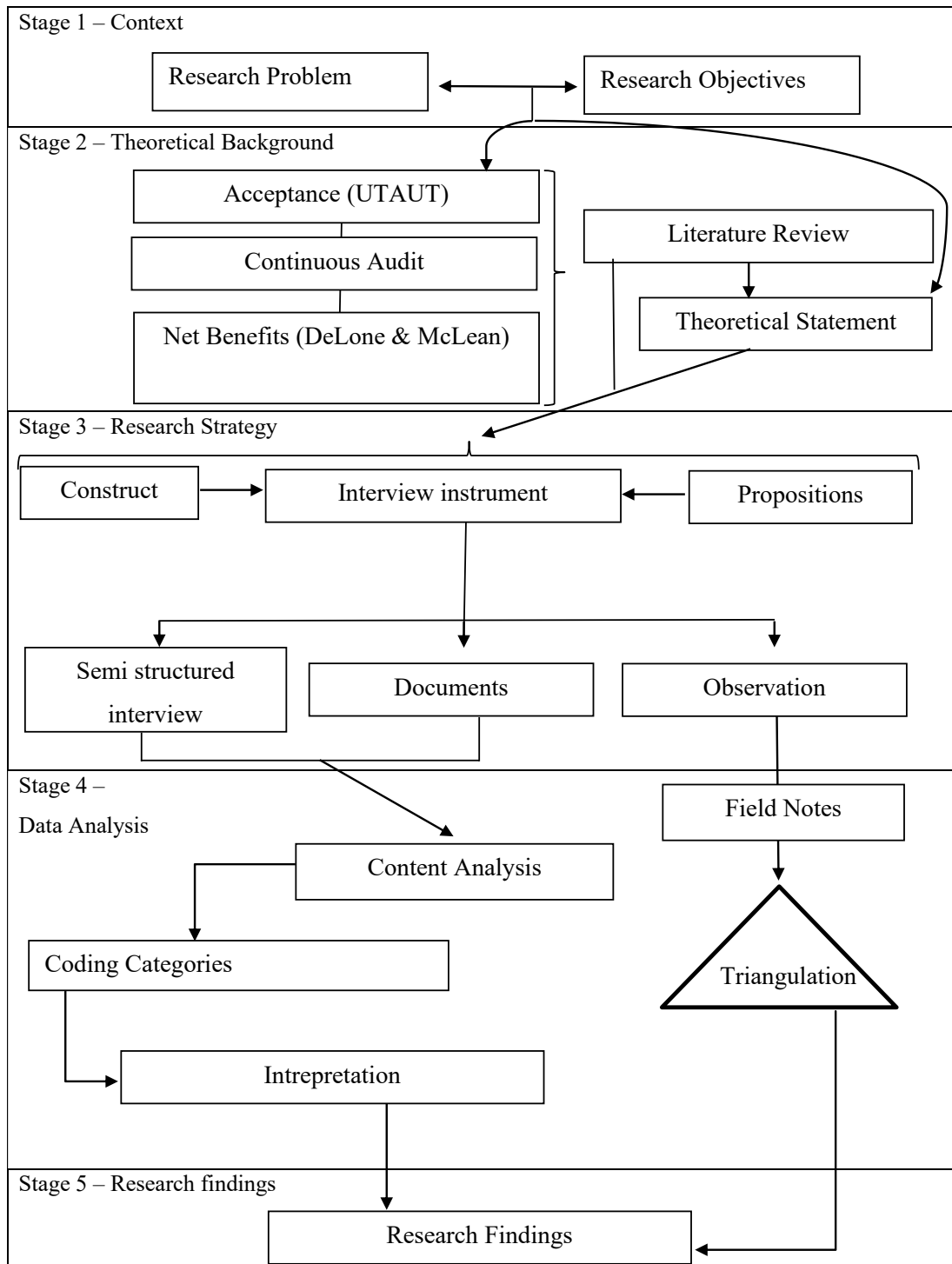


Figure 7 - Research Stages

4 DESCRIPTION AND ANALYSIS OF RESULTS

In this topic we present the research results. First, the organization that was the object of study is presented, with a specific focus on the characteristics of the payroll of the Executive Branch of the State of Santa Catarina. Characteristics of the state payroll architecture is presented, as it is important to understand its complexity and its relationship with barriers and net benefits. Results discussions are divided into three parts: the first demonstrates the use and satisfaction with the use of CA within GAPES. The second discuss the CA acceptance antecedents. Finally, the net benefits of CA are presented. At the end of this section, we discuss the theoretical propositions and the thesis declaration.

4.1 THE ORGANIZATION

4.1.1 Executive Branch of the Government of the State of Santa Catarina (PEESC)

The present study was carried out in the Executive Branch of the Government of the State of Santa Catarina (PEESC), more specifically in the Personnel Audit Management (GAPES), which belongs to the General Controllershship of the State of Santa Catarina (CGE).

Complementary Law No. 741, of June 12, 2019, provides for the current structure of the PEESC. According to Art. 2, Art. 3 and Art. 4, PEESC is composed by the Direct Public Administration (*Administração Pública Direta*) and the Indirect State Public Administration (*Administração Pública Indireta*). State departments such as the Santa Catarina Governor Office, the Vice-Governor Office and other State Departments are part of the first. Governmental foundations, state-owned companies, among others, are known as part of the Indirect State Public Administration.

Art. 5th shows which are the superior state departments of the Direct State Public Administration:

- I – o Gabinete do Governador do Estado, do qual fazem parte:
(...)
- e) a Controladoria-Geral do Estado (CGE);
(...)
- III – a Secretaria de Estado da Administração (SEA), a cuja estrutura se integra o Escritório de Gestão de Projetos (EPROJ);
- IV – a Secretaria de Estado da Administração Prisional e Socioeducativa (SAP);
- V – a Secretaria de Estado da Agricultura, da Pesca e do Desenvolvimento Rural (SAR);
- VI – a Secretaria de Estado da Comunicação (SEC);
- VII – a Secretaria de Estado do Desenvolvimento Econômico Sustentável (SDE), a cuja estrutura se integra a Secretaria Executiva do Meio Ambiente (SEMA);
- VIII – a Secretaria de Estado do Desenvolvimento Social (SDS);
- IX – a Secretaria de Estado da Educação (SED);
(...)

CGE belongs to the State Governor Office, being directly linked to it. The PEESC is composed of different entities, which have different peculiarities to meet the needs of Santa Catarina State. For example, the State Department of Education (*Secretaria Estadual da Educação* - SED) is responsible for all education-related matters in the state. Within this structure are the more than 70,000 teachers who currently work in the State as public servants, at the most different school levels: basic, elementary, special education, etc. The Higher Collegiate of Public Security and Official Forensics (NR) is made up of the Military Police, Civil Police, Military Fire Brigade and the General Institute of Forensics of the State of Santa Catarina. Under its responsibilities are the entire scope of the State's public security.

Therefore, attributions of the State, its structure, its staff, and its responsibilities are quite broad, covering a complex organizational structure. This capillarity and breadth reflect directly on the State's payroll and people management. As can be seen in the next section.

4.1.2 Human Resources and Payroll

The first legislation on the personnel area in Santa Catarina occurred with the creation of the Civil Servants Statute (Law 6.745/85), with the Military Police Statute (Law 6.218/83) and with the Magisterium Statute (Law 6.844/ 86). These first laws structured some careers within the Executive Branch of the State of Santa Catarina (PEESC) and served as references for the structuring of different positions later.

The Government of Santa Catarina has an organizational structure that is responsible for policies related to the different sectors of the state public administration. This structure is directly coordinated by the State Governor (Governo de Santa Catarina, 2021a).

Within this structure is located the State Department of Administration (*Secretaria de Estado da Administração* - SEA), which is responsible, among other responsibilities, for the Directorate of Personnel Management and Development (DGDP). DGDP, in turn, is composed by many divisions that are responsible for the management of the SIGRH (payroll management system), human resources management (recruiting and training), among other responsibilities (SEA, 2021).

According to Complementary Law No. 741, of June 12, 2019 of Santa Catarina, in its Art. 29, it is incumbent upon SEA to:

- I – standardize, supervise, control, guide and formulate people management policies, involving:
 - a) functional benefits of a non-pension nature for civilian personnel;

- b) entry, movement and staffing of civil, permanent and temporary personnel;
- c) career plans, positions and salaries of civil servants and state military personnel;
- d) health insurance plan;
- e) functional progression of civil servants;
- f) remuneration of civil servants and state military personnel;
- g) medical and health forensic of civil servants;
- h) improvement of occupational health conditions for public servants and prevention of work accidents;
- (...)
- III – to manage and coordinate the development and evolutionary maintenance of the Integrated Human Resources Management System (SIGRH);

As a result, SEA is the central body for PEESC's People Management and Human Resources. According to Complementary Law Art. 741/2021, under the coordination of SEA, people management is structured, organized, and operationalized in the form of administrative systems. The Art. 127 of the aforementioned law emphasizes that each administrative system is composed of a central body, sectoral divisions (For example, Human Resources from Education State Department) and sectional divisions (For example: human resources from schools, hospitals). In the case of personnel, the central body, as mentioned, is the DGDP. Each State Department has its sector (which may concentrate all human resources functions). The sectoral and sectional bodies are responsible for the execution and operationalization of the powers delegated by DGDP. Figure 8 demonstrates the flow of information of the personnel area. The same logic can be applied to all other State Departments.

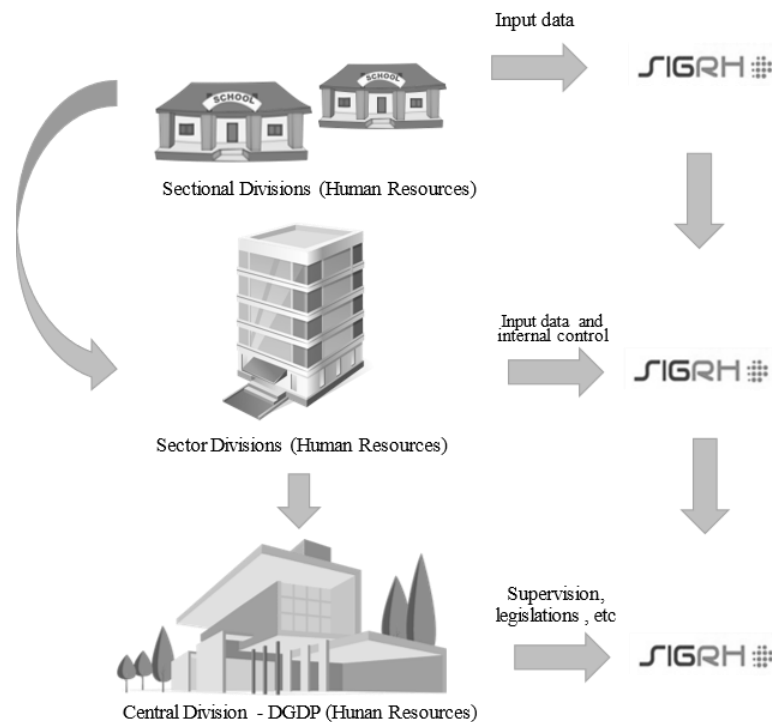


Figure 8 - Data flow in Payroll

To exemplify this flow, an example from education (SED) is used. Several factors/transactions may occur that interfere in the personnel area within a school (sections) during a regular month. Teachers may withdraw or go on vacation; it may be necessary to hire more teachers; it may be necessary to dismiss a teacher; or it may be necessary to change the workload of a particular teacher. The management of the payroll, in this way, is up to the sectionals. This means that the sections themselves insert the information into the people management system – in SED, there is still another management system to meet specific needs of this State Department. The information (from SED) is later integrated into the Human Resources Management System (SIGRH). Some sections have different subdivisions, and this usually depends on the size of that State Department.

Sectors are responsible for some other information, including the supervision of imputed data. SED's human resources division (sector) is responsible, for example, for gathering all the information from all these sections, in addition to other attributions. For example, State Departments human resource divisions are the one who are the most familiar with the specific legislation on the payroll of their own State Departments (SED, PMSC, CBMSC, etc.).

Finally, the main duties of the DGDP (as a central body) are to regulate, supervise, control, guide and formulate people management policies. Thus, it is not up to the DGDP to input information into SIGRH.

DGDP is also responsible for ensuring the proper functioning of the SIGRH, which is the management system for all information relating to the functional life and payroll of PEESC's public servants. SIGRH maintains databases with various registration, functional and financial information of all the public servants from PEESC (CIASC, 2021). SIGRH is the only management system that should be used in PEESC and all the maintenance of the system is DGDP responsibility. The evolution of SIGRH allows more data to be recorded digitally. In addition, several rules and internal controls related to payroll are already within these management systems.

Payroll information is inputted in SIGRH throughout the month by State Departments human resources divisions. These data must be inputted in the system according to the annual calendar prepared by the DGPE. IN SEA n° 003/2021 established the payroll processing schedule for the year 2021. According to Art. 1 of IN SEA n° 003/2021, payroll processing takes place through four stages: I) opening (*abertura*); II) preliminary/preview or testing phase

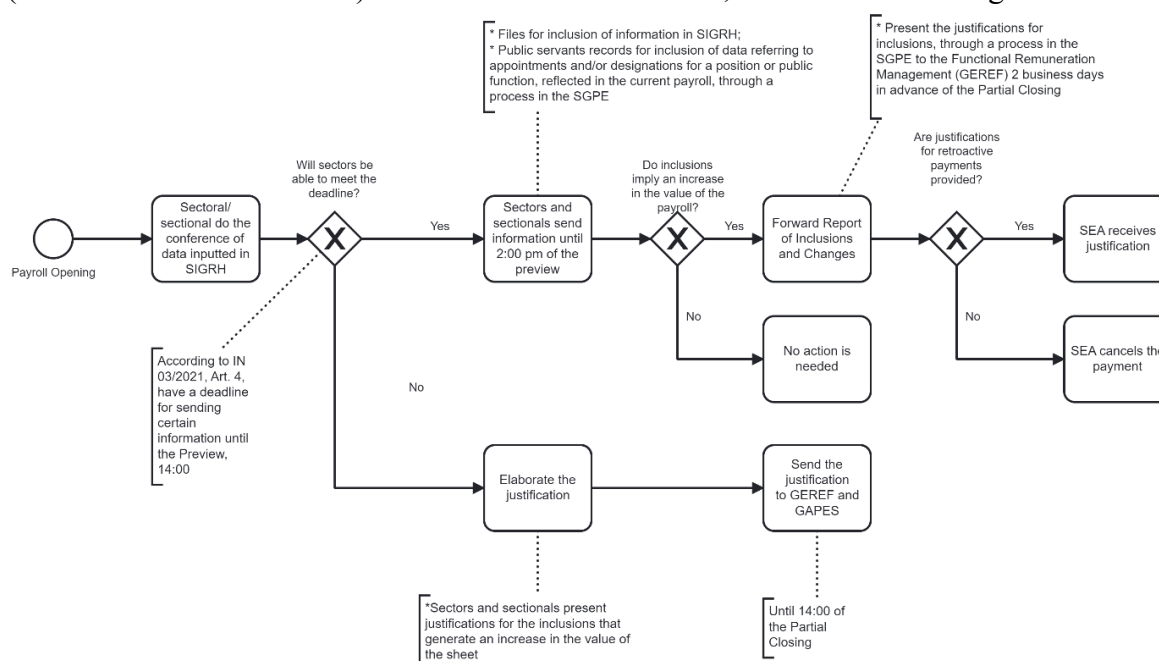
(*folha preliminar*); III) partial closure (*fechamento parcial*); IV) definitive closure (*fechamento definitivo*). The 2021 schedule can be viewed in Table 11.

Table 11 - Payroll Stages Schedule (2021)

Month/2021	Opening	Preliminary	Partial Closure	Definitive Closure
January	5	11	15	19
February	1	5	10	12
March	1	9	16	18
April	1	8	14	16
May	3	8	14	18
June	1	8	15	17
July	1	8	16	20
August	2	9	13	18
September	1	9	14	17
October	1	8	15	19
November	1	9	15	17
November 13°	18	23	25	29
December	1	7	10	14

Source: IN 03/2021

IN SEA n° 003/2021 also establishes a processing flow, listing sectional and sectoral (human resources divisions) boundaries and attributions, as can be seen in Figure 9.



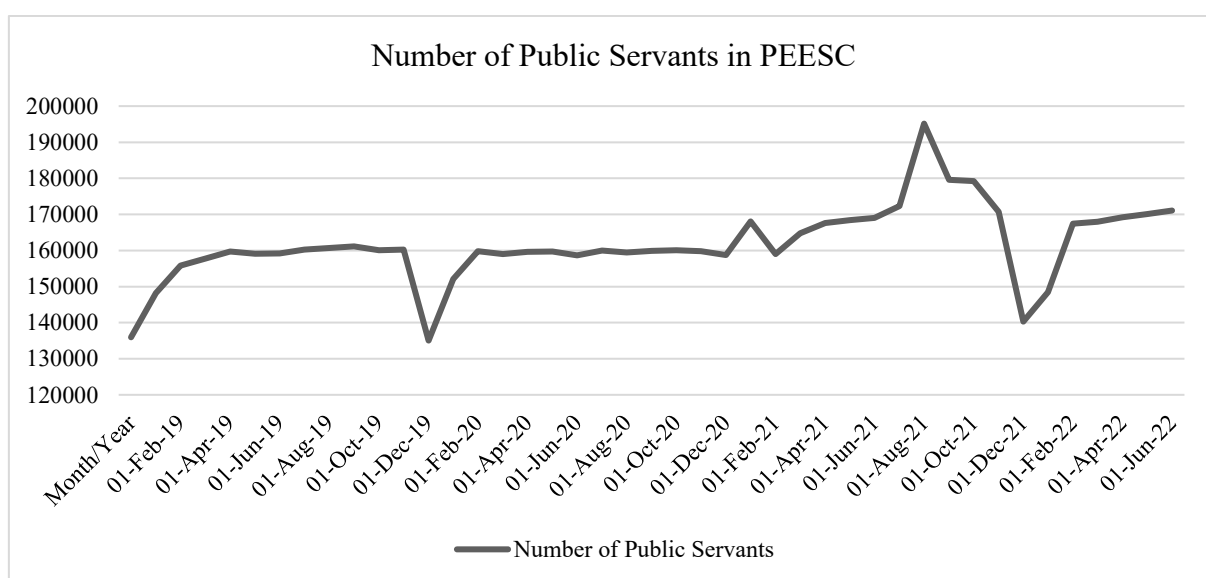
Source: IN 03/2021

Figure 9 - Payroll Flowchart

Human resources divisions can input data into the system at any time of the month. However, for the information to have financial consequences within the same month, it is necessary that the information be inputted until the definitive closing of the payroll (Definitive Closure date).

In addition to its capillarity (the state has administrative structures throughout all regions of the State of Santa Catarina) and complexity, PEESC has many employees and the expenses related to it have a considerable value when comparing to the total expenses of Santa Catarina State. In July 2022, the payroll consisted of 159,341 public servants and 15,441 pensioners, of which 99,628 are public servants that are not retired and are still working. In financial terms, this is equivalent to a monthly payroll amount in July 2022 of BRL 1.396 billion [USD 260,5 million in November 2022] (Portal da Transparência, 2022).

PEESC payroll also has many changes in throughout the year. Variations in the number of public servants can be seen in Figure 10. Since 2019, for example, the state has varied in the number of enrollments in an approximate amount of 5300 per month. It only shows the number of public servants that were on the payroll at that time (and in each month there may have been several public servants' entries and exits).



Source: BoaVista.

Figure 10 - Public Servants in PEESC

Finally, a very complex aspect of payroll concerns the amount of existing legislation that regulates payroll. Any existing type of payment in PEESC payroll has at least one related legislation, as shown in the next section.

4.1.3 Wages, Benefits, Deductions and Payroll Legislation

Public servants have many types of wages, benefits, and deductions in PEESC. All wages, benefits and deductions are based on different legislation and each career, and each State Department may have specific legislation for each of the items that make up its public servants' paycheck.

To demonstrate the complexity of payroll, it is possible to analyze the number of existing types of payments and deductions. Currently, the payroll has around 1200 active payment and deduction types. Variations in the number of payments type can happen over time, as some of these payments don't occur every month.

Each payment has its own format numbering, as can be seen in Figure 11, taking an example of a regular (basic salary) payment of a public servant, where:

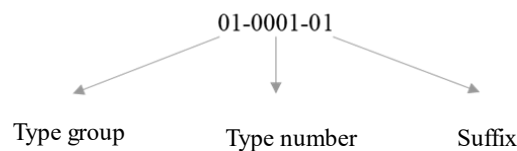


Figure 11 - SGRH payments/deductions format

Table 12 shows the most important types of existing wages, benefits, deductions and aggregations, with the respective amount in the payroll for the month of August 2021. These means that, for instance, there is 344 different types of regular earnings in PEESC, such as salaries, commissions, 13th salary, overtime salaries, unhealthy/dangerous conditions compensation, etc.

Table 12 - Number of Wages/Benefits/Deductions/Aggregations Types in SGRH

Name of the Item Type	Description	Item Type (numerical representation)	Amount of Payment Types (August/2021)
Regular Earnings/ Ordinary income	These are the normal earnings of public servants, such as salary, subsidy, food allowance, etc. Basically, they are different kinds of wages and benefits.	1	344
Differences in Earnings	These are eventual differences that the public servant receives, usually because of some undue payment in previous months.	2	115

Name of the Item Type	Description	Item Type (numerical representation)	Amount of Payment Types (August/2021)
Discount Returns	Returns made to the public servant due to possible undue discounts.	4	13
Deductions	These are payroll deductions, such as Income Tax, INSS, payroll-deductible loans, etc.	5	391
Deduction Differences	Discounts made on the public servant payroll that were possibly not made in previous months.	6	33
Earnings Returns	These are returns made by the public servant to PEESC due to an undue payment.	8	112
Aggregation types	These presents aggregation values (for instance, gross salary)	9	143
Earnings from Previous Year	These are earnings that the public servant for some reason had to receive from the previous year.	10	50
Earnings from years before previous year	Refer to earnings that the public servant for some reason had to receive from years prior to the previous year.	12	46
Total			1249

Of these items, 344 relate specifically to the Regular Earnings type (1). Next we present the five highest values in PEESC:

1. **Subsídio (Subsidy) (Type of Payment 01-0263)**, in the total amount of R\$ 267.838.954 (30380 public servant have this type of payment);

2. **Vencimento (Basic earning) (Type of Payment 01-0001)**, in the total amount of R\$ 235.348.550 (86716 public servant have this type of payment). Although it's very similar to *Subsidio*, legislations, personnel that receive and State Departments are different;

3. **Salário Mag. ACT (Basic Earning for Temporary Teachers) (Type of Payment 01-1021)**, in the total amount of R\$ 54.091.662 (33067 public servant have this type of payment);

The type of item "Deductions" (05) has the largest number of existing items, but most of these items relate to employees' payroll loans, which are deducted directly from the payroll. The most significant value of Deductions is "Desconto do Imposto de Renda IRPF" (Income Tax), in the total value of R\$ 110.491.661.

In addition to the huge number of items, many of these items have different legislation in different State Departments. For example, the legislation regarding the State Attorney General's (PGE) Subsidy type of payment is different from the legislation regarding the CGE Subsidy type of payment.

This means that the values and rules attached, for example, can be different. In addition, some items vary monthly according to the number of days worked, or the number of hours spent on a given activity. The payment value also varies depending on the position level of the public servant within the state and each position may have its own structure.

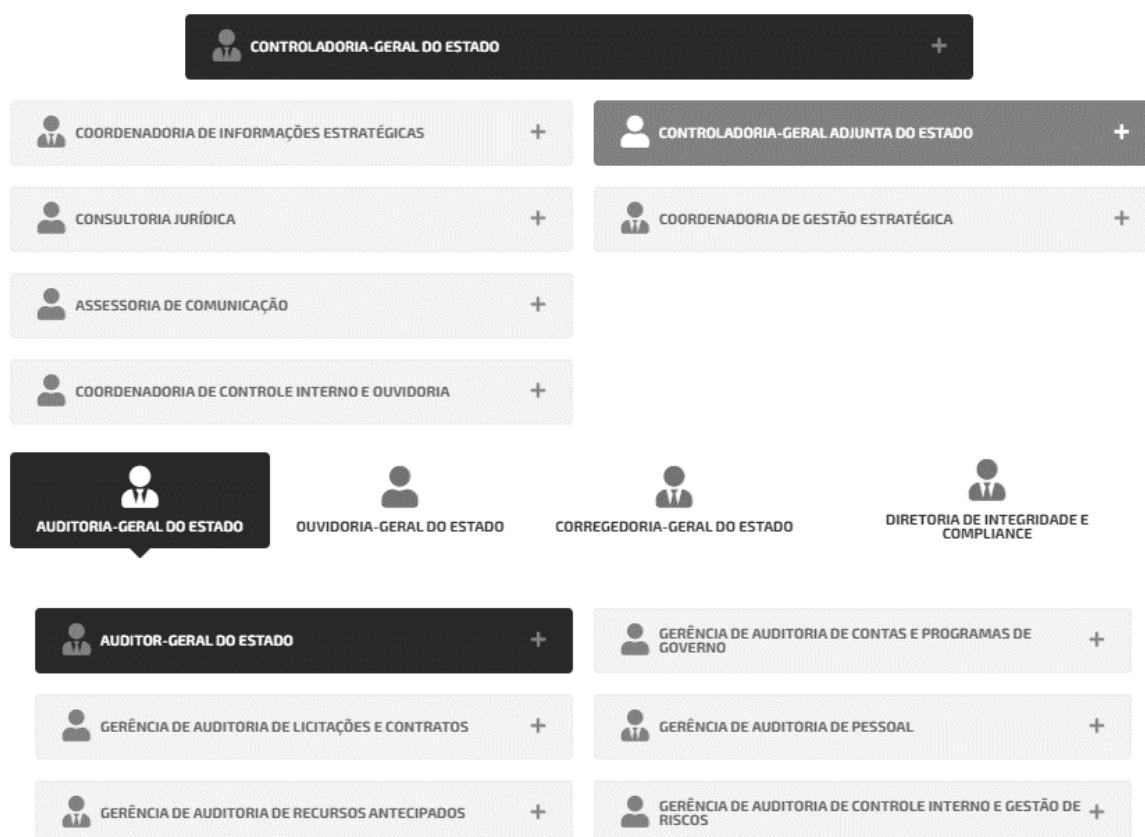
Responsible for auditing PEESC activities is the General Audit of the State, which is subordinated to the Comptroller General of Santa Catarina (CGE). CGE is composed by different divisions, and one of them is responsible specifically for auditing the different transactions related the payroll and human resources.

4.1.4 CGE and GAPES

The internal control system of public administration is a constitutional precept and is provided in articles 58 and 62 of the Constitution of the State of Santa Catarina. As responsibility they have: the accounting, financial, budgetary, operational and property inspection of the State and public administration State Departments.

CGE is the central body of the administrative system of internal control of the Executive Branch. Created by Complementary Law No. 741, of June 12, 2019, which provides for the basic organizational structure and management model of the state public administration. Although it was created with LC 741/2019, the internal audit functions are old in the State, although they were previously allocated in another structure.

Current structure of the CGE can be seen in Figure 12.



Source: CGE (2022).

Figure 12 - CGE Organizational Chart

CGE is composed of four directorates/divisions: General Audit, General Ombudsman, General Internal Affairs and Integrity and Compliance Directorate. It is within the State Audit General that the Personnel Audit Management (GAPES) is located.

Complementary Law No. 741, of June 12, 2019, its Art. 25, presents the attributions and powers of the CGE:

I - take the necessary measures for the defense of governmental assets, internal control, public auditing, correction, prevention and fight against corruption, ombudsman activities and increasing management transparency within the State Public Administration;

VIII – coordinate the Internal Control System of the State Executive Branch; and

It is noteworthy that the CGE, in its creation (LC741/2019), incorporated the internal audit activities, until then carried out by the General Audit Board (DIAG), from the State Department of Finance (SEF). CGE's mission is to contribute to the improvement of public management, through the control and evaluation of expenditures and public policies (including

all payroll expenses), the dissemination of good practices and the encouragement of compliance with the guidelines established in governance by the top management, promoting correction, fighting corruption and promoting transparency and social control. It currently has 87 public servants on its staff, totaling a gross remuneration of BRL 2.532 million per month (July/2022) (Portal da Transparência, 2022).

The last public tender held for the composition of the career of Internal Auditor of the Executive Power took place in 2005. The state had 75 internal auditors occupying positions. Currently, the career has 55 active state auditors, of which 51 work at the CGE and the others at other State Departments (Informação CGE nº 38/2022).

In June 2022, GAPES had five internal auditors and one manager. These internal auditors, in small numbers, are responsible for auditing the entire PEESC payroll. This includes the various State Departments and state-owned companies, which have different specific personnel legislation, in addition to a voluminous number of positions.

4.2 RESULTS OVERVIEW

To present an overview of the elements most presented in the interviews, the word cloud technique was used, as shown in Figure 13.



Figure 13 - Word cloud elaborated from Interviews

The top ten words that appeared were: (*a gente*) we, (*auditoria*) audit, (*dados*) data, (*folha*) payroll, (*trilhas*) audit trails, (*sempre*) always, (*forma*) form, (*pessoal*) personnel, (*sistema*) system, (*análise*) analysis. Although alone they may not have a concrete meaning, when analyzing the word cloud together with the contexts of the interviews and observations carried out in the field, there are very important elements that could not come to light so easily. The word most highlighted by the interviewees (*we*) represents a lot about the reality of the CA model implemented within GAPES.

Over the years, it was noticed that the CA model was improved mainly due to the initiative and will of GAPES' internal auditors, who even with the technological, structural and human resources limitations managed to keep the CA operating throughout this period, with passages through more robust models and simpler models. Thus, having this word as the most cited in the text represents this context well.

The third most cited word concerns the essence of the CA performed at GAPES: data. Without data, regardless of its format, it is not possible to run any CA model or technique (Appelbaum et al., 2018). Although within the context of the interviews these data have sometimes appeared together with positive reports, and sometimes with negative reports, it is understood that the data are the fundamental pillar of CA in GAPES.

The fifth word (trails) concerns an important feature of the CA currently being performed within GAPES: the model is operationalized through audit trails (deterministic or not, as we can see in the next section). Thus, the strong presence of this word in the interviews shows how they are aware of the importance of these audit trails for the proper use of the model. Unlike other models that use artificial intelligence (Zhang, 2019), or other statistical techniques, the GAPES CA model was built to verify different business rules that currently exist in the payroll.

In addition, two other words most often cited by internal auditors are important and deserve to be highlighted: personnel and system. Both words also represent fundamental aspects for the CA model, which are the organization's human resources (whether specialized IT personnel or not) and the system/systems (software, technological tools, etc.) to be used for operationalization of CA.

Thus, our findings from the word cloud allow an overview of the GAPES CA model, and this result is quite convergent with what we present next, based on the analysis of the interviews, documents and observations.

To present an overview of how the findings from the word cloud are connected to the research findings, a summary of results is presented in Table 13. For an easier follow-up of the following analyses, the research constructs are presented, along with the adjacent propositions, and a summary of the main features evidenced in each of these propositions.

Table 13 - Constructs, Propositions and main findings

Constructs	Propositions	Summary of results
Acceptance antecedents	<p><i>Proposition 1: the impact on performance (relative advantage), the effort required, the facilitating conditions, the social influences and the quality of the system, drives the use and individual satisfaction of CA.</i></p> <p><i>Proposition 2: Individual</i></p>	<p>CA acceptance is associated with individual efforts and skills, collective efforts, human resources, physical structure (especially data quality), organizational structure (including, in this specific case, legislative complexity), and quality of systems. These barriers can be overcome when there is an adequate relationship with the audited bodies and support from top management. This support from top management will occur better</p>

Constructs	Propositions	Summary of results
	<i>characteristics, such as gender, age, experience and voluntariness of use, drives the use and satisfaction with the use of Continuous Auditing</i>	when managers understand the importance of CA and the data that is used as input for the model.
Use and Satisfaction	<i>Proposition 3: The use and satisfaction with the use of CA generate benefits and associated negative impacts for internal audit, and these benefits and associated negative impacts driven the extent, frequency, and quality of CA.</i>	The use of CA occurs through Audit Trails, which vary in terms of their length and timing. Elements of satisfaction were observed more prominently in relation to the deterministic audit trails. Auditors reported the accuracy of findings and freeing up auditors' time as benefits related to these trails. More data-oriented auditors have higher levels of satisfaction with CA, although non-data-oriented auditors also had positive feelings about CA. An interrelationship between use/satisfaction and net benefits was noticed, in line with the theory (DeLone & McLean, 2003).
Net benefits	<p><i>Proposition 4: the perception of the net benefits generated by the CA will be different depending on the type of participation that a certain auditor has within the CA.</i></p> <p><i>Proposition 5: The extension (use), frequency (use) and quality (satisfaction) of the CA driven results with greater accuracy and agility and affect the cost-effectiveness and efficiency of the audit.</i></p> <p><i>Proposition 6: The extent, frequency and quality of CA changes the way auditors use data to plan their audits, directing them towards a risk-based audit.</i></p> <p><i>Proposition 7: the extent (use), frequency (use) and quality (satisfaction) of CA modifies the relationship of internal auditors with the information generated by internal audit, boosting their perceptions regarding relevance, timeliness, and reliability.</i></p> <p><i>Proposition 8: The inherent agility of CA has negative effects on the</i></p>	Positive effects were identified, such as financial benefits, efficiency gains, more comprehensive control, precision of action. Negative factors such as the number of false positives, overlapping of functions between internal audit and management, and the difficulty of CA recommendations to become effective improvements in internal controls were evidenced. These gains, however, are not uniformly perceived by internal auditors and vary according to CA models. The part of CA operationalized through deterministic trails generate more accurate results, although they are not as comprehensive as the other audit trails. Audit trails based on variation models in turn, generate more false positives and require more manual work. The CA modifies the internal auditors' relationship with organizational data, especially in relation to the demands for more timeliness and relevant data. Although the CA can help in the planning of traditional audits, this should only occur when there is a more robust CA model, which mainly allows for the organization of the audit evidence retrieved from CA in an adequate way. No independence issues were identified and depending on how the CA is performed, the independence of internal auditors is not only maintained, but also improved.

Constructs	Propositions	Summary of results
	<p><i>organization and these effects are mitigated or accentuated depending on the way in which audit alarms are managed within internal audit.</i></p> <p><i>Proposition 9: CA brings auditors closer to relevant events, and consequently brings the auditor closer to the internal control function, generating potential risks to the independence of internal auditors.</i></p>	

Next section analyzes the result of interviews carried out with internal auditors, documents collected, and observations made in the field. Although the constructs were presented in the following order: i) antecedents; ii) use and satisfaction; iii) net benefits, the present research chose to present first findings about how the use and satisfaction of the CA model occurs, since it is necessary to understand this use so that the analyzes that follow can become more understandable.

In this way, the search results that are presented in the following sections are ordered as follows:

- i) Continuous Audit at GAPES: the models currently performed (Use and Satisfaction with Use);
- ii) Background of Acceptance of the Continuous Audit at GAPES;
- iii) Net Benefits from the Continuous Audit at GAPES.
- iv) Discussions about theoretical propositions and thesis declaration.

4.3 CONTINUOUS AUDIT AT GAPES: MODELS CURRENTLY PERFORMED

In this section, it is presented how the use and satisfaction with the use of CA occurs within GAPES. We chose to present the use first (before the discussions about the antecedents of use) because we understand that it becomes simpler to understand the results found in the present research. Understanding how use occurs and how CA is operationalized is essential so that the necessary associations between antecedents and net benefits can be understood.

The use of CA within GAPES currently occurs on different fronts and has evolved over the last few years. Several internal auditors were involved in the maturation of this methodology, which is conducted through various Audit Trails. GAPES uses the nomenclature

“Audit Trail”, in accordance with the term used by the Brazilian Office of the Comptroller General (CGU).

Although some internal auditors (more data-oriented) operationalize their own audit trails and do their own analyses, all internal auditors are part of the general CA model, which mainly involves the so-called Continuous Payroll Monitoring (*Monitoramento da Folha*). Thus, it can be said that CA is used both collectively and individually. The use of CA in PEESC demonstrates that in fact organizations might have different intensity of use, reinforcing some evidence from literature (Protiviti, 2017).

Payroll Monitoring has been carried out at GAPES for at least ten years, and is considered the most important function of this management, as highlighted by some internal auditors.

We can say that the flagship of our work is the Payroll Monitoring, which is carried out every month (...). This work was done from the beginning, using SQL, right? Our [data-oriented auditor] who did the data extraction, ran some audit trails, and then sent these results for us to analyze. (E5)

O carro chefe dos nossos trabalhos a gente pode dizer que é o Monitoramento da Folha, que é realizado todo mês (...). Esse trabalho era feito desde o início, com a utilização de SQL né? O nosso [auditor voltado a dados] que fazia a extração dos dados, rodava algumas trilhas, e aí largava esses resultados para gente analisar. (E5)

importance should be given to [Continuous Monitoring]. This type of work should never be relegated, it should always have space in the annual planning, combined with special audits, but a slice of the working hours should go to the CA. (E1)

deve ser dado a importância [ao Monitoramento Contínuo]. Nunca deve ser relegado esse tipo de trabalho, ele sempre deve ter espaço nos planejamentos anuais, combinado com auditorias especiais, mas uma fatia das horas de trabalho com certeza deve ser direcionada para a AC. (E1)

Monthly continuous monitoring practices have been carried out at least since the early 2000s, when data began to be structured more appropriately for the purposes of a CA. The first audit trails that existed until then were still executed within Excel, crossing the data available at that time. With the arrival of new auditors in 2006, new analytical auditing tools and software began to be incorporated into the process, such as ACL Galvanize (ACL Analytics at that time), the use of database management tools, such as Access, and other tools that allow data extraction, transformation and loading (ETL) such as QlikView. QlikView also allows the creation of analytical dashboards, as well as Power BI, another system that has gradually been incorporated into the work of auditors at the CGE.

E3 highlights this evolution, pointing out that CA started to help traditional audits. This initial step of automating traditional auditing processes in building a CA model is highlighted by Vasarhelyi et al. (2009), Vasarhely, Alles & Williams (2010) and Vasarhelyi et al. (2012).

First, data analysis was established to carry out traditional audits. It was seen over time that the [ACL Galvanize] tool could be used for other purposes, for auditing not just after problems happened. So we started to do some analysis in anticipation of monitoring during the preliminary information itself. It was a small beginning there (...) it culminated in what we have today. (E3).

Primeiramente estabeleceu-se a análise de dados para fazer auditorias tradicionais. Foi se vendo com o passar do tempo que a ferramenta [ACL Galvanize] poderia ser usada para outros fins, para um trabalho não só depois das coisas acontecerem. Então começamos a fazer algumas análises antecipando no próprio monitoramento da prévia. Foi um comecinho ali (...) culminou no que se tem hoje. (E3).

E3 also highlights that at the beginning the analyzes were simpler and sporadic, focused on “verifying some inconsistencies in the legislation, duplicity of payments, something that occurred a lot in PEESC”. With a greater understanding of the technologies and data, internal auditors realize the potential to perform further analysis, closer to relevant payroll events. Subsequently, the Variations Audit Trail (called Payroll Monitoring) was created, which compare the positive variations that occurred between one month and another, still during the preliminary payroll (before the Definitive Closure and in time of preventing incorrect payments).

According to SEF Process 12905/2017 (08/10/2017), in 2017, negotiations began on a new improvement in the payroll monitoring process. Spearheaded by three internal auditors and the Personnel Audit Manager at the time, the project sought to optimize the processes in order to identify outliers. Also, to check possibilities of how to address the problems directly with human resources divisions - that is, audit evidence was supposed to be send directly to the entities responsible for the payroll.

Structuring the data currently used by GAPES also took place over the last two decades according to the demand/need of human resources divisions and GAPES. Much of this demand came from the internal auditors themselves, who saw the need to have access to timely updated data so that the analyzes could be carried out even before the payment to the public servants were made – that is, that the data were available before the definitive closure of the payroll. Until almost 2010, auditors had to use only the ready-made reports from SIGRH, which greatly

limited the work of a data-oriented audit, since reports from management systems are not usually adequate for control and audit purposes.

The data used by auditors are currently available on an online platform (database) called BoaVista. BoaVista is a bigdata platform built on the Apache Hadoop framework, which has a database management system, built into the system itself and available online (using Impala Cloudera).

An overview of BoaVista can be seen in Figure 14.

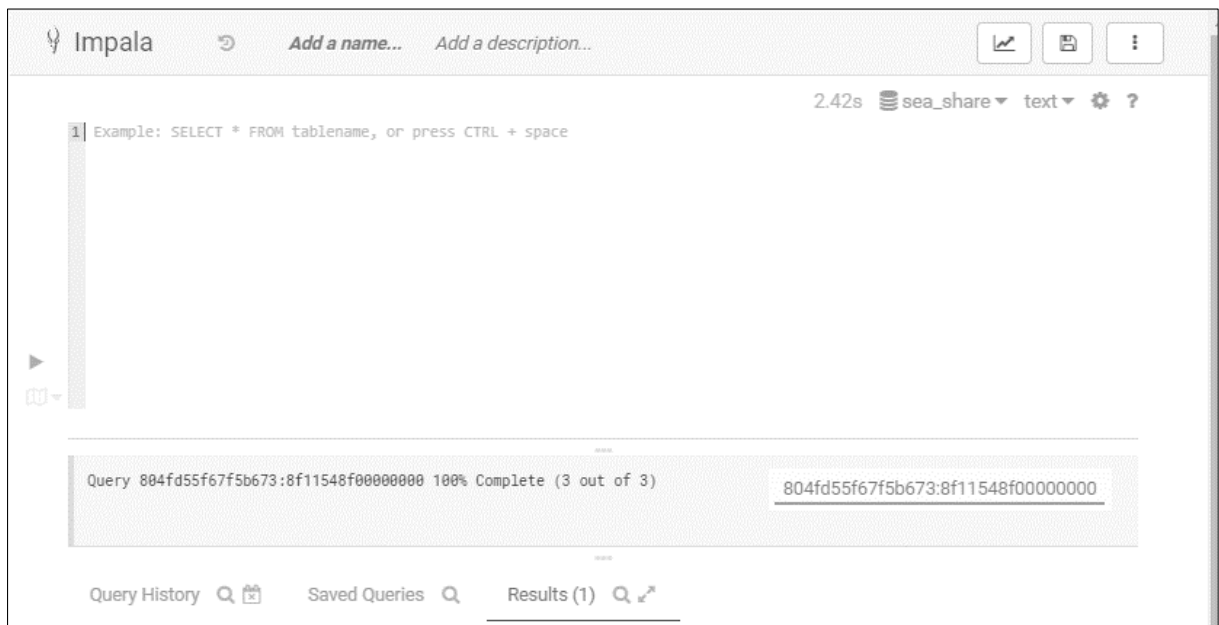


Figure 14 - BoaVista Overview

The expression “Example: SELECT * FROM tablename” is where the auditors can perform queries in the database via Standard Query Language (SQL). SQL is a computer language that allows internal auditors to communicate with the database, allowing auditors to perform filters and to compare information in multiple tables. An advantage of BoaVista is its high agility, its high processing power and the fact that it allows internal auditors to perform database queries online, directly within the tool. Much information regarding the payroll can be retrieved from BoaVista, instead of retrieving information from SIGRH. BoaVista also allowed scalability in the functions of filtering, transforming and extracting data and consequently creating audit trails.

Information available on BoaVista, in turn, is extracted from two different locations: a) directly from the payroll system database (SIGRH); and b) from another database called Extrator (It means “Extraction”, in English). Extrator, in turn, retrieve information directly from

SIGRH. For many years it was the only database internal auditors had at their disposal. In addition to having a platform where internal auditors can make their queries directly in the database, BoaVista also has a larger number of tables and a larger set of data available. In addition, BoaVista joined several tables from the Extrator into a single table (called `pagamento_funcional_poder_executivo`), which facilitate the analysis of internal auditors. Using queries directly in this table, auditors can access a wide set of public servant data, such as, payment items of that public servant, total amounts, payment index (which can be in days, hours or percentage), retirement date and other public servant data in a single table. In the Extrator, the data must be accessed via Open Database Connectivity (ODBC), which is a specification that allows the interface with the data available in the Extrator. To consult the Extrator data, internal auditors need to use and configure ODBC to connect with the SIGRH database, through ACL or Excel (in the case of GAPES, these are the two systems used). This is not necessary via BoaVista, as the query is carried out directly in its own database management system, as presented earlier. In this way, internal auditors only have indirect access to SIGRH data, regardless of whether via Extrator or via BoaVista.

Besides, Extrator or BoaVista are not property of internal audit. Extrator responsibility are shared between the central human resources department, the state-owned company of technology from State of Santa Catarina and the private company responsible for SIGRH maintenance. BoaVista in turn is the sole responsibility of the state-owned company. Figure 15 shows the flow of data extraction from SIGRH until they reach the internal auditors.

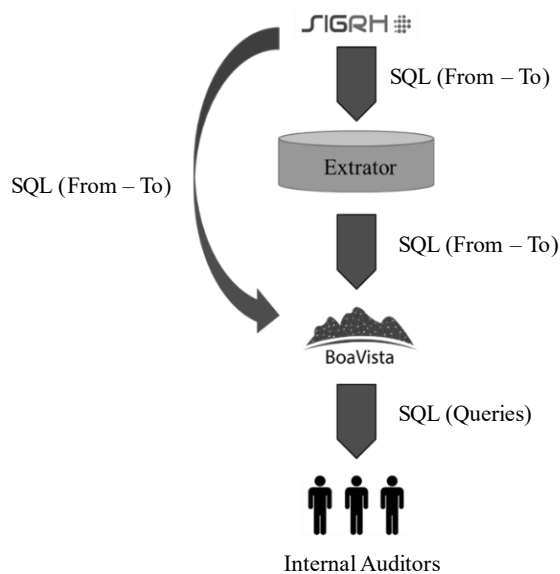


Figure 15 – Data Extraction (Extrator and BoaVista)

Thus, GAPES do not use built-in audit modules (Alles et al., 2006a) to carry out the CA. This means that the analyzes performed by the CA do not occur directly within SIGRH, and are therefore operationalized in an external database, which mirrors part of the SIGRH data. In addition to not having direct access to SIGRH, GAPES also does not own this platform (BoaVista). Therefore, auditors limit themselves to using only the data that is available in these systems. With the data available via Extrator or BoaVista, the internal auditors run their audit trails. A summary of the audit trails used in the CA is shown in Figure 16.

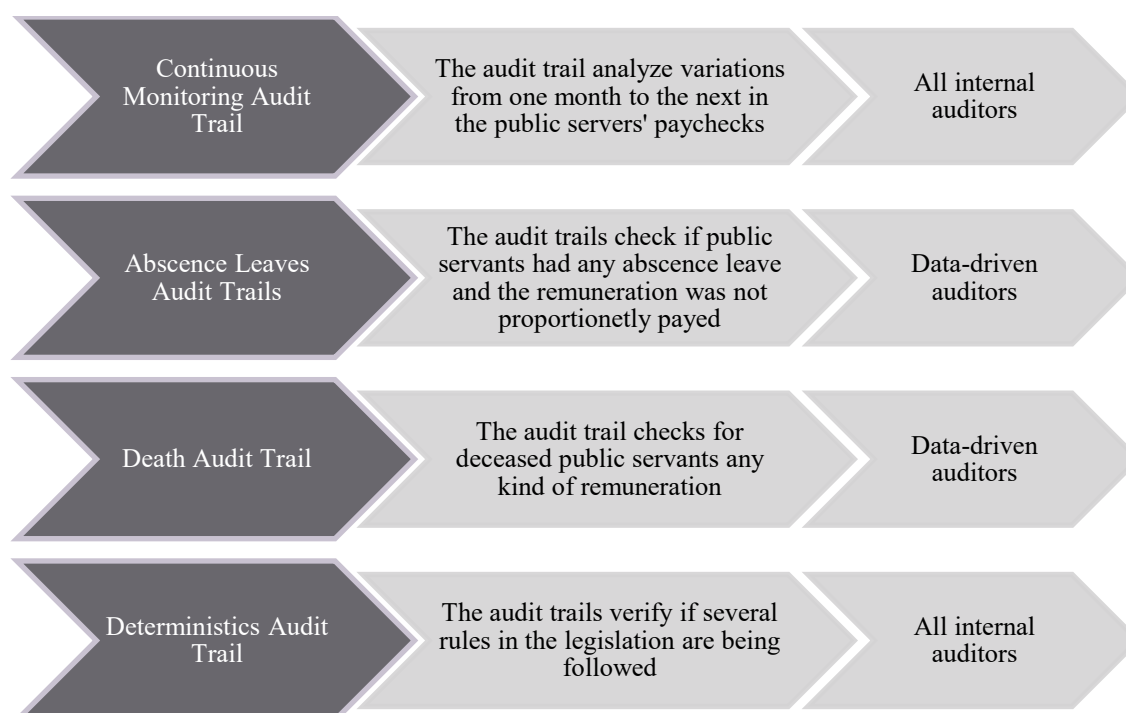


Figure 16 - Audit Trails Summary

4.3.1 Continuous Monitoring Audit Trail

Continuous Monitoring Audit Trail is based on the evidence of atypical variations in the payroll from one month to another. Used for more than a decade by internal auditors, it has already been able to timely identify a set of problems. It is still performed during preliminary payroll – a time lapse during the month that human resources divisions are still able to input more data on SIGRH and DGDP is usually doing tests on the monthly database to check for inconsistencies and integration issues. E3 explains how the audit trail is designed.

The audit trail verified variations above R\$ 3500 from one month to the next month. If it goes over that amount, it falls on the track for analysis, and then is send to auditors for analysis. (E3)

A trilha verificava as variações acima de R\$ 3500 de um mês para o outro. Se passa daquele valor cai na trilha para análise, e isso é passado para os auditores analisarem. (E3)

Monitoring these variations even during the preview payroll allows auditors to highlight abnormal situations and inconsistencies before they are actually paid to public servants. The exact date internal auditors execute the audit trail varies from month to month, as the date that the payroll is closed (human resources department can't input new information on SIGRH) has variations over the months. Besides, internal auditors don't have full control about the date that the extraction of this information will happens. Nevertheless, Continuous Monitoring Audit Trail is usually performed between the preliminary payroll and the partial closure. After the partial closure, human resources divisions from State Departments can't input anymore data on SIGRH that would affect payments for that month. The dates on which the payroll was made available in the year 2021 can be seen in Table 11. For example, in October 2021, the human resources sections and sectors had until October 15th to input all data in the system, so that any payments and deductions could still occur within the month of October. After that, human resources sections and sectors should not, a priori, make further changes.

Data are usually available to the auditor one or two days after the date that the preview payroll is available in SIGRH (these two days are necessary, because as already mentioned, data are extracted from SIGRH via Extrator, and then extracted a second time to BoaVista). Because they use a huge amount of data, these extractions take some time to be performed. Thus, in Continuous Monitoring, internal auditors have approximately one or two days to carry out their analyzes (sometimes they only have half a day), and the sectorial or those responsible who will receive the internal audit recommendations, usually also have one or two days to verify the auditors' recommendations, fix the problems or justify the reason of that variation.

E1 highlights this process.

The CA takes place in the preliminary processing phase, which is when the human resources divisions have already imputed their information into the system and the report is produced [via ACL Galvanize] of the main variations by enrollment. Enrollments that had greater positive variations, excluding some events (for instance, vacations) (...) these events [types of payments] are withdraw from the analysis to prevent a vast number of false positives (E1)

A AC ocorre na fase do processamento da prévia, que é o momento que os órgãos setoriais e seccionais já inseriram suas informações no sistema e é produzido o relatório [via ACL Galvanize] das principais variações por matrícula. As matrículas que tiveram maiores variações positivas, excluindo alguns eventos (por exemplo, férias) (...) esses itens ficam de fora para não ter um volume muito grande de

resultados. Partindo daí é feito um corte do valor das variações positivas e distribuída pela equipe para fazer o trabalho. (E1)

Items that internal auditors understand that should be excluded from the audit trail were gradually suggested by the internal auditors over the years. These suggestions were mainly based on several analyzes carried out during this period, which indicated that such items were never or rarely associated with inconsistencies.

The Continuous Monitoring Audit Trail flow is summarized in Figure 17.

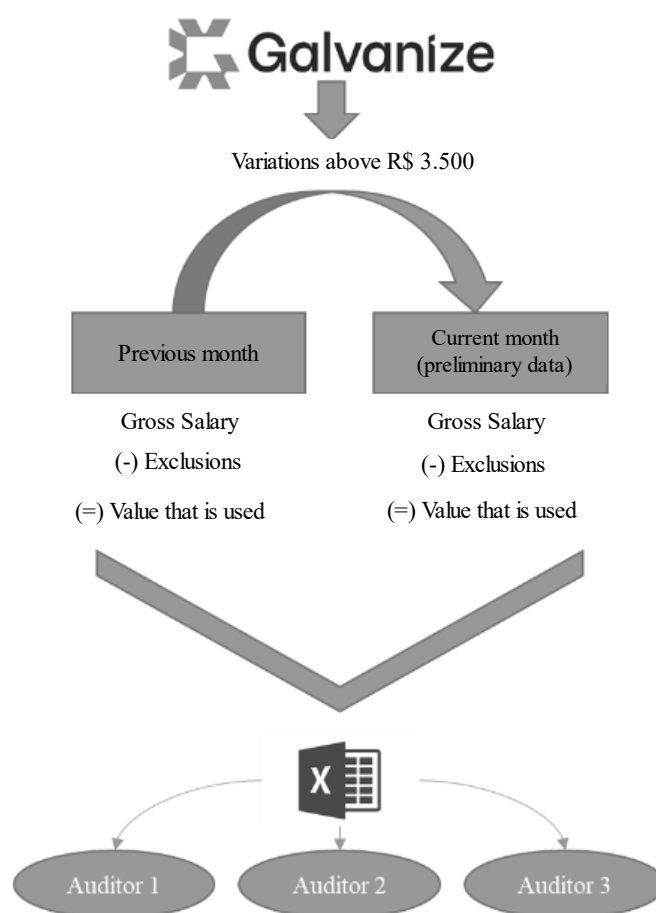


Figure 17 - Continuous Monitoring Audit Trail Flowchart

The operational flow of the trail begins with the execution of the script within the ACL, which was prepared by one of the internal auditors and is currently responsible for maintaining the audit trail. One of the greatest initial difficulty in building this audit trail is mastering the tool used (ACL in this case), understanding the existing relationship between tables from the database, and building the script to be executed. Once this step is completed, the effort to run the audit trail periodically is minimal, and the only information that the internal auditor needs to input to run the audit trail is the month of analysis. After executing the trail in the ACL, the

results are then inserted into a folder on the internal server. These findings (anomalies) are then forwarded to each internal auditor by the audit manager. Usually, each internal auditor is responsible to analyze situations from a particular State Department that they have more knowledge (SED, CGE, etc). Due to the limited number of internal auditors, it is not possible to analyze all the anomalies. Usually, only the largest variation values found in the month are analyzed.

As it is based on analyzes of atypical variations, the audit trail is not deterministic, and therefore, it generates a large volume of possible inconsistencies. This large (around 400 cases per month) is partially analyzed by the internal auditors. From this analysis, items that could suggest inconsistency are rarely identified, as reported by internal auditors and by observations made in the field. This process demands intense manual work, as internal auditors constantly need to access information about the public servant within SIGRH to search for possible explanations for the variations.

Continuous Monitoring Audit Trail was one of the main trails to be executed within GAPES for many years, involving almost all internal auditors from GAPES during this time. Mixed comments were evidenced with the satisfaction of using this audit trail. Some internal auditors think that the Continuous Monitoring Audit Trail, when performed in the preview, allows internal auditors to have a comprehensive view of the PEESC payroll. However, they reported that it requires extensive manual and time-consuming work, which often did not become any audit findings – in other words, it brings too many false positives.

Over the years, some internal auditors began to expand their knowledge of data analysis and because of that the CA model also became more mature, as reported by E3.

then we started to create other audit trails for other analyses. Retroactive payments or irregular payments. We also elaborated some analyzes to verify manual inclusions in SIGRH (E3)

depois a gente começou a criar outras trilhas de outras análises. De retroativos, de restituição ao erário, de pagamentos irregulares dessas funcionalidades. Uma análise para verificar as inclusões manuais do SIGRH (E3)

Thus, in addition to the Continuous Monitoring Audit Trail, which usually involves all internal auditors, including the GAPES manager, there are CA methodologies performed individually by data-oriented auditors. These auditors usually have more knowledge of extraction techniques, data analysis, and specialized auditing systems, such as ACL (Galvanize) or database language, such as SQL.

4.3.2 Absence Leaves and Death Audit Trails

Absence Leaves Audit Trail consists of the verification of many situations of absence leaves (sick days, vacation, long term disabilities, etc.) within the PEESC. Public servants can be removed from their duties for multiple reasons. For example, public servants can i) leave permanently – that is, when employee ceases his relationship with PEESC; ii) temporarily paid leave - that is, when public servant temporarily take a leave, but is still entitled to his remuneration (or at least part of his remuneration as some payments can only be paid to employees who are effectively performing their duties); iii) temporarily not paid leave - that is, when the employee take a leave for some reason and he does not entitle to receive any remuneration. These are some examples of leave situations that need to be assure by management and by internal audit.

Inconsistencies might occur because, in certain situations, information about the absence leave of the public servant is only inputted in SIGRH after the payroll is already processed, that is, after payroll is already closed. In these cases, SIGRH cannot calculate the proportional value of that month for the employee, and usually pays incorrectly his full remuneration. Naturally, the human resources departments should assure such situations and request employees to pay back to PEESC on a subsequent payroll, or via a reimbursement process. However, this does not always occur and for this reason these audit trails are necessary.

Considering all types of possible leaves, including retirements, deaths, vacations, sick leave, etc., in March 2022 alone, 35,230 leaves happened in the PEESC, from 26,279 different public servants, in April, we found 31,674 leaves, out of 24,030 different employees, and in May, 39,388 leaves from 28,528 different employees (according to data from BoaVista). A public servant can have multiple absences (leaves) in the same month. This includes vacation leave, absences, sick leave, maternity leave, unpaid leave, etc. As can be seen, PEESC has a considerable amount of leaves over the months. Managing all these leaves requires a high level of effort and involves considerable risk to internal control and auditing.

Absence Leaves Audit Trails have always been performed by a data-oriented auditor, who, in addition to being responsible for the entire construction of the scripts (in ACL), is also responsible for analyzing and communicating inconsistencies, as well as doing the follow up of these inconsistencies.

The data-oriented auditor performs different Absence Leaves Audit Trails, since for each type of leave it is possible to have a specific rule. An example can be seen next (Definitive Absence Leave Audit Trail).

The Definitive Absence Leave Audit Trail verifies if inclusions of definitive leaves (cases in which a public servant will stop working in PEESC) were carried out in the SIGRH after definitive closing of the payroll. Definitive leaves can occur through exoneration, retirement, dismissal upon request, death, etc. The audit trail is executed monthly, and it checks all records of permanent leaves of the public servants (except for retirement and deaths) included in the SIGRH after the definitive closing date of the previous month, and whose leave start date happened before the first day of the current month. To be executed, it is necessary that the payroll of the current month is closed and the database available in BoaVista for the internal audit, as the audit trail also checks if in the subsequent (current) month of the inclusion of the leave occurred, public servants return incorrectly payment to PEESC.

For instance, if human resources divisions input information about the permanent leave of the employee on October 25th and the closing of the definitive payroll happened on October 22nd, and the leave of the public servant started at October 23rd, the employee should receive the remuneration of that month proportional to 23 days. However, as the payroll is already closed to input any more information (that would have reflections on that current month), the public servant will receive 100% of its remuneration improperly. In November, when the termination labor contract occurs, the human resources department can request the return of the amounts paid in excess (in the example, 7 days) to the employee, although this procedure is not always performed by human resources divisions. An internal auditor then runs the audit trail (usually via ACL) between the middle of November (if using data from the preview), or the end of November or beginning of December (if using data from the definitive payroll). In Figure 18 is the exemplification of what we mentioned before.

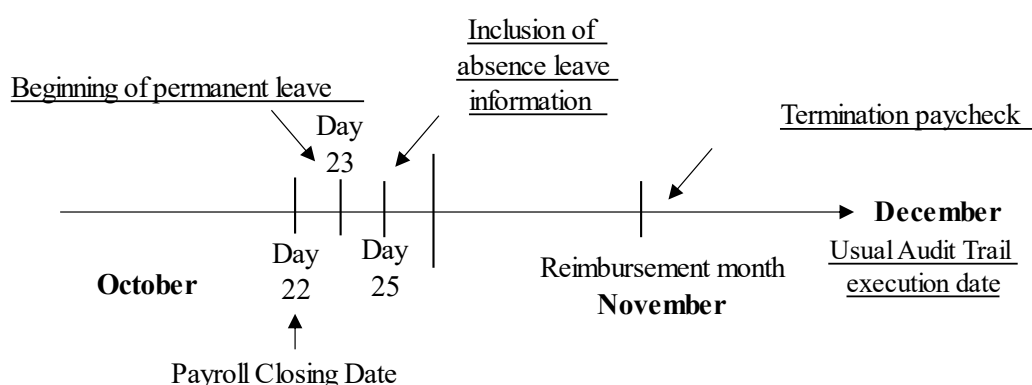


Figure 18 - Absence Leave Audit Trail Example

If all events mentioned in Figure 18 occurred and the public servant has not reimbursed the values in November, this situation will be understood as an exception in the audit trail. After that, the data-oriented internal auditor will carry out the analysis of the situation and will send a recommendation for the human resources division to open a process of reimbursement to the treasury. The ACL script also can automatically calculate the number of days unduly paid, although the internal auditor always evaluates (by sampling) the situations identified, in order to avoid false positives.

It is noteworthy that the start date of the leave does not always coincide with the month in which the information on the leave of the employee was included. Due to various issues in the management of these situations, it may occur, for example, that the inclusion of this information occurs months after the permanent leave, as has already been observed in previous situations. In this case, the audit trail will point out the need for reimbursement of the undue amounts of all these months, since the public servant would potentially not be entitled to these remunerations.

Another audit trail carried out and operated exclusively by a data-oriented auditor is the Death Audit Trail. The Death Audit Trail cross-references information on death records from the registry offices in Brazil (SISOBI – Sistema de Óbitos) and cross-references this information with the internal information of SIGRH. Comparing these two datasets enables internal auditors to indicate when there are deceased public servants receiving remuneration in PEESC.

Been the only audit trail to use external data, the Death Audit Trail is monthly executed. Personnel from SISOBI sent a monthly file updated according to the information sent

by the notaries and the family's own notice. Thus, usually auditors have access to this data in timely way. Another characteristic of this audit trail Figure 19.

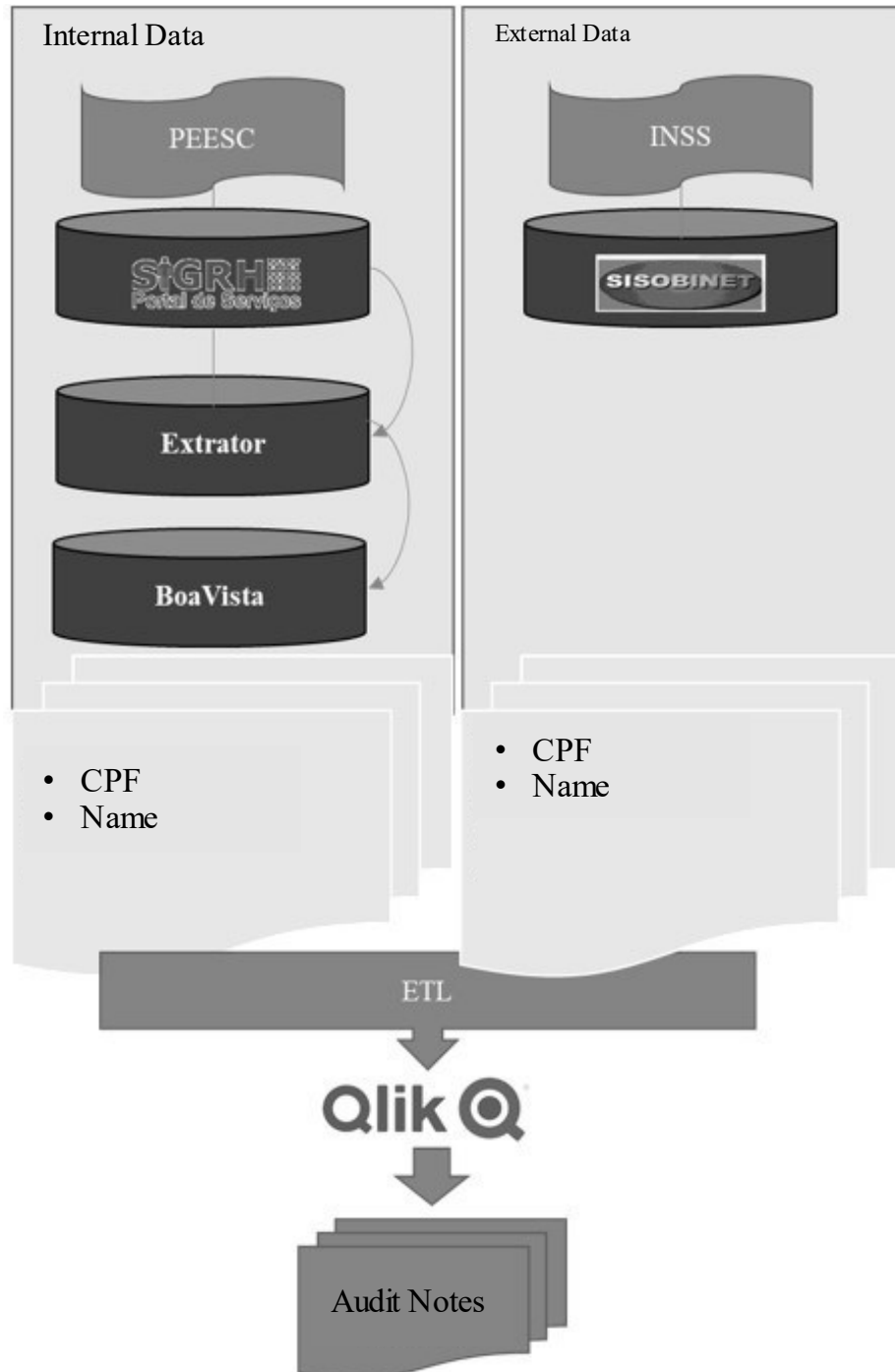


Figure 19 - Death Audit Trail Flowchart

Internal auditor responsible for the trail combine both datasets (internal and external databases) using CPF, which is a unique Brazilian identification number. The auditor loads

the SISOBI data into QlikView and then cross-checks this information with the SIGRH data. From this intersection arise the audit findings (exceptions), indicating that there are deceased employees (according to the SISOBI database) who are receiving remuneration at SIGRH. Eventually the auditor needs to look manually to confirm if there are discrepancies in the employee's name, as sometimes the CPF number in SISOBI or in SIGRH has some inconsistency. Public servant death date's information is extracted so that the number of days unduly paid can be counted, if applicable. Lastly, the internal auditor prepares Audit Notes and sent them to human resources divisions (using SGPE) so that the public servant is effectively removed from the SIGRH, and that the amounts paid unduly be reimbursed, if applicable. A very similar audit trail is executed by the Brazilian Navy, as shown in De Freitas et al. (2020).

Both the Absence Leaves Audit Trails and the Death Audit Trails are exclusively performed and analyzed by data-oriented auditors, who are also responsible for forwarding the findings to the responsible State Departments.

4.3.3 Deterministic Audit Trails

Another set of trails performed by GAPES, and which involve all internal auditors are the so-called Deterministic Audit Trails. These trails verify specific rules, mostly based on aspects of the legislation or internal rules of PEESC's payroll. Usually, scripts are written in SQL. Information's regarding this audit trails are stored within a Microsoft Word® file named Permanent Inventory of Audit Trails (DOC 10). This document gathers all the important information about each of the audit trails currently running, such as: i) audit trail criteria; ii) related legislation; iii) parameters; iv) SQL script; v) name of internal auditors who validate the audit trail; among other information.

SQL is executed in within BoaVista database management system, which allows all results to be exported to an Excel spreadsheet. Exceptions are then copied to a folder inside the CGE internal server, where internal auditors can access, perform their analysis and make the necessary referrals. Figure 20 demonstrate the flowchart of the Deterministic Audit Trails.

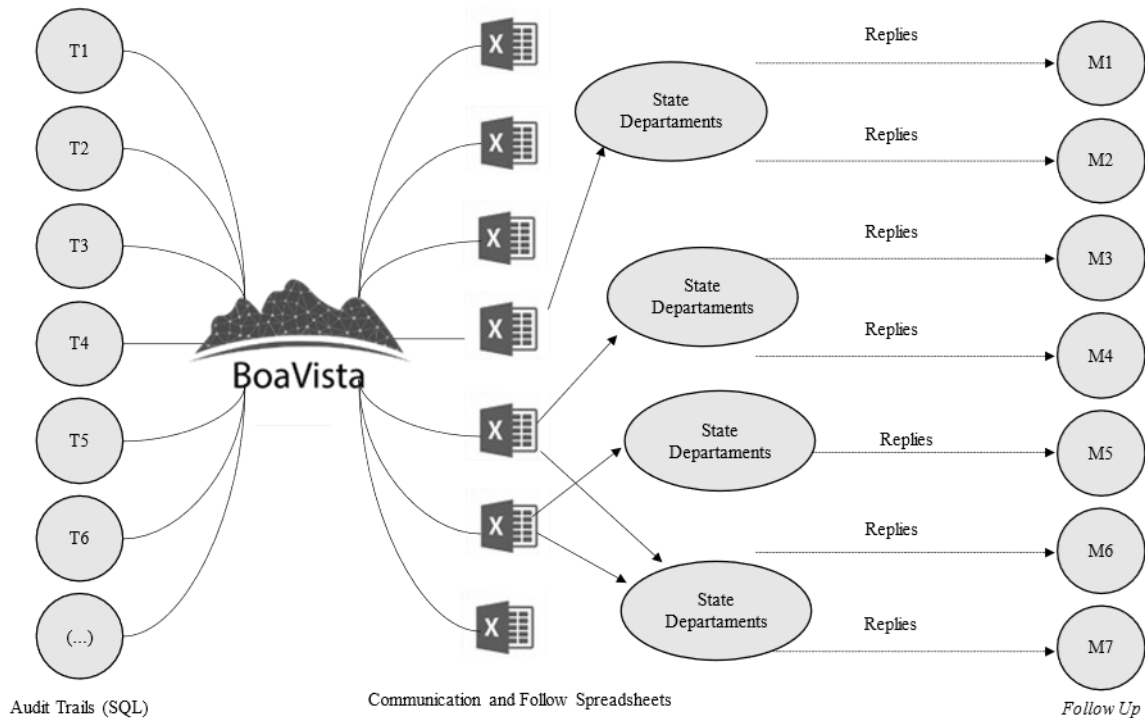


Figure 20 - Deterministic Audit Trails Flowchart

The biggest difference between the Deterministic Audit Trails and the Continuous Monitoring Audit Trail is that the results of the audit trails (exceptions), a priori, can be directly forwarded to human resources divisions. As Deterministic Audit Trails are prepared in accordance with different rules of legislation and, before being put into production, undergo intense validation by GAPES' internal auditors, the number of false positives is quite low. In this validation, auditors verify if the audit trail criteria are valid and if the outcomes (exceptions) are in fact pointing to what should be pointed out.

This validation is a fundamental part of the success of these audit trails, and validations issues can lead to the discontinuity of the model, as has happened in the past.

We had already tried to do something new, build some audit trails [in the past]. There was a time when an IT from [the state-owned technology company] worked with us, together with the [data-oriented auditors]. We managed to build some deterministic audit trails, but in the end, it didn't evolve either because we needed to refine [to validate better] those audit trails and it didn't work. (E5)

Nós já tínhamos tentado fazer algo novo, construir algumas trilhas. Teve uma época que veio um analista da [empresa de informática do Estado], trabalhou com a gente ali, junto com os [auditores voltados a dados]. Conseguimos construir algumas trilhas, mas no final das contas não evoluiu também porque precisava refinar aquelas trilhas e a coisa não fluiu. (E5)

While the validation process can be time consuming and laborious, it decreases the likelihood of false positives, although it does not eliminate them. The validation flow adopted by GAPES can be seen in Figure 21.

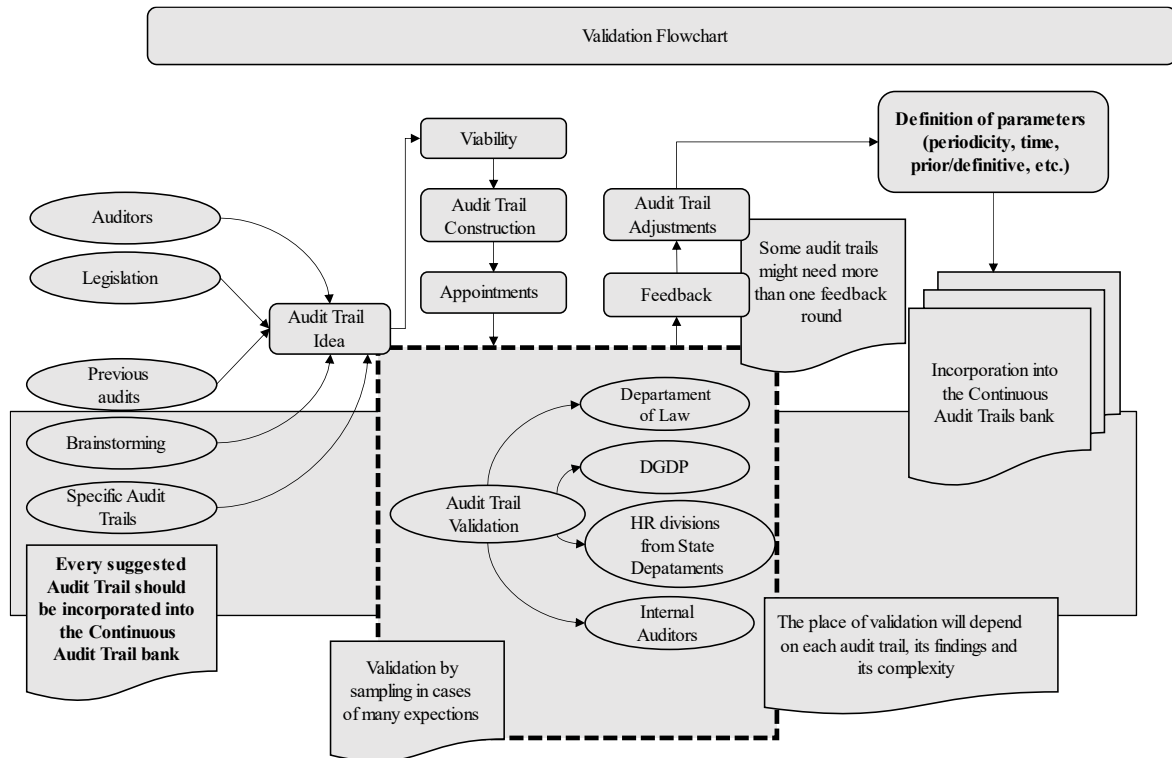


Figure 21 - Deterministic Audit Trails Validation Flowchart

Although these Audit Trails are called deterministic, false positives can still arise, mainly due to legislative exceptions or judicial decisions that modify some interpretations about the viability or not of a certain payment. Because some of these exceptions are difficult to incorporate into the audit trail criteria, as in some cases exceptional payments may legally occur for a single public servant or for a specific group of public servants, the audit trail does not eliminate the likelihood of false positives. Still, these audit trails usually reduce the risk of false positives to an acceptable level according to internal auditors. Kogan (2014) points out that there are two important types of irregularities in business processes: i) those that are violations of deterministic business process rules; ii) and those that are statistically significant deviations from the expected behavior of the business process. These audit trails can be fitted into the first group presented by Kogan (2014). As also highlighted by Kogan et al. (2014), exceptions

should demand evaluation and immediate response. Related issues with problems in the feedback by the auditees are presented in next sections.

Due to problems in the delay in the availability of preview data (preliminary payroll), deterministic trails are always executed in the definitive payroll, usually at the beginning of the month, as soon as the database in BoaVista becomes available. In July 2022, internal auditors had fifty deterministic audit trails already validated in their Inventory, which were being executed monthly.

4.3.4 Communication and Follow Up Process

Communicating process of CA anomalies or exceptions are usually done to the human resources departments via telephone, e-mail or Whatsapp. Internal auditors prefer to use these types of communication, because anomalies usually require timely action on the part of the human resources divisions. Traditional communication processes, such as Audit Notes or Audit Reports, which usually take more time to prepare, are avoided within this methodology, although they do occur in some cases.

However, this communication process increases the challenges in carrying out the follow-up process. Follow up of CA outcomes are usually done using Excel spreadsheets (Example: TRILHA_Monit_Rem_202012 – DOC 5) or even in the internal auditors' E-mail. Therefore, each internal auditor is generally responsible for monitoring the findings on their own.

4.3.5 Identified Elements of Satisfaction with Use

Satisfaction with the CA model is viewed in a mixed way within GAPES. Although all internal auditors understand the model as important, there are many obstacles that seem to influence its satisfaction. Satisfaction with the model can be divided according to the type of the audit trail and by the type of auditor.

In general, internal auditors showed greater dissatisfaction with the Continuous Monitoring Audit Trail, mainly due to the need to perform manual tasks and the low number of findings.

[Continuous Monitoring Audit Trail] was still very rudimentary. The trail selected the paychecks that extrapolated a certain amount, took the payroll information of the current month, the previous one, and compared it with the final payroll of the previous month. Any variation that exceeds R\$3500 pops up on the trail, for whatever reason (...) there were months when you had 500 paychecks for each auditor to analyze. Then

it was necessary enter the SIGRH, paycheck by paycheck, assess whether that variation had any irregularities. It was not possible to analyze all and we basically had to trust in our own judgement. So we knew that it was very rudimentary (E5).

[o Monitoramento da Folha] era algo muito rudimentar ainda. Selecionava os contracheques que extrapolavam determinado valor, pegava a folha do mês atual, da previa, e comparava com a folha definitiva do mês anterior. Qualquer contracheque que ultrapassasse R\$ 3500 caía na trilha, por qualquer razão (...) tinha mês que você tinha 500 contracheques para cada auditor para analisar. Então era necessário entrar no sistema, contracheque a contracheque, avaliar se aquela variação ali tinha alguma irregularidade ou não. Não dava para analisar todos e a gente ia no feeling. Então a gente sabia que aquilo estava muito rudimentar. (E5)

Of course, as the value was very low, R\$ 3500, the universe was very large that had to be analyzed. And as you had to do it manually, you had to enter enrollment by enrollment in the system, so it was very time consuming. (E7)

Claro que como o valor era muito baixo, R\$ 3500, o universo era muito grande que tinha que ser analisado. E como você tinha que fazer manualmente, tinha que entrar em matrícula por matrícula no sistema, então era muito demorado. (E7)

Internal auditors also reported positive aspects about this audit trail, showing a certain level of satisfaction with the model. The main findings we found about this satisfaction concern the possibility of avoiding payments and the scope achieved with the trail, that is, the possibility of showing any type of irregularity.

In general, auditors believe that the current CA model could be improved, and several organizational obstacles end up generating dissatisfaction.

if you wait for things to happen at the normal pace, that's the time we've taken since we got here. We ask for improvement, to hire more auditors, than we can go to the data analysis audit and things don't work out (E3)

se ficar esperando a coisa acontecer no ritmo normal, é esse tempo que a gente já levou desde que a gente entrou aqui. Pede a melhoria, que traga mais auditor, que vamos partir para auditoria de análise de dados e a coisa não anda (E3)

Possible improvements in this model are listed as reasons for satisfaction, as can be seen in the statements of E7.

[the improvement of the model] will relieve stress and give more satisfaction in verifying that what we are creating a model that effectively brings results and identifies the problems. (E7)

a melhoria do modelo] vai desestressar e dar mais satisfação em verificar que aquilo que estamos criando um modelo que efetivamente traz resultados e identifica os problemas. (E7)

It is noticed that the more the CA manages to be more effective in bringing results and identifying the problems more precisely, the greater the satisfaction with the model. Due to these characteristics, great satisfaction with the deterministic trails was evidenced by practically all internal auditors, especially because of this characteristic: accuracy in their results.

Data-driven internal auditors showed signs of dissatisfaction with traditional auditing models, and this dissatisfaction was always associated with greater satisfaction with the CA model – regardless of the model executed. These auditors criticized the usually barely palpable results achieved by traditional audit, in addition to the length of the process, which can often take years. Dissatisfaction with traditional audit is most acutely perceived by internal auditors who are more data-driven. In this way, dissatisfaction with the results of traditional audits is perceived as a driving force for CA.

4.4 ANTECEDENTS OF ACCEPTANCE CONTINUOUS AUDIT

This section presents the CA acceptance antecedents identified within GAPES and how they affect this acceptance. It is noteworthy that the acceptance of CA depends on numerous elements, and that these elements may or may not be perceived differently by each user, as already highlighted by previous works (Bradford et al., 2020). In addition, the way in which each auditor perceives the effort required or what organizational conditions are sufficient for the adequate performance of the CA also varied from auditor to auditor (Bonsón & Borrero, 2011, Vasarhelyi et al. 2012, Miranda, 2018). Specifically, differences were seen among the more data-oriented auditors, who are auditors who have more knowledge about the technological aspects involved in the operationalization of CA.

In this research, the acceptance of CA is composed only by the categories of use and satisfaction with use. CA is already used and is part of the daily routine of the internal auditors, and therefore, it would not be possible to also try to understand the intention of using the CA by these auditors.

4.4.1 Continuous Audit and Performance Expectation

As the CA is already in use within GAPES, internal auditors were asked what improvements they would see if the currently executed model were more robust and automated,

with the objective of trying to capture the possible performance expectations that exist in this context.

Although the CA is operationalized at the organizational level (in this case, at the level of GAPES) and has always been performed by all the internal auditors who were part of GAPES, the results show that the impacts generated for the internal audit are different at the level of the individual. That is, there are individuals who have benefited more from its use than others. These differences seem to be related to the initial acceptance that these individuals have of this methodology and to the familiarity they have with technologies, as reported by E2.

There are many individual expectations that CA can enhance the performance of internal auditors, including in formal CGE documents. IN CGE 38/2022 (DOC 11) highlights that with greater digitization of processes and development and use of more sophisticated IT tools, the productivity of the work tends to be enhanced, and consequently related benefits.

IN CGE 38/2022 also shows that internal audit can evolve from a reactive profile, on a traditional, periodic and sampling basis, to a proactive profile, on an advanced, timely and broad basis, in which monitoring, and control of public expenditures will be carried out in real time, allowing internal auditing to immediately assess and forward to managers any possible transactions that are not in an expected standard of normality.

IN CGE 38/2022 visualizes an CA model for the entire CGE. However, as already highlighted, GAPES already has a model that has at least some of these characteristics, such as a continuous monitoring and analysis of the entire population, which in turns allows timely and preventive analyses.

IN CGE 38/2022 adds that these improvements would also lead to greater robustness and assertiveness in the execution of substantive and control tests; the decrease in the need to carry out manual tests; the simplification or automation of the data analysis process, in short, increasing the effectiveness of audit procedures.

Even with a CA in operation for two decades, there are still complaints from internal auditors the CA still has too many manual tasks.

Starting back in 2017 was when I started to have contact with this payroll monitoring, this audit model, right, which was continuous, but it was very manual. (E7)

Começando lá atrás em 2017 foi quando eu comecei a ter contato com esse monitoramento da folha de pagamento, esse modelo de auditoria né, que não deixava de ser contínuo, mas era muito manual. (E7)

E2 reinforces that automation is still not very common in the CA model, reporting that CA is “at least partially automated. When creating the audit trails, it is necessary to analyze each legislation and develop the trails [manually]” (E2).

Thus, to better understand what the performance expectations of internal auditors would be, we asked what these expectations would be in the face of a more automated CA model. With this, internal auditors report possible advantages and improvements in their performance in the case of a more robust and automated CA.

if we had a more robust model, we would be able to start working on other audit nuances. We could work with situations that are not in the payroll, but that are also the scope of audit (...) we could start to work in a form of management evaluation (...) to have a work more linked to management and management criticism (E2).

se tivesse um modelo mais robusto, a gente ia poder começar a trabalhar outras nuances de auditoria. Seria trabalhar situações que não estão em folha, mas que são escopo de auditoria também. (...) a gente começa a trabalhar de forma de avaliação de gestão (...) ter um trabalho mais ligado a gestão e de crítica da gestão (E2).

You would free up manpower to do a little more traditional auditing as well, to get out of monitoring just a little bit. Conduct operational audits, improvements in the State Departments processes (E6).

Você liberaria mais uma mão de obra para fazer um pouco mais de auditoria também, sair um pouco só do monitoramento. Fazer auditorias operacionais, melhorias nos processos dos órgãos (E6).

We will be able to better determine the financial benefits of the audit itself. We leave the guesswork behind and go straight to the concrete numbers, right? I think the optimization of time, right. Better information management. Bring more agility to the work (...) I think it's always a matter of time, right? The more automated, the more spare time left. And the organization of information is an issue that the more automated CA will allow us. (E7)

A gente vai conseguir apurar melhor os resultados financeiros da auditoria em si. A gente sai um pouco do achismo e vai direto aos números concretos né. Eu acho que a otimização do tempo né. Melhor gerenciamento da informação. Trazer mais agilidade para os trabalhos (...) eu acho que sempre a questão do tempo né. Quanto mais automatizado, mais tempo sobra. E a organização das informações é uma questão que a AC mais automatizado ela vai nos permitir. (E7)

E2 highlights that greater automation would allow expanding the scope of internal auditing, moving away from the control function and going to a management assistance function, which, as the auditor himself reports, due to current demands this is not possible to be carried out, at least not at the desired intensity.

E3 reports, however, the challenges mainly regarding human resources for the maintenance of these automated systems.

I think that automation will undoubtedly improve our analyses. But I see a problem that is the creation and assembly of this automation, right? Which is not such a simple thing to do, if you don't have people with knowledge in the tool that will use technology to automate it. So, today we have few people who know how to automate audit analyses, now I see potential, right? I have always advocated the use of ACL, although we are now using SQL within BoaVista to automate these analyzes (E3).

eu acho que automatização sem dúvida ela vai melhorar nossas análises. Mas eu vejo um problema que é a criação e montagem dessa automatização né? Que não é uma coisa tão simples de fazer, se não tiver pessoas com conhecimento, sei lá, na ferramenta que vai usar de tecnologia para automatizar isso. Então assim, hoje a gente tem poucas pessoas que conhecem como automatizar as análises de auditoria, agora eu vejo potencial né? Eu sempre defendi o uso do ACL, embora a gente esteja agora usando o SQL dentro do BoaVista para automatizar essas análises (E3).

E3 also adds that today there are tools within the PEESC that would allow greater automation of the CA process, but that the major obstacle for this to become a reality is the lack of human resources, time, training, costs involved and management support to make the ACL is an official tool for this kind of work.

I always advocated [for ACL] and from the events I attended that I got to know the ACL analysis tool. Man, it has all this automation, including referrals, communication, workflow, follow up, which we have never explored, because we don't have time and we also need more training in this area, right? (...) So, I know that it has a considerable cost to maintain such a tool, in all its available modules (...) I don't know if PEESC is available to pay, but I think the benefit would be greater than the cost in the end. (...) I don't know if we will be able to convince the internal audit as a whole or the CGE of the use of the ACL, including as an audit management tool for the general state audit (...) But I see that automation via ACL, I think it would be the paramount for data analysis for us, for the professionalization even of continuous auditing and analysis. (E3)

Mas assim, eu sempre defendi e dos eventos que participei que eu conheci a ferramenta de análise do ACL. Cara, ela tem toda essa automatização inclusive de encaminhamentos, de comunicação, de workflow, de follow up, que nunca foi explorado pela gente, porque a gente não tem tempo e precisa ter mais treinamento nessa área né? (...) Então assim, eu sei que tem um custo considerável para manter uma ferramenta dessas, em todas os seus módulos disponíveis (...) não sei se o estado está disponível a arcar, mas eu acho que o benefício seria maior do que o custo no final. (...) Não sei se a gente vai conseguir convencer a auditoria como um todo ou a CGE do uso do ACL inclusive como ferramenta de gestão de auditoria da auditoria geral do estado (...) Mas eu vejo que a automatização via ACL, eu acho que seria o supra sumo para a análise de dados para nós, para profissionalização mesmo de auditoria continua e analise. (E3)

Thus, it is interesting to highlight certain contradictions between the interviewees' statements, because although they understand that the automation of tasks would free up more time, they understand that the lack of time does not allow the automation of these tasks. Currently, PEESC has sought automation by other means (development of its own systems).

Although we are going through a path that can also be good, the problem could be the management of that, right, of SQL, via Camunda, up front when we don't have the [IT technician] here. How are we going to start doing this and keep the maintenance, the changes that need to be made, right? With ACL, if you are well trained, you don't depend on IT (E3)

Embora a gente esteja indo para um caminho que pode também ser tão bom quanto, mas é a gestão disso né, de SQL, via Camunda, lá na frente quando a gente não tiver o [técnico em TI] aqui. Como que a gente vai passar a fazer isso e ficar com as manutenções, as alterações sendo feitas né? Enquanto o ACL se for bem treinado com equipe bem treinada, ela consegue: tu não depende de TI (E3)

In this way, the internal auditors observe different improvements in the performance of the auditors due to the automation of tasks, such as freeing up time and speeding up the completion of tasks. This is also highlighted by formal documents. However, there are difficulties for this automation to occur in the current scenario that seem to be a little contradictory: even aware that automation could generate positive benefits above its costs, and that this would result in more free time for other activities, GAPES has difficulty to achieve this automation.

Although there are ready-made software's already adopted by CGE to solve at least partially this problem, such as ACL Galvanize (or other similar tools, such as Idea), GAPES opted to develop its own tools. This has its benefits, especially about flexibility, in line with what was presented by Alles et al. (2006a), but it also has its challenges, as it necessarily depends on people specialized in IT who can provide adequate support to this structure, as presented in the section on Facilitating Conditions.

In addition, the contradiction between the lack of time for automating processes and audit routines (which could generate give more free time for auditors) may also be due to the effort required, especially the initial effort required for this automation. Some characteristics of this effort can be seen in the following section.

4.4.2 Continuous Audit and Effort Expectation

4.4.2.1 Individual and Collective Efforts

Effort expectancy can be understood as the degree of ease associated with using a given system (Davis, 1989, Venkatesh et al., 2003). As with different technologies, it was observed that the effort required is an important category that interferes with the use and satisfaction with the use of CA. This effort, as demonstrated, seems to depend on a set of individual and organizational characteristics.

Most internal auditors who are not data-driven reported difficulties in learning data-oriented auditing techniques, use of databases, and even some difficulties with Excel spreadsheets, as can be seen in the speech of E7 and E1. At least part of this difficulty may be related to the profile or skills inherent to these individuals.

I have 100% difficulty. I know how to work with an Excel spreadsheet, when the data comes to me I can work, but not with SQL, Python, these data analysis tools I don't have any mastery of it. (E7)

Tenho 100% de dificuldade. Sei mexer em planilha de Excel, quando o dado chega para mim eu consigo trabalhar, mas não com SQL, Python, essas ferramentas de análise de dados eu não tenho domínio nenhum. (E7)

I confess that the IT part, the data extraction part, was never my strong. In the beginning I participated more (...) but I don't have the same profile, the ability, the aptitude that [other auditors] have. (...) I had some training and I found it difficult, the ACL was difficult for me. Back then, that VLOOKUP was done a lot, it's very useful, for day-to-day work. That's not it for me either. (E1)

Eu confesso que a parte de TI, a parte de extração de dados nunca foi muito meu forte. No início eu participava mais (...) mas eu não tenho o mesmo perfil, a habilidade, a aptidão, que [outros auditores] possuem. Meu perfil não era esse. (...) Eu fiz treinamento, um curso e achei difícil, o ACL para mim foi difícil. Lá atrás se fazia bastante aquele PROCV, é bem útil, para os trabalhos do dia a dia. Também não é para mim isso. (E1)

E7 highlights characteristics such as profile, skill and aptitude, traits that are little discussed in the specialized literature of UTAUT (Dwivedi et al. 2017). Another reason internal auditors reported for not being closer to CA techniques and technologies was their education background.

Maybe because of my education background, I don't have and I never had much proximity to programming or data, right? So actually the first major contact was here at the audit itself. Even so, my work is more in the analysis than in the extraction. Because I don't have enough knowledge for that. (E4)

Talvez pela minha formação, eu não tenho e nunca tive muita proximidade com programação ou com dados né? Então na verdade o primeiro contato maior foi aqui na auditoria mesmo. Até por isso o meu trabalho é mais na análise do que na extração. Até porque eu não tenho conhecimento suficiente para isso. (E4)

Data-driven auditors, on the other hand, did not report difficulties in using these techniques.

I don't have much trouble with that. I even like it, so it's easier for me. I have challenges in knowing other systems and software, other languages. But we haven't reached that stage, so I'm not having that difficulty. (E2)

Eu não tenho muita dificuldade em relação a isso. Eu até gosto, então eu tenho mais facilidade nessa parte. Tenho desafios em conhecer outros sistemas e softwares, outras linguagens. Mas não chegamos nessa fase, então não estou com essa dificuldade. (E2)

Not difficult, but I had to study statistics again (...) and the language of the ACL, right? It is totally different, but we learn, we study and learn. (E6)

Dificuldade não, mas tive que estudar um pouco de estatística de novo (...) e a linguagem do ACL né? Ela é totalmente diferente, mas a gente vai aprendendo, vamos estudando e aprendendo. (E6)

Another characteristic of the three data-oriented auditors is that they all had previous experiences (before becoming auditors) in the data analysis area, specifically with structuring or using databases. In addition, one of these auditors has a high school specialization about databases.

Changes in accounting curriculum is suggested by different studies in the area of CA, which point out that without these changes, the automation of audit procedures may not occur as expected (Chan et al., 2018). It is also noticed that these auditors relate some difficulties directly to technological issues. E2 explores this situation, reporting that other auditors depart from the CA due to technological reasons.

I think there is a certain distance due to technology. I have experience, due to other functions outside GAPES, what I noticed is that there is a certain aversion to technology, and CA was part of the aversion. Because you can't think about CA without the use of technologies, and technology aversion is a problem. At the time I talked to some auditors to try to expand CA to other areas, and the biggest barrier is that if there is technology involved "it's up to you [data-oriented auditor]". And it wasn't, in fact the auditor needs to embrace technology, and if he doesn't embrace technology he will stay in a traditional model, it is outdated and will have a productivity below what he could have. These auditors often view CA as using technology and that other people, not them, should be using the technology for them, i.e. they just want to receive the data. But that's the mistake, in my opinion, the auditor needs to embrace technology. (E2)

Eu acho que existe um certo distanciamento em função da tecnologia. Eu tenho experiência, em função de outras funções fora da GAPES, o que eu percebia é que existe certa aversão a tecnologia, e a AC fazia parte da aversão. Porque não se pode pensar a AC sem o uso de tecnologias, e a aversão a tecnologia é um problema. Na época eu conversei com alguns auditores para tentar expandir a AC para outras áreas, e a maior barreira é que se tem tecnologia envolvida "é com você [auditor voltado a dados]". E não era, na verdade o auditor precisa abraçar a tecnologia, e se não abraçar a tecnologia ele vai ficar em um modelo tradicional, ele está desatualizado e terá uma produtividade abaixo do que poderia ter. Esses auditores visualizam a AC muitas vezes como o uso de tecnologia e que outras pessoas, e não eles, devem usar a tecnologia para eles, ou seja, eles só querem receber os dados. Mas esse é o erro, na minha opinião, o auditor precisa abraçar a tecnologia. (E2)

In E2's view, auditors need to embrace technology and this aversion to technology ends up also causing an aversion to the CA model, potentially impacting the performance of these auditors. When comparing E2's comments with the fact that some internal auditors believe that the lack of knowledge of technology is due to personal skills and aptitudes, it is

inferred that aversion to technology, aversion to CA and personal skills and aptitudes are directly intertwined. Enhancing these skills can be an important factor for greater acceptance of CA within organizations. E2 also adds:

the biggest existing barriers are psychological. Because people are not used to it, and people are a little distant from data, there is a clear preference for traditional auditing and this is a big barrier to be overcome (...) trying to insert these people into the CA context. Inserting these auditors and placing the CA within a routine, not just something punctual it is quite difficult. (...) it is very difficult to sell the idea to everyone. Not everyone is aware of the advantages and can understand the CA using databases. It was a great difficulty I had (...) trying to sell the model in a more theoretical and less practical way is more difficult to achieve. But it was something I believed [about the model], which I believe (E2).

as maiores barreiras existentes são mentais. Pelo fato de as pessoas não estarem acostumadas, e as pessoas estarem um pouco distante dessa parte de dados há uma preferência clara pela auditoria tradicional e essa é uma grande barreira a ser superada (...) tentar inserir essas pessoas no contexto de AC. Inserir esses auditores e colocar a AC dentro de uma rotina, não sendo apenas algo pontual, e é bastante difícil. (...) é bem difícil vender o modelo para todo mundo. Nem todo mundo tem noção das vantagens e consegue entender a auditoria contínua utilizando bancos de dados. Foi uma grande dificuldade que eu tive (...) tentar vender o modelo de forma mais teórica e menos prática é mais difícil de se conseguir. Mas era algo que eu acreditava [sobre o modelo], que eu acredito (E2).

E8, although he also reported difficulty with the area and highlighted that this difficulty may be related to some aptitude, the interviewee reports that this difficulty could be at least partially overcome when auditors get used to the tools they use - that is, when these techniques are applied in their daily life.

I find it difficult (...) Of course, as you use it, you get used to them, as they are not user-friendly tools. I wasn't born to write scripts, it's not my field, it's not something that I even like. But for example, when you had QlikView, you already had the entire database, you had the fields there, (...) the relationships between tables were already there, okay? That's what I say, for me to do... "Oh, you have to create a relationship between these tables", you can explain it to me 30 times, it's not something I like to do. Now, if you have the system, if the tables are already related, then just pull the fields, then we do it. Now in the sense of assembling, of creating it for me, it's not my area and it's not something I like. (...) I have all the difficulties in the world in this sense. (E8)

Eu acho difícil (...) Claro, conforme você vai trabalhando você vai se acostumando, pois não são ferramentas amigáveis. Eu não nasci para montar script, não é a minha seara, não é uma coisa que eu inclusive eu gosto. Mas por exemplo quando tinha o QlikView, você já tinha toda a base de dados, você tinha os campos ali, (...) os relacionamentos das tabelas já estavam prontos tá? É o que eu digo, para eu fazer... "Ah você tem que relacionar essa tabela com aquela tabela", pode me explicar umas 30 vezes, não é uma coisa que eu goste de fazer. Agora, se tem o sistema, se já estão relacionadas as tabelas daí é só você puxar os campos, daí a gente faz. Agora no sentido de montar, de criar daí para mim não é a minha área e não é uma coisa que eu goste. (...) Tenho todas as dificuldades do mundo nesse sentido. (E8)

E7 also corroborates E8's view and reinforces that the use of CA and its adjacent techniques and technologies in the daily life of internal auditors are in fact related to the effort required to operationalize this methodology.

I think it's more about daily practice, because it's an area you look at and for me everything is Greek, those numbers and sentences. So, I would have to stop and study just that, but we can't do that here, right? (...) something comes up and you must attend to it there. So, since it's not our specialization field, I come from a legal background, I've never dealt with data analysis, with IT. I never had much knowledge. So, for me to sit down and learn about this, it's hard. I don't think it would be impossible, but it would be hard (E7).

Eu acho que é mais a prática, porque é uma área que tu olha e para mim tudo é grego, aqueles números e frases. Então assim, teria que parar e estudar só aquilo, mas a gente não consegue fazer isso aqui né (...) surge uma coisa e já tem que atender ali. Então como não é a nossa área, eu venho da formação jurídica, não lidei nunca com análise de dados, com TI. Nunca tive muito domínio. Então para eu sentar e aprender a mexer aquilo é bem difícil assim, teria que parar e fazer só aquilo durante um tempo para pegar. Não acho que seria impossível, mas seria trabalhoso (E7).

In addition to these individual characteristics, E1 reports that some organizational characteristics (collective efforts) should also be considered and seem to be related to the ease of use of CA. These characteristics relate mainly to the need for internal audit and other entities involved in the improvements recommended by CA to work in collaboration. E1 recognizes that many implementations are difficult to carry out, but collective effort can be used to optimize the process and thereby reap future benefits.

There is often resistance to be implemented [CA recommendations] because it takes time and effort to create a routine (...) you must meet with other areas involved, with budget, area of IT, and they are routines that are not easy to be implemented, we were always available to find solutions in meetings with analysts from [the state technology company] and to try to find the solution, because sometimes it is real a puzzle to solve (...) it takes a little work to do, but then there is a big gain (E1).

Muitas vezes há resistência para ser implementada [recomendações da AC], não por haver um desgaste do gestor em resolver aquele assunto, mas porque dá trabalho criar uma rotina (...) tem que fazer reunião com outras áreas envolvidas, com orçamento, área de TI, e são rotinas que dão trabalho, a gente sempre se colocou à disposição para encontrar as soluções nas reuniões com os analistas da [empresa de tecnologia do Estado] e para tentar achar qual é a solução, pois às vezes dá um quebra cabeça realmente (...) dá um pouco de trabalho para fazer, mas depois tem um ganho grande (E1).

Another situation that can reduce the effort required for the acceptance of the CA was reported by E2 and concerns the proximity of auditors more familiar with data/technologies and the CA model. This is because an organization can create a particular audit department that is responsible for organizing such a methodology on the most diverse fronts. However, as reported

by E2, the proximity of the data-oriented auditor to the model itself can reduce the efforts needed to accept the CA.

Working specifically within an audit management, although it has its challenges, I believe it is easier for us to implement. I would be closer to the implementation than when I was at the Information [Audit] Management (E2).

Trabalhando especificamente dentro de uma gerência, embora isso tenha seus desafios, eu acredito que seja mais fácil de a gente conseguir implementar. Eu estaria mais próximo da implementação do que quando eu estava na gerência de informações (E2).

Internal auditors' descriptions corroborate the idea of understanding the effort expectation as an innovation being easy or difficult to use (Venkatesh et al., 2003). In this way, technologies related to CA will be more used by those auditors who do not perceive difficulties in using them. The reason for this difficulty may be related to:

- i) Personal skills;
- ii) Professional and education *background*;
- iii) Profile;
- iv) Aptitude;
- v) Qualification, previous experience or knowledge

The findings presented in this section imply questioning about the unidimensional cause-and-effect relationship theorized between effort expectancy and use/use intention by Venkatesh et al. (2003). The authors theorized that effort expectation impact intention to use and the use of technologies. What we found throughout interviews demonstrate, however, that at least in the area of CA the day-to-day use of the systems used by CA potentially affects the ease of use of these tools. That is, in addition to the proposed relationship that effort expectations lead to use behavior, this thesis also proposes that the use/satisfaction with the use of CA in everyday life reduces the efforts necessary for it to continue to be used. That is, day-to-day practice could reduce the effort required for the proper operation of CA. In addition, UTAUT was concerned to analyze effort expectations only at an individual level. In the present dissertation, collective efforts were also identified as possible predictors of use and satisfaction with use and, therefore, these efforts must be considered when analyzing CA. This new perspective can be seen in Figure 22.

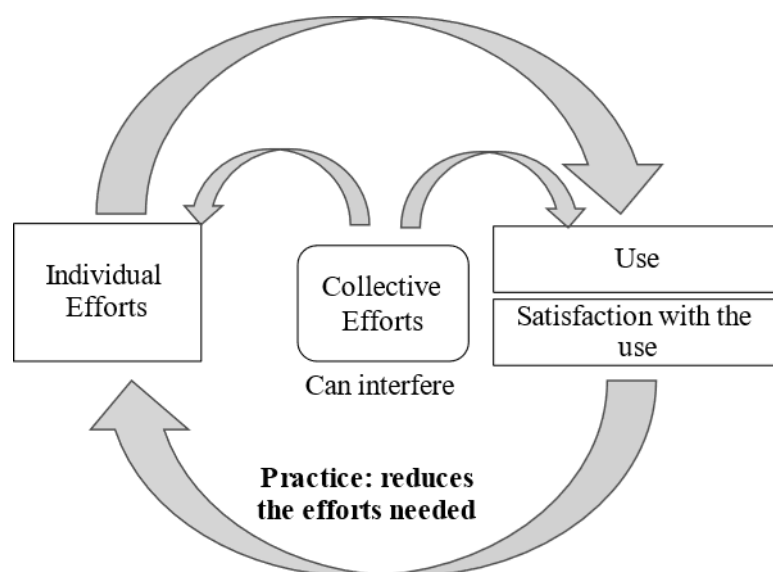


Figure 22 - Individual and Collective Efforts and it's relationship with use and satisfaction

4.4.2.2 General Knowledge and Necessary Skills Listed By Internal Auditors

Characteristics and skills necessary for the operationalization of CA were identified.

E5 presents skills and knowledges necessary for the adoption of CA.

I see that there is a team that will work more directly on the construction of audit trails, on the technical side. This team is going to be specialized [in technology or data analysis tools], there's no other way. Now, the auditors who are going to work with the CA outcomes (anomalies and exceptions), I believe they must have basic knowledge of how it is constructed. Even because they themselves will have to suggest [new audit trails]. If they realize that the situation verified could become an audit trail, he needs to have a basic knowledge of how it is built, how it works. Because otherwise he will come across that situation and won't realize that it can become an audit trail, that it can make his work easier. He doesn't have to do it manually, looking for inconsistency manually. An audit trail can check on a much larger scale. You can scan the entire system, instead of looking at half a dozen paychecks (E5)

Eu vejo que tem a equipe que vai trabalhar mais diretamente na parte da construção das trilhas, na parte técnica. Esse aí vai ser especializado [em tecnologia ou ferramentas de análise de dados], não tem como fugir disso. Agora os auditores que vão trabalhar com os resultados, eu creio que eles têm que ter uma noção, um conhecimento de como que é construído. Até porque eles próprios vão ter que sugerir [novas trilhas]. Se eles verificarem que aquela situação ali verificada merece a construção de uma trilha, ele precisa ter uma noção, um conhecimento básico de que como é construído, de como isso funciona, por traz. Porque senão ele vai se deparar com aquela situação e não vai perceber que aquilo ali pode se tornar uma trilha, pode facilitar o trabalho dele. Ele não precisa ficar fazendo isso manualmente, buscando a inconsistência manualmente, que uma trilha pode verificar e até em uma escala muito maior. Pode varrer todo o sistema, ao invés dele ficar olhando meia dúzia de contracheques (E5)

It would be good if everyone had this knowledge [of data]. Those who master this tool, even Excel, when they need to debug data, insert columns, see what the exceptions are. The more mastery you have over it, mastery of Excel, databases and even basic programming knowledge, there is no doubt that it favors and favors a lot (E1)

Seria bom se todo mundo tivesse, esse conhecimento [de dados]. Quem domina essa ferramenta, mesmo o Excel, na hora que precisa fazer uma depuração de dados, colocar duas colunas, ver quais que são as exceções. Quanto mais domínio tu tem sobre isso, o domínio do Excel, das bases de dados e até conhecimento básico de programação, não tem a menor dúvida que favorece e favorece bastante (E1)

E5 reinforces that although there must always be different skills needed depending on the type of auditor, all auditors should have at least some understandings about how databases works and the potential of audit trails. E5's speech is followed by other auditors, such as E1, E2 and E3 and this view is shared by data-oriented and non-data-oriented auditors. Auditors need to understand that through CA, an inconsistency found in isolation can be sometimes converted in an Audit Trail. For that, auditors need to have some basic knowledge in databases.

Knowledge reported by these auditors concerns knowledge about databases and important aspects of the programming area, such as logic. E2 reports that he don't see any reason, for example, in hiring internal auditors who do not have database skills, as these skills are no longer as difficult to achieve as they used to be. E6 also reports the importance of understanding SQL, a typical database language. Instead of SQL, internal auditors could know more about ACL or other specialized audit software. According to E6, ACL is a more user-friendly system and the requirement for programming knowledge (as in the case of SQL) is not so necessary, since ACL is software built for individuals who do not necessarily have a programming background. E3 also reports the importance of statistics in Excel itself.

E2 adds that other tools and languages widely used in data science can also be important, such as PowerBI, QlikView and Python. In addition, E7 highlights the importance of understanding the theoretical concept of CA.

First, the theoretical concept of what CA is, I think it's important. I think many here [internal auditors in GAPES] did not realize that we were already doing some type of CA. In everyone's understanding, CA was just the full automated process. So, I think the concept has already improved and I would start from the theoretical concept. (E7)

Primeiro o conhecimento teórico do que é uma AC, acho importante. Acho que muitos aqui não imaginavam que a gente já fazia algum tipo de AC né nesse processo todo. Na cabeça de todo mundo a AC era só o processo todo automatizado. Então acho que o conceito já melhorou e eu partiria do conceito teórico né. (E7)

In addition to different knowledges about technology, E1 highlights three important aspects for the proper functioning of CA: i) a systemic view, to understand how jurisprudence moves on the legislative situations of PEESC; ii) the manager's pragmatic profile, to speed up the most bureaucratic procedures and to timely resolve the problems identified; and iii) interpersonal relationships, as it can favor the transit of the audit area along with State Departments, increasing the chances of good partnerships for the improvement of CA.

Finally, E3 reports a skill that is rarely reported in the literature, which is the ability of auditors to adequately demonstrate CA results.

I think properly present the benefits, right? That would be the visualization of data (...) even I have difficulties with that. I never did and I should. How to demonstrate the result from CA through a visualization that does not take up the manager's time to whom you will show it in a presentation (E3)

Eu acho que a demonstração dos resultados, né? Que seria a visualização dos dados (...) inclusive eu tenho dificuldades disso. Eu nunca fiz e deveria fazer. Como demonstrar o resultado em uma forma de visualização que não ocupe tempo do gestor para quem tu vai mostrar em uma apresentação (E3)

Evidencing the financial benefits in a more adequate way, as reported by E3, could improve the audit's image, make it easier for senior management to support the CA's work and demonstrate the benefits of auditing for society. All these benefits are very important for the public administration.

Findings in this section show that all internal auditors understand the importance of having minimal knowledge of the database, regardless of whether they are data-driven auditors or not. These skills are related to the types of auditors necessary for the operationalization of the CA, which in turn, can be associated with the efforts involved with the acceptance of the CA. Thus, Figure 22 is complemented, adding the skills mentioned above, as can be seen in Figure 23.

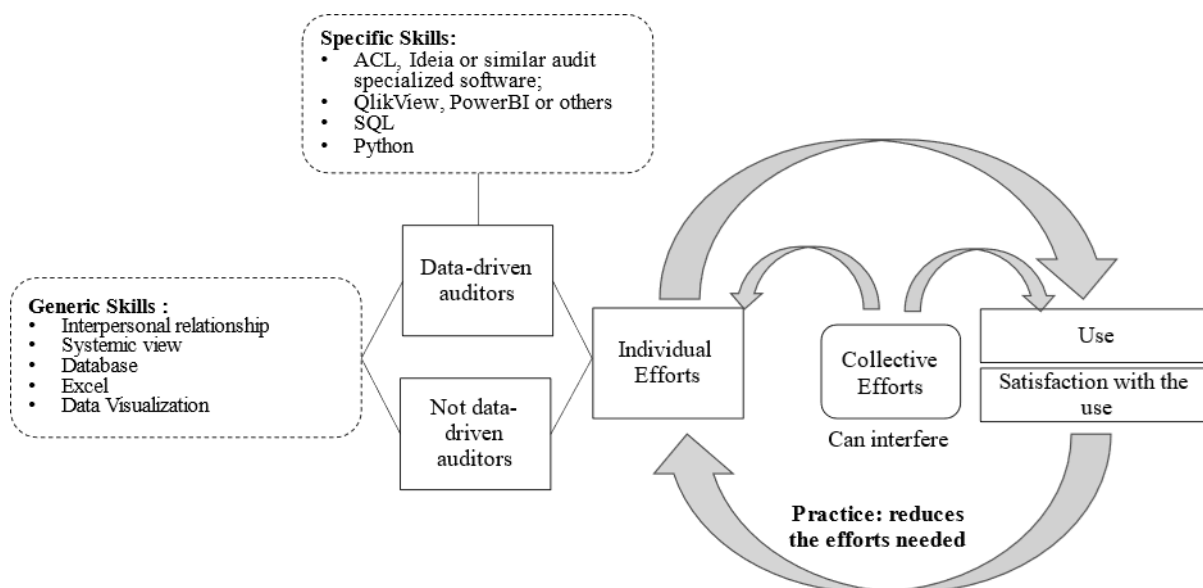


Figure 23 - Skills and Individuals Effort

4.4.3 Continuous Audit and Facilitating Conditions: Human, Structural and Technological Barriers

We found that there are several humans, structural and technological barriers that presented themselves as “facilitating conditions” for the acceptance of CA.

4.4.3.1 Human Resources

Auditors reported that the GAPES team is currently qualified to execute the current CA model in terms of technical qualifications (ie, knowledge of data analysis tools and technical knowledge of auditing and the business area). Even so, a shortage of human resources was reported as an obstacle to improve CA, as highlighted by E1.

The team is very small. The team need to be bigger, since the scope of payroll is extensive. The realization of a public tender is necessary, it is a consensus. (E1)

A equipe é bem pequena. A equipe tem que ser maior, já que a atuação da área é grande. A realização de concurso é necessária, é um consenso. (E1)

In addition to personnel shortage, GAPES have the risk of having some of their staff moving to other audit areas. Risk is greater when it involves specific internal auditors who help in the operationalization (technological part) of the model, as reported by E2.

The moment you have a data-driven public servant transferred, without a replacement with someone with knowledge, this can become a problem. (E2)

No momento que se tem uma saída de um servidor [voltado a dados], sem que ocorra uma substituição com alguém com conhecimento, isso pode se tornar um problema. (E2)

Although E2 did not specifically report what this could lead to, losing a data-driven auditor could completely stop the currently running CA model (or at least a large part of that model). This risk was also reported in another governmental organization (de Freitas et al., 2020) and needs to be adequately addressed within organizations that currently use the CA methodology.

In addition to the shortage of personnel, auditors also have a consensus on the need for human resources in the IT area, specifically.

I understand that you must focus, especially on the next public tender. (...) Personnel from IT area, but who will work with auditing. So, the focus has to be on the next public tender to bring in more auditors with IT training. And the other auditors will help with business knowledge and together with this IT staff to set up a better data analysis structure (E3).

eu vejo que tem que focar, principalmente nos próximos concursos. (...) Uma linha para TI. Pessoal que vai ser TI, mas que vai trabalhar com auditoria. Então o foco tem que ser no próximo concurso trazer mais auditores com formação de TI. E os demais auditores vão auxiliar com o conhecimento de negócio e junto com esse pessoal de TI a montar uma estrutura melhor de análise de dados (E3).

The need to hire more auditors is also presented in formal documents. These documents also validate the information that the CGE does not have Auditors trained in Information Systems, Computer Systems or Data Science (IN CGE 38/2022). The last public tender held for the composition of the career of Internal Auditor of the Executive Power took place in 2005. The PEESC had 75 internal auditors back then. Currently, the career has 55 active state auditors, of which 51 work at the CGE and others in different State Departments (Information CGE n° 38/2022).

IN CGE 38/2022 also emphasizes that within the CGE there is the Strategic Information Coordination (CIES), a division that is specialized in collecting and analyzing strategic information with the use of ITs. The document emphasizes that although it is a fundamental area, the auditors still carry out their work depending on partnerships with other employees of the PEESC state-owned technology company or outsourced companies specialized in technology, which, as highlighted by IN CGE 38/2022, is not recommended for works like audit and assurance.

These new IT and audit specialists could encourage the use of technology-based auditing techniques that would allow for better performance, effectiveness and efficiency of

audit work during all its phases: planning, execution, reporting and follow up. They would also allow more robust analyzes on the database, including the analysis of large volumes (entire population), reducing the risk of issuing a mistaken opinion (IN CGE 38/2022). IN CGE 38/2022 adds that with the use of CA, the scope of actions of internal auditors will change, as they will be able to identify and verify large amounts of data, working with the analyzed population.

Thus, in CGE vision, specialized IT auditors are fundamental for the operationalization of the CA and the evolution of the methodology. Observations carried out in the field also showed that the lack of people specialized in IT is an obstacle to the model.

The lack of specialized human resources in IT can be reflected in difficulties in making the CA process more automated, as reported by E4. And it also has an impact on the maintenance of this system, as reported by E5.

We need to have IT analysts on the board, so that maintenance can occur. It's no use to build [a CA model] and not maintaining it. So, we need trained, qualified personnel to work on this data later (E5).

Nós precisamos ter no quadro, analistas de TI, para que se faça uma manutenção depois. Não adianta você construir e não dar manutenção. Então precisamos de pessoal capacitado, qualificado, para trabalhar esses dados depois (E5).

Furthermore, the lack of IT specialists is not a recent issue, and may have impacted the evolution of the model, as reported by E3.

In 2015, we got an analyst from [PEESC's state-owned technology company] (...) we needed someone who could write the scripts [SQL] better, who would make the scripts in a more practical and faster way, because we had to build the script and also do the analysis. We spend a lot of time, we couldn't make much progress on the audit trails. We got an analyst who knew a lot about data analysis and with (...) our business knowledge we started to build [the audit trails] with all our colleagues. We brainstormed a lot of audit trails that could be useful for audit work, and he built the SQL scripts. But it reached a limit of analysis because the group got smaller and smaller (E3)

*Em 2015, a gente conseguiu um analista da [empresa de tecnologia do PEESC] (...) a gente precisava de alguém que conseguisse escrever melhor as trilhas [os scripts], que fizesse as trilhas de maneira mais **prática e rápida**, porque a gente além de fazer a trilha tinha que fazer análise. A gente perdia muito tempo, a gente não conseguia avançar muito nas trilhas. A gente conseguiu um analista da [empresa de tecnologia do PEESC], que conhecia muito de análise de dados e com (...) nosso conhecimento de negócio a gente começou a montar [as trilhas] com todos os colegas. Fizemos vários brainstorms de definição de trilhas que poderiam ser úteis para o trabalho de auditoria, e ele transformou isso em trilhas de SQL. Só que chegou a um limite de análise porque o grupo ficou cada vez mais reduzido (E3)*

Thus, it is possible to observe that even with a specialized and available IT person, this was not enough to modernize and improve the model as expected. E3's speech also shows that data-oriented auditors are usually responsible for the entire technological part of the CA, but they also accumulate typically traditional audit activities (analysis of findings, referrals and follow-up).

Although the lack of specialized IT staff is a problem for the acceptance of CA, it is necessary to be clear about what is expected of such a model, in order to understand where the need for staff really is. According to E2's report, although the lack of human resources is a consensus within GAPES, the lack of personnel for the operationalization of the CA may be more related to its "quality", than to the ability to execute the current model.

I would say it depends on the speed we want to implement and what we expect in return. Thinking about GAPES, I think we can place the CA within a routine in a very reasonable way and. As we want to improve, we will need more databases, develop other activities and need more people. It really depends on how much you want to put into practice. If we are going to run 100 audit trails, executed every month, with a results management system for these audit trails, based on the database that we already have today. I think we have enough to have a routine and put it into practice (E2).

Eu diria que depende da velocidade que queremos implementar e do que esperamos de retorno. Pensando na GAPES, eu acho que a gente tem condições de colocar a AC dentro de uma rotina de uma forma bastante razoável e na medida que vamos querendo melhorar, vai ter mais outras bases de dados, ai sim precisaremos desenvolver outras atividades e outras pessoas. Depende muito do quanto se quer colocar em prática. Vamos colocar ai 100 trilhas de auditoria sendo executadas todos os meses, com um sistema de gestão de resultados dessas trilhas, nas bases que já extraímos hoje em dia e com o que sem já é possível ter uma rotina e colocar isso em prática. (E2)

E2's speech triggers a critical analysis of E4's speech, who comments that even if there were 500 internal auditors, it would still not be possible to assure PEESC payroll entire. In other words, the lack of human resources may be more related to understanding where one wants to go and what one wants to verify, than the mere need to have more auditors for the sake of having more auditors.

E3 reports that even when there was the availability of an exclusive IT person to work on the model, the model does not evolve due to lack of personnel and external demands, reinforcing that the allocation of IT people will not necessarily guarantee CA success and acceptance.

We brought all these audit trails ideas, he [the IT specialist] set up all the audit trails and they started to present results and there were a lot of audit trails. We had many ideas, he wrote, but we were not able to continue with the validations because there was a lot of demand for other works. There were several demands that the general audit referred to us. The demands were very large and there were a lot of staff away

to other audit divisions or State Departments. (...) The need [to meet the demands that were emerging] overcame. Routine won this issue of improving the analysis, using the data and validating the audit trails, right? So, the validations were postponed for another moment, when we got more people, or when someone came to GAPES (E3).

A gente levantou todas as trilhas, ele [o especialista em TI] montou tudo as trilhas e elas começaram a dar os resultados e tinha um monte de trilha. Várias trilhas tinham ideia, ele só escreveu, mas a gente não conseguiu dar continuidade das validações porque começou a aparecer muita demanda de outros trabalhos. Eram várias outras situações de trabalho que a auditoria geral encaminhava para nós. As demandas foram muito grandes e tinha muito pessoal saindo a disposição (auditores) para outros órgãos. (...) Venceu a necessidade [de atender as demandas que iam surgindo]. A rotina venceu essa questão de melhorar a análise, de usar o dado e validar as trilhas né? Então as validações ficaram para um segundo momento, quando a gente conseguisse mais pessoal, ou que alguém voltasse para que começasse a dar esse enfoque (E3).

These findings are in line with what some articles on CA present, that the proper adoption of this methodology is not so much a problem of lack of systems or technologies, but of people. It is practically unanimous that there is a lack of people (including auditors) for both the technology part and the data analysis part (such as building and validating audit trails and analyzing audit findings). For GAPES it was noted that the auditors highlighted the need for specialized personnel in IT area, mainly in order to improve the system and allow its faster evolution. Some interviews reports that with the knowledge and personnel currently available, it is already possible to run a more robust model than what is currently available, albeit with limitations. A possible solution to the lack of human resources that was presented by the internal auditors would be to carry out more training in this area, as shown in the next section.

4.4.3.2 Training

Some interviewees reported the importance of training to improve the use of CA. The availability of specific training in the data area may be related to the support and understanding of top management about the importance of these types of training.

Data-driven internal auditors reported that they learned more about analytical techniques because of their day-to-day work than with in-depth training, although they reported that they had some isolated training in the past (E3 and E6). This situation highlights the importance of practicing and applying these techniques daily. Even so, the lack of more in-depth training may have some negative implications for CA, as reported by E3.

I had to study a lot of ACL, we took some courses [on our own]. It wasn't easy, but I was learning, practicing, studying that ACL material, taking courses. (...) Training is very necessary (E6)

Eu tive que estudar bastante ACL, fizemos alguns cursos [por conta]. Não foi fácil, mas eu fui aprendendo, fazendo, estudando aquele material do ACL, fazendo cursos. (...) O treinamento é bastante necessário (E6)

I've never done programming training. I had to learn data by working, using it daily. I find it very difficult to think of better solutions there in the use of an analysis, of an analysis logic. If I had been trained, passed through a better knowledge of statistics, of programming, it might have given an improvement to my function, right? So, I think that no auditor was trained or had training in this area, and it was never focused on "Oh, let's prepare these people with statistics, with programming, for those who know how to develop this line of reasoning and use of data analysis" (E3).

Eu nunca fiz treinamento de programação. Eu tive que aprender dados assim trabalhando, usando no dia a dia né. Eu tenho muita dificuldade de pensar soluções melhores ali no uso de uma análise, de uma lógica de análise. Se tivesse sido treinado, passado por um conhecimento melhor de estatística, de programação pode ser que daria um outro up nos trabalhos né? Então assim, eu acho que nenhum auditor foi treinado ou teve treinamento nessa área e nunca foi focado "Ó vamos preparar esse pessoal com estatística, com programação, para quem sabe desenvolver essa linha de raciocínio e uso de análise de dados (E3).

In E3's speech, it is possible to perceive that training could help the auditor to solve problems that persist within the CA at GAPES today. Combined with field observations on the subject enables us to conclude that the daily tasks that auditors are embedded in make it difficult for them to "think outside the box". This is because it is natural for public servants to get used to and feel familiar with their activities. That's why E3's speech allows important insights: training for auditors focused on data goes beyond mere technical knowledge, and can potentially help in the disclosure of solutions that could not be identified only with the day-to-day activities.

The offer of training by PEESC seems to have a greater impact on the vision of data-oriented auditors, which means that, for these auditors, training allows an improvement of the models executed in the organization. Need for training in the public administration focused on the IT area is in line with West (2005) conclusions.

Training alone does not guarantee improvements in CA acceptance. The application of techniques on a day-to-day basis can be fundamental to define how data-oriented the auditor will be. As reported by E6, training without day-to-day application will probably lead to forgetting these techniques.

I've been trained, but very superficial training. (...) As at the time the works were not applied in daily life, we did not get the practice. And if you don't apply it, it doesn't work (E7).

Já fui treinado, mas treinamentos muito superficiais. (...) Como na época os trabalhos não aplicavam no dia a dia, a gente não pegou a prática. E se tu não aplicar, não funciona (E7).

E3 also reports that it would be important for the board/management to prepare training schedules with a focus on statistics, programming and data analysis. E3 comments, however, emphasize that courses in the area have already been offered, although they have been superficial. Interest in these courses is not limited to data-oriented auditors, although it is not possible to understand how useful these courses would be for other auditors, as they also reported that were not very interested on the subject. E3 reports that these trainings may not have a major impact on non-data-oriented auditors.

I think that training now in IT and in data analysis for the auditors who are already here in the group will not help anything, except for those who are already in this field (data-driven auditors) and who will continue working with it (...) than we should focus on these new people [auditors] who are going to join [CGE] (E3)

Eu acho que treinamento agora em TI e em análise de dados para os auditores que já estão aqui no grupo não vai adiantar nada, a não ser para quem já está nessa linha e que vai continuar trabalhando com isso (...) depois é focar nesse pessoal novo que vai entrar (E3)

E3's analysis converges with the reports of other auditors and aligns with the effort it would take for these (non-data-driven) auditors to become data-driven auditors. As reported by E7, for example, this would not be impossible, but it would take a great effort. Besides, all GAPES and CGE auditors have been working according to their skills and specificities for at least ten years, which makes it quite difficult for these trainings to be reflected in behavioral changes to the point that an auditor not focused on data become a data-driven auditor. Thus, the focus of training in situations similar to those found at GAPES should be on auditors who are more familiar with the technological aspects of CA.

4.4.3.3 Physical Structure of Gapes

Structural problems were reported regarding the workplace (furniture, room, chairs, etc.) and the machinery currently available, as reported by the internal auditors.

The equipment, working conditions, tables, chairs, bad furniture. IT equipment too (E1)

A parte de equipamentos, as condições de trabalho, mesas, as cadeiras, mobiliário ruim. Pois um servidor se afasta, por problemas ergonômicos, ele custa bastante para o Estado. (...) Equipamentos de TI também (E1)

E8 reports that “This whole structure is certainly deficient. We have an issue”. E5 adds that "To continue evolving the system, we need equipment. Equipment with better capacity to work with it." (E5)

Reports from non-data-oriented auditors identify specific problems in the physical structure, but usually this type of auditor doesn't have a deeper understanding of current demands from CA. E2 and E4 complement each other.

eventually we need a more conditions and it takes a long time to get improvements, right? [in organizational conditions]. But what I think is that today we already have in terms of database, technology, availability of equipment, something to give an excellent kick-off. Of course, in a while we will need more things: more databases, better equipment, more memory, more access to other databases. But the great is the enemy of the good. Today it is possible to put a lot into practice in CA (E2)

eventualmente a gente precisa um pouco mais de condição e demora muito tempo para conseguir melhorias né [das condições organizacionais], mas o que eu penso é que hoje a gente já tem em termos da base, de tecnologia, de disponibilidade de equipamentos, algo para dar um excelente ponta pé inicial. É claro que daqui algum tempo nós iremos precisar de mais coisas: mais bases de dados, equipamentos melhores, mais memória, mais acesso a outras bases. Mas o ótimo é inimigo do bom. Hoje já dá pra colocar muita coisa em prática de AC.(E2)

More would be better, but also where would we put it, how would we put it? You also must have professionals who know how to handle it, because it's no use having the software and not knowing what to do with it. (E4)

Seria melhor mais, mas também onde que colocaria, como que colocaria? Também tem que ter profissionais que sabem mexer, pois não adianta ter o software e não saber o que fazer com ele. (E4)

E2 demonstrates more understanding about current conditions, and he thinks that what they already have allows a modernization of the current CA model. E4 reinforces that more equipment and systems need to be accompanied by more professionals capable of using such tools.

4.4.3.4 Data Quality and its Interaction with Continuous Audit

Quality of the data used to operationalize CA was mentioned by all internal auditors in GAPES as a barrier to the acceptance of the CA. The data quality and its characteristics can be visualized as an acceptance element or a barrier of CA – specifically within a Facilitating Condition for the model. Internal auditors also highlighted that the data used for CA represents an important part of the model and problems in the data can generate negative impacts with reflections on the use and extent of the use of CA within GAPES.

Aspects of integrity, completeness, timeliness, maintenance, access and risks involved with the current structure were highlighted by the internal auditors. It was evidenced that internal auditors will more likely use and be part of this model when they realize that the data available for CA meet their needs. However, we found some divergence about perceptions of data quality between internal auditors. For example, some auditors pointed out that the problems in the data are one-off and do not disrupt the model as deeply. Others evidenced that these problems generate high risks, including the usability of the model.

First, it is necessary to delimit the sources of the data problems in this research. These problems can occur in different ways: i) absence or problems of data from SIGRH itself - and thus, the organizational reality is not well represented in the digital world; ii) data problems in Extrator extraction, and iii) data problems in BoaVista. Second, it is necessary to identify the sources of these problems, which can occur due to: i) data integrity problems – that is, the data do not represent what they should represent; ii) absence of data or difficulties in accessing data – that is, the non-existence of data within SIGRH, Extrator or BoaVista. These sources can also be related to technical problems of the system itself, such as maintenance problems, incorrect entries, absence of specific fields for filling in information, etc. All these elements were highlighted by the internal auditors during the interviews.

Regarding the information from SIGRH, some auditors reported how this becomes a barrier to the CA. The digitization of data, as already mentioned, is a fundamental factor for the good functioning of the CA, since the data are the main input of the analyzes carried out by this methodology. Several auditors reported on SIGRH's data integrity issues and its failure to adequately represent the physical world. The lack of data integrity is a complicating factor for the CA, as reported by E7.

[the SIGRH] It does not have data integrity. We already have examples of this, right? Much data in SIGRH is not accurate. An example, place of work. In most cases it is not that - the data in SIGRH is not accurate and is not updated (E8)

[o SIGRH] Não possui dados íntegros. A gente já tem exemplos disso né? Muita coisa no SIGRH não está preciso. Um exemplo, lotação e local de exercício. Na maioria não é aquilo - o dado no SIGRH não é preciso e não é atualizado (E8)

There is another weakness in the records on organizational units (place of work), which is the responsibility of the [human resources central body], which is that the system must reflect all organizational units. You will have a public servant that is physically working in a department, but it doesn't have a mirror [in SIGHR]. That place of work does not exist in the system. So, he ends up being assigned to another one, and this gets distorted and it's no small thing, there are several situations. So first the system must be reflective to the point of trust (E5)

Existe uma outra fragilidade nos registros sobre unidade organizacional, que é de competência do órgão central de gestão de pessoas, que é o sistema tem que refletir todas as unidades organizacionais. Você vai ter servidor que está lotado fisicamente em uma lotação, mas ele não tem um espelho. Aquela lotação dele não existe no sistema. Então ele acaba sendo lotado em outra, e isso vai desvirtuando e não é pouca coisa, tem várias situações. Então primeiramente o sistema tem que ser reflexivo a ponto de que se haja confiança (E5)

Jun & Vasaerhelyi (2016) theorize about the mirror world – the moment when all physical information of organizations will be mirrored in a digital world. However, although theorized, even basic and important information may not be adequately represented in the digital world, demonstrating that there is still a long practical journey to go to reach the scenario imagined by Jun & Vasaerhelyi (2016).

E1 reports that more information should be digitally mirrored.

Everything that the laws require, you have to think that needs to be into the system so that management can be done in the form of data and many issues are not there yet (...) there is a barrier yes, it needs to be improved (E1)

aquilo que as leis exigem, tem se pensar que aquilo precisam ir para o sistema de forma que o gerenciamento possa ser feito na forma de dados e muitos temas ainda não estão (...) existe uma barreira sim, precisa ser melhorado, que aquilo que é uma exigência na lei, toda a gestão seja feita de forma eletrônica. (E1)

E5 adds that the lack of confidence in this data requires auditors to always need to validate the information (even with an CA model that detects situations in a deterministic way) before sending it to those responsible (human resources departments). These issues further decrease the quality of the CA as well as limit the extent of its usage.

Absence or problems with data make different analyzes in the CA difficult. For example, there are payments in PEESC that have variations in their percentage of payment according to employee place of work in which a particular public servant is allocated. When using this data to assemble audit trails, the auditor may come across false positives or the audit trail may not show payment irregularities (in the example, in percentages not compatible with those organizational units). Such situations were observed in different months throughout the year 2022 (DOC 4). Although some problems related to these situations have indeed been observed, there are doubts as to whether these problems are generalized, as implied by the reports of E5 and E8, or are more specific, as commented by other auditors.

That said, the statements of E1, E2, E4 and E8 demonstrate that the data are, in general, quite complete, although they emphasize the absence or incompleteness of these data.

I don't think it has any major integrity issues. What is missing is that they are incomplete. Data is reliable and secure. (E1)

Eu acho que não tem problemas maiores de integridade. O que falta é que são incompletos. Os dados são confiáveis e seguros. (E1)

often the human resource department does not input information in the system about the reason for that payment or often the system does not have a field available to do it. (E8)

muitas vezes o setorial não alimenta o sistema com informações do porquê daquele pagamento ou muitas vezes o sistema não tem campo para alimentar. (E8)

I trust a lot in the data that we have. Eventually, we need more data or information that isn't there, but I would say that what you have is quite reliable (...) But as we are starting to work with the definitive payroll, I would say that it is reasonably reliable, and it is made available within a reasonable period of time. (E2)

Os dados que temos eu confio bastante. Eventualmente precisamos de um dado ou informação a mais que não está lá, mas eu diria que o que tem é bastante integro do que está disponível. (...) Mas como estamos partindo para trabalhar com a folha definitiva, eu diria que ela é razoavelmente íntegra e ela é disponibilizada dentro de um prazo razoável. (E2)

I think the data is reliable. As a lot of payrolls are executed, it can happen that some information appear and the next day they are not there anymore, because the payroll has already been updated, but they are reliable. They appeared for some reason (...) now it may not be there anymore because it has already been corrected or because they were doing tests on the payroll and removed a certain thing that no longer happens. (E4)

Acho que os dados são confiáveis. Como roda muita folha, pode acontecer de eles aparecerem e no outro dia não estarem mais lá, porque a folha já rodou, mas eles são confiáveis. Apareceram por algum motivo (...) agora pode ser que não esteja mais porque já foi corrigido ou porque estavam fazendo testes na folha e tiraram determinada coisa que já não acontece mais. (E4)

E4 adds a fact about the dynamics of PEESC's payroll. In fact, information can change frequently within SIGRH, causing this type of situation commented on by E4, especially when internal auditors work with the preview payroll. However, in July 2022, field observations showed that some inconsistencies appeared to the internal auditors on a given date, but that the same inconsistencies could not be traced within SIGRH. Even in talks with several technicians (from the IT area and responsible for the systems) it was not possible to find the origin of such inconsistency or any changes in these problems. Internal auditors were clearly unhappy with this situation.

It was commented by a non-data-oriented auditor that this problem in the data could even cause a complete stoppage of the entire model, since false positives usually appear because of these problems. Documents and meetings also corroborate the statement above and GAPES have been trying to mirror the data for some years, still without success (DOC 3). Data mirroring would allow internal auditors to have full access to the entire database from SIGRH.

In addition to commenting that organizational conditions are in fact lacking in relation to the data issue, E7 comments on another very significant risk (considered by him the biggest obstacle) in the data used by the CA: the existence of third parties in the middle of the process between the source (SIGRH) and the data used for analysis by the internal auditors (Extractor/BoaVista).

The lack of a mirror that we can access 100% of the data is the biggest obstacle. Besides you have this bridge in the middle of the way, which is the Extractor. It may have flaws because you have the SIGRH base, then the Extractor comes and extracts it there, so you can insert it on BoaVista. In the middle of this process, there may be flaws that makes you use a wrong database, as has happened several times. (E7)

A falta de um espelhamento que a gente possa acessar 100% dos dados é o maior empecilho. Além de você ter essa ponte no meio do caminho, que é o Extrator. Pode ter falhas porque você tem a base do SIGRH, daí o Extrator vem extrai ali, para daí jogar no BoaVista. No meio desse processo pode ter falhas que te faz trabalhar com uma base errada, como já aconteceu várias vezes. (E7)

I think that although it has improved a lot from what it was before to what it was today, we still see a lot of data that are not adequate within the extraction, right? And that we have a battle that has been going on for a long time, which was to allow us to access this data directly in the SIGRH database, and not go through an intermediary via an Extractor, right? Let us search data without any boundaries. Then there would be a very big evolution because we would explore all the information that can be there (E3)

Eu acho que embora já melhorou muito do que era antes para o que era hoje, mas ainda muitos dados a gente vê que não estão adequados dentro da extração né? E que a gente tem uma luta que já vem a tempo, que era nos permitir acessar esses dados diretamente na base do SIGRH, e não passar por um intermediário via extrator né? Deixar a gente caminhar nos dados. Daí sim teria uma evolução muito grande porque a gente exploraria todo o potencial que pode ter ali de informação (E3)

The mirroring mentioned by E7 would in fact have direct implications for the success of the model and would help to solve some of the problems mentioned below, bringing greater use and satisfaction with the use of CA.

One of the expected improvements with this mirroring would be a greater timeliness of action, since it would no longer be necessary to wait for the release of data by third parties (Extractor and BoaVista). However, there is no consensus that the current timeliness of access to this data is a problem. E2 highlights, for example, that data is currently available within a reasonable period, especially when internal auditors use the definitive payroll.

Perhaps one point that could be improved on would be the speed with which we receive this data. Sometimes we want yesterday's information, sometimes we want something above what the rest of Brazil has. (E2)

Talvez um ponto que poderia ser mais aperfeiçoado seria a velocidade com que recebemos esses dados. Às vezes queremos a informação de ontem, às vezes a gente quer algo acima do que o resto do Brasil tem. (E2)

The timeliness of releasing the definitive payroll for internal auditors can be seen in Table 14. As can be seen, auditors usually have access to data within 5 days after the end of the month. For example, data from April was available for auditor trails to be executed on 2022/05/05. Variations in the date may occur for different State Departments.

Table 14 - Dates that data were available for internal auditors in BoaVista

Month	Load Date of the Data
April/2022	2022-05-05 12:30:55
May/2022	2022-06-30 18:58:55
June/2022	2022-06-29 19:55:55
July/2022	2022-07-26 14:44:42

Source: BoaVista.

In this way, data mirroring would potentially improve the timeliness of internal auditors' performance, but perhaps it would bring more benefits if the CA methodology started to execute the audit trails during the preview payroll.

Although the availability of data is an obstacle to improvements in the timeliness of auditors' performance, a significant problem that occurs due to the "outsourcing" of these extractions concerns the uncertainties about the date that such data become available to auditors, which makes it difficult to a proper planning of when the CA and its audit trails will be executed.

[about data problems] the issue of data availability in our work. Not being made available on the correct dates, within the correct deadlines, means that we are often working with outdated data. Then we keep doing work with no practical result. (E7)

[sobre problemas nos dados] a questão da disponibilização do dado no nosso trabalho. Não ser disponibilizado nas datas corretas, nos prazos corretos, faz com que a gente muitas vezes a gente esteja trabalhando com dados desatualizados. Dai a gente fica fazendo um trabalho sem resultado prático. (E7)

This delay mentioned by E7 had important implications in the past for GAPES, as reported by E1.

There was a situation where, for example, something did not appear in the CA (..) there is a certain delay to make the data available to Extrator, and simultaneously [the central body] continues to insert values and it must have been at that moment that a paycheck was left with a positive variation of R\$ 900 thousand positive. It was an amount that they released administratively, but something that [GAPES] was not aware of (...) so it is very bad, having an auditing division for payroll and it is not aware that that fact is happening (...) is a matter that can easily go to the press (E1)

Teve situação, que por exemplo, algo não apareceu na AC (..) tem um certo delay para disponibilizar os dados para o Extrator, e simultaneamente [o órgão central] continua fazendo inserção de valores e deve ter sido nesse momento que ficou um contracheque com uma variação positiva de R\$ 900 mil positivo. Foi um valor que liberaram administrativamente, mas uma coisa que fugiu ao conhecimento [da GAPES] (...) então é muito ruim, ter um órgão de auditoria da folha e ele não ter ciência de que está acontecendo aquele fato (...) é um assunto que facilmente pode ir para a imprensa, ainda que regular. (E1)

For most data used by the CA, the extraction goes through two different systems (Extrator and BoaVista), which creates risks of inconsistency in the extracted data, as mentioned by E7. In addition, the work of internal auditors is limited to the data available on both platform (databases), which is not all the data available today on SIGRH. Some auditors report problems that exist because of this.

there is the problem of Extrator, because we do not have direct access to the database [from SIGRH]. They don't release the database itself to analyze, so it already has the distortions. So they're not accurate. They have inconsistencies too (E8)

tem o problema do Extrator, pois a gente não tem acesso direto a base. Eles não liberam a própria base para analisar, então já tem as distorções. Então não são precisos. Eles têm inconsistências também (E8)

Two facts reported seem to be related to the difficulty of auditors in achieving improvements in this data structure: i) the lack of understanding by top management about the importance of these data for the purpose of CA improvements; and ii) the distant relationship between internal audit (GAPES) and the central human resources division.

E1 and E3 reinforce this view.

Regarding data quality, we have a problem, even though we still don't have recognition, perhaps from our board, of the importance be in contact with the State Departments that are responsible for the data, right [PEESC technology company and central human resources division]? To meet our data access request, right? To improve the data, to meet the demands of the audit in relation to information, to improve this information, to check for the inconsistencies in the data, the parameters that these data are set up for us to do the analyses. (...) [for the top management] To request these improvements, such as the data mirroring. (E3)

Com relação a qualidade dados, a gente tem um problema ainda que a gente não tem um reconhecimento ainda talvez da nossa diretoria, da importância que seria de correr atrás junto com os órgãos responsáveis pelos dados né [Empresa de tecnologia do PEESC e órgão central]? De atender as nossas solicitações de acesso aos dados né? De melhorar os dados, de atendimento das demandas da auditoria com relação as informações, melhorar essas informações, de ver as inconsistências dos dados, os parâmetros que estão montados esses dados para a gente fazer as análises. (...) De solicitar essas melhorias que a gente solicita de acesso ao espelhamento da folha de pagamento. (E3)

CGE needs to have more strong relationship with the Government and the Governor. So that when audit recommendations are made, State Departments/managers/directors give the due importance they need. (E1)

A CGE precisa ter mais força junto ao Governo e ao Governador. Para que quando cheguem recomendações de auditoria, os órgãos/gerentes/diretores deem a devida importância que precisa. (E1)

E2, on the other hand, thinks that the Auditor General and the Controller are willing to accept the CA idea and they encourage the adoption of the model. Connecting this answer with E3's comment, we can conclude that although they are encouraging CA, perhaps a more data-oriented view is lacking to truly understand the importance (and the effort that should be given) for improvements to occur in these data. E5 has a similar view.

Maybe it's missing [support], I'm not saying it's missing within our CGE, the general controller. We have support there, but maybe we need support from the government as a whole, right? The top management, the Governor and State Department Commissioners need to know and understand what we are doing. You need a sensibilization of these people there, so that they really support you, right? (E5)

Talvez falte, não digo que falte dentro da nossa CGE, do controlador geral. Ali a gente tem apoio, mas talvez precise de apoio do governo como um todo né. O primeiro escalão, o Governador e Secretários precisam conhecer e entender o que a gente está fazendo. Precisa de uma sensibilização desse pessoal ai, para que realmente apoie né? (E5)

In addition to the support from senior management, as mentioned, a closer relationship with the human resources central division (responsible for managing these data) was mentioned as an important factor that has, in the past, facilitated access and had improve the quality of data used by internal auditors.

As we were [allocated in the human resources central division], things were solved faster, such as the creation of new fields in the system. We needed an ideal field to carry out our analysis and this was incorporated, improving the data extractor [Extractor]. (E3)

Como a gente estava [no órgão central da folha], ela conseguia, conforme a auditoria precisava, as coisas iam mais rápido, como por exemplo a criação de novos campos no sistema. A gente precisava de um campo ideal para fazer nossas análises e isso foi sendo incorporado, melhorando o extrator de dados. (E3)

At the beginning of audit in PEESC, auditors who currently work at GAPES were allocated within human resources central division itself, although they had attributions of internal auditors. This overlap of management and audit is highlighted in the literature, especially regarding sharing of organizational information and data (Bumgarner & Vasarhelyi,

2018). In the case of GAPES, the sharing of attributions and data proved to be beneficial for the use and satisfaction with the use of CA. E3 also reports that at a given moment a board with auditors, technicians from the central human resource division and TIs from PEESC technology state-owned company was set up and that this partnership helped to improve the data that are currently available to the CA.

Thus, it can be understood that the proper acceptance of CA depends on the adequate availability of data for CA. These data are part of Facilitating Conditions that influence the extent and quality of the CA. Although it may seem intuitive that the audit has broad access to any organizational data, this may not be a reality, at least not in all scenarios, as demonstrated by the present research. In addition, internal audit needs to overcome different obstacles, including the absence of data in the system.

4.4.3.5 Organizational Structure: Culture and Complexity of Payroll Legislation

A characteristic that is not commonly mentioned in the literature and can be understood as an organizational barrier concerns organizational culture and its related legislative complexity, especially on payroll from the public administration.

our legislation is very complex and I have not seen any progress in recent years. It is a sad reality that PEESC has not evolved in terms of legislation. So sometimes a law is enacted and a situation that should have been dealt within the law are left out. But in practice, to resolve this injustice that was not addressed in the law, it is still paid for the public servants. And therein lies the irregular situation. (...) so an item that gets in the way is this, you grant a benefit, which is not supported by law, without being duly founded and authorized by the competent authority. Instead of taking it to the competent authorities, they just input the situation in SIGRH. (E1)

nossa legislação é muito complexa e eu não vi nenhum avanço nos últimos anos. É uma triste realidade que o Estado não evoluiu em qualidade de legislação. Então realmente às vezes uma lei é editada e fica de fora uma situação que deveria ter sido tratada na lei. Só que na prática, para resolver essa injustiça que não foi tratada na lei, é pago pela folha. E daí fica a situação irregular. (...) então um item que atrapalha bastante é isso, você conceder um benefício, que não tem amparo em lei, sem estar devidamente fundamentado e autorizado por autoridade competente. Ao invés de levarem para as autoridades competentes, só jogam a situação para o SIGRH. (E1)

In addition to this complexity being naturally difficult to analyze, E1 also comments that sometimes payment situations are left out of the legislation (due to some flaw in the writing of the law, for example) and yet they are paid in SIGRH. A CA model based on deterministic trails based on legislation will flag these cases as inconsistencies.

E5 highlights that a legislative catalog, which currently does not exist in the State, could help the work of auditors in improving CA, so that deterministic audit trails can be more easily elaborated.

I miss it a lot, I think this is actually a responsibility of the central human resources division (...) we should have a catalog with all the type of payments identifying the legislation. (...) This rubric X the legal basis is this, the way it calculates the parameters that are in the system. (E5)

eu sinto muita falta, que acho que isso na verdade é uma responsabilidade do órgão central (...) nós deveríamos ter um catálogo com todas as rubricas identificando as legislações. (...) Essa rubrica X a base legal é isso aqui, a forma como ela calcula os parâmetros que estão no sistema. (E5)

While the compilation of this catalog may seem simple, the legislative complexity in payroll is quite intense, and changes occur quite frequently. There are legislations with decades of existence and with dozens of modifications over these years. As mentioned before, PEESC has hundreds of payment items, and these payment items may be legislated by one or more laws, which may include dozens of articles, etc. In addition, PEESC constantly changes its legislation, which requires a greater effort from the internal audit to maintain the CA model. As E2 points out, “as legislation changes, what was produced will become outdated and meaningless. So, you must have a maintenance routine.”

As reported by the internal auditors, CA model can be improved when there is a better relationship with auditees, since as mentioned in the literature, the partnership between management and auditing will become increasingly fundamental for the success of CA models.

Finally, two topics can be highlighted concerning the organizational structure. E1 associates some problems that interfere in CA due to the paternalistic culture of the State.

It is also the lack of culture, as the state has always been very paternalistic. A paternalistic state doesn't worry if the state will pay something wrong “*leave it like this, it's to help* [the public servant]” (E1)

É a falta de cultura também, pois o estado sempre foi muito paternalista. Um estado paternalista ele não se preocupa se o estado vai pagar errado “deixa assim, é para ajudar” (E1)

These situations imply problems and difficulties for CA models, as it causes barriers to human resources divisions, which often have resistance to making changes.

Added to this is the fact that the CGE does not have any sanctioning power within the current structure.

if they don't respond to CGE, we don't have sanctioning power, like a TCE. The TCE will notify you and if you do not comply, it can fine you. So TCE everyone responds.

Now internal audit, as it is part of the organization, it ends up being difficult to have feedback sometimes. The legislation does not oblige State Departments to respond to us as quickly as we think they should. It ends up being a problem (E6).

se eles não responderem a CGE, a gente não tem poder sancionatório, como tem um TCE. O TCE vai te notificar e se tu não cumprir ele pode te multar. Então TCE todo mundo responde. Agora auditoria interna, como faz parte da organização, acaba sendo difícil o retorno às vezes. A legislação não obriga os órgãos a nos responderem com a celeridade que a gente acha que tem que ter. Isso acaba sendo um problema (E6).

4.4.3.6 Relationship with the Auditees and the Feedback of Audit Recommendations

The perception of the existing relationship between the internal audit, through the CA, with the auditees proved to be quite different among interviewees. Basically, internal auditors maintain contact through the CA with human resources sectorial and with central human resources division, and there is clearly a different perception about the existing relationship with these two different groups. Some internal auditors reported that possibly most auditees do not even know the existence of the CA or at least do not understand how it is operationalized, as can be seen in the statements of E2, E4 and E7.

The relationship with the central human resource division was always a difficult issue (...) they always considered the audit partner, but in a very relative way. They were partner when it was convenient for them. (E1)

O relacionamento com o órgão central sempre foi uma questão difícil (...) eles sempre consideraram a auditoria parceira, mas de forma bastante relativa. Era parceira quando para eles era conveniente. (E1)

I believe that the sectors are neutral, right? [The central human resource division] that perhaps has a little more reluctance. We don't get much feedback from them of our audit notes (E5)

Eu acredito que os setoriais são neutros né? [O órgão central] que talvez tenha um pouco mais de relutância. A gente não tem muito retorno do órgão central dos nossos apontamentos (E5)

I think they are quite unaware of CA. Also because of our history here, they seem to me that they don't even understand our role as internal audit itself, right? We are alerting them of the problems, for them to correct, so that the TCE does not come in two or three years and say "Oh, you caused damage here and you have to repair it". So, are bringing to their knowledge the problem in advance. They don't have any knowledge about CA. They don't see it as an CA concept, they see it as an audit that the CGE does like that, they don't have that theoretical concept. (E7)

Eu acho que eles desconhecem bastante o modelo. Até porque pelo nosso histórico aqui eles me parecem que eles não entendem nem o nosso papel como auditoria interna propriamente dita né? A gente está alertando eles dos problemas, para eles corrigirem, para que não venha o TCE daqui dois três anos e diga "Ó você causou um dano aqui e tem que reparar". Então a gente estaria trazendo o problema de forma antecipada. A AC propriamente dita eles não têm conhecimento nenhum. Mas

eles não enxergam isso como um conceito de AC, eles enxergam como uma auditoria que a CGE faz assim, não tem esse conceito né. (E7)

In this way, there are differences in the relationship with the central human resources divisions and with the sectoral ones. E1 highlights this point.

When it only involves situations within the scope of the sector division, they usually take immediate action. They just don't do it when they don't have the possibility to do that reformulation. (E1)

Quando envolve somente situações com a alçada das setoriais, normalmente eles tomam providência de imediato. Eles só não fazem quando eles não têm possibilidade de fazer aquela reformulação. (E1)

However, even within human resources sectors, it is possible that there are differences in how the relationship between internal auditors, through the CA, and auditees occurs. E3 explores this in detail.

Auditees have the most divergent views on CA, at least from my experience. From those who understood our analyzes and results, and also over time, saw that we were really identifying problems, but not in a very large mass of tasks for them, they appreciate CA. Small State Departments, especially smaller ones, they always give us feedback (...) because the results we found are few and they manage to solve it in an adequate time. They realize that that is helping, so the feedback is always (...) “Your work is excellent in terms of anticipating the problem for us, for us to solve it”. (E3)

Os auditados têm as mais diversas visões sobre a AC, pelo menos pela experiência que eu tenho. Dos que entenderam as nossas análises e os resultados, e também com o tempo viram que a gente realmente estava identificando problemas, mas não em uma massa muito grande de tarefas para eles, daí é só elogio. Órgãos pequenos, principalmente órgãos menores, eles sempre nos dão um feedback (...) porque os resultados encontrados são poucos e eles conseguem resolver em tempo adequado. Eles percebem que aquilo ali está auxiliando, então sempre o feedback é (...) “O trabalho de vocês é excelente em relação a antecipar o problema para nós, para a gente resolver. (E3)

Thus, some characteristics stand out from human resources divisions that have a positive view of the model: i) understanding of the analyzes and results presented by CA; ii) audit notes in reasonable quantities; iii) State Departments that are not too large; and iv) ability to resolve situations in a timely manner. Interviewee E1 adds more details about this.

I perceive two differences. The State Department human resource division that is more committed to having everything correct, that likes to have a strong internal control, is more receptive. When staff who works in the sector or in the sectional has training compatible with the activity he performs there, when he has a professional attitude, he is always more receptive. When the employee who performs the function does not have the necessary profile, sometimes he has a large volume of work, sometimes he works there because of a indication by someone, he is grateful for the manager (...) the lack of functional autonomy of who is in the audited area is an obstacle. Lack of

autonomy, inappropriate profile. So, there are areas that have resistance and others that they always looked for, when they had some difficulty (E1)

Eu vejo assim, duas diferenças. O órgão que é mais comprometido em ter tudo certinho, que gosta de ter o controle, ele é mais receptivo. Quando o profissional que atua na setorial ou na seccional ele tem a formação compatível com a atividade que ele exerce lá, quando ele tem uma postura profissional, ele é sempre mais receptivo. Quando o servidor que desempenha a função não tem o perfil necessário, às vezes tem um volume grande de trabalho, às vezes ele foi lá porque saiu de uma atividade finalística e ele tem gratidão pelo gestor (...) a falta de autonomia funcional de quem está na área auditada é um entrave. Falta de autonomia, perfil não adequado. Então tem áreas que possuem resistência e outras que inclusive sempre procuravam, na hora que tinham alguma dificuldade (E1)

In addition to the characteristics listed by E3, E1 adds other important characteristics for the sectors and sections responsible for payroll/people management: i) interest in having strong internal control; ii) compatible training and suitable profile; iii) professional attitude; iv) functional autonomy. Like E3, E1 reinforces that a high demand for work can also disrupt the good relationship between audit and auditee.

In general, many of these characteristics are not subject to control by internal audit, but they can still affect the acceptance and success of the CA.

However, when we are faced with these same analyzes sent to larger [State Departments], which have many enrollments, many inconsistencies (...) They initially accepted the model. Accepting that this would help them, but as a lot of inconsistency begun to appear and they have a lot of internal problem, I started to notice that they started to ignore you. They started to think that we were creating problems for them and not that it is their problem. (...) So, what I realize is that it depends on the demand, the number of problems and the structure of State Department to deal with these inconsistencies, you know? (...) larger State Departments with many enrollments and inconsistencies, at first, they find a good idea of doing a control for them, but then they realize that they cannot cope with the demand and they have their own internal demands. And then this overloads them and already has an impact on the feedback. (E3).

Contudo quando a gente se depara com essas mesmas análises encaminhadas para órgãos maiores, que tem muitas matrículas, muitas inconsistências (...) Eles começam em um primeiro momento a aceitar. Aceitar que isso vai ajudar, mas como começa a aparecer muita inconsistência e eles têm muitos problemas, eu comecei a notar que eles começam a te ignorar. A achar que nós estamos criando problemas para eles e não que é problema deles. (...) Então o que eu vejo assim, é que depende da demanda, da quantidade de problemas e da estrutura do órgão para dar vazão a essas inconsistências, entendeu? (...) órgãos grandes com muitas matrículas e inconsistências, esses em um primeiro momento acham a ideia maravilhosa de ter, de estar fazendo um controle para eles, mas depois percebem que eles não conseguem dar conta da demanda e eles tem a demanda deles e mais a da GAPES. E aí isso sobrecarrega eles e já dá um impacto no atendimento. (E3).

Personnel working at the operational level, honestly, don't like the CA very much because it's an extremely laborious period for the staff, they must input the data, they must review the imputed data and confirm that the public servant will receive the payment. Do the final review of the payroll and in those 4 to 5 days that they are

extremely busy comes CGE and send them a spreadsheet with 100, 200 records for the staff to analyze in 2 days (E6).

O pessoal da ponta, sinceramente, não gosta muito da AC por causa disso, porque é um período extremamente trabalhoso para o pessoal da folha, que eles tem que fazer a implementação dos dados, tem que fazer a conferencia. e ver se o servidor vai receber né. Fazer a conferencia final da folha e nesses 4,5 dias que ele está extremamente atarefado vem a CGE e joga uma planilha com 100, 200 registros para o cara analisar em 2 dias. Isso é difícil para quem está na ponta (E6).

Thus, it is noteworthy that i) larger State Departments with more enrollments; and ii) State Departments with many inconsistencies tend to have negative associations about the model, especially when these CA demands accumulate with their day-to-day attributions. E3's speech is also perceived in E1's speech.

It became clear that the CA model can be better used when there is a certain level of partnership between internal audit and auditees. E3's speech highlight this situation.

[Execution of CA audit trails] (...) it was something that would lead to excellent results from our work. If we were able to assemble the audit trails and have the support of the human resources divisions. That they understand that that CA can bring results and help them in the analyzes (E3).

[A execução de trilhas de AC] (...) era uma coisa que ia levar resultados excelentes do nosso trabalho... se a gente conseguisse montar as trilhas e com o apoio das setoriais. Que eles entendam que aquilo ali pode dar resultado e ajudar eles nas análises (E3).

E1 complements E3 when he comments that it is important for the human resources divisions to understand that they can see the internal audit as a partner.

A way to overcome these barriers with the auditees would be to hold meetings with the auditees, carefully explaining the importance of CA, including the explanation of all theoretical aspects of CA.

(...) Now that we are visiting and explaining, we see that they begin to understand a little better, right? About the audit trails developed by types of payment. The last meeting with the [human resource division] we saw that they were very surprised with the type of work we are doing. (E7)

(...) agora que a gente está visitando e explicando é que a gente vê que eles começam a compreender um pouco melhor né? Essa questão de trilhas desenvolvidas por rubrica e tal. A última conversa com a [setorial] a gente viu que eles ficaram bem surpresos com o tipo de trabalho. (E7)

As reported by E7, these meetings allow auditees to better understand how CA is operationalized, making them part of the process and bringing them as partner. As already mentioned, the approximation between internal audit and management is expected with CA

models, as already reported in the literature, and seems to be important for strengthening the model.

However, it seems that an inadequate model can generate opposite results, as reported by interviewees.

but once again, with time, we execute several audit trails and many brought a lot of false positives... (...) with time [divisions] answered “this is a false positive”, but I think they got tired and they didn't start to give more feedback regarding these audit trails, right? After they started not giving feedback for any audit trail... it's just that there were audit trails that were working as supposed to work (E3).

só que mais uma vez com o tempo cara, a gente viu que rodou várias trilhas e muitas vinham muito falso positivo... (...) com o tempo [os órgãos] respondiam “isso é falso positivo”, mas acho que eles cansaram e eles não começaram a dar mais um feedback em relação a essas trilhas né? Só que aí começaram a não dar mais feedback para nenhuma trilha... só que tinha trilha que tinha resultado (E3).

In CA this happened a few times. We ended up generating a lot of audit notes that ended up being normal situations, which end up happening on the payroll and this ends up causing a deterioration on the relation with human resources divisions. You send the first time, send the second and the third time a series of repetitions begins to come, which have already been explained before, but as a rule it appears as a false positive in this case, right? So, this ends up generating disbelief in the work, disbelief in the audit trail. CA should always be aware of these issues. The model should be adequate before sending exceptions or anomalies to the human resources divisions (E6)

Na AC isso ocorreu algumas vezes. A gente acabava gerando uma grande quantidade de apontamentos que no fundo acabavam sendo situações normais, que acabam acontecendo na folha e isso acaba gerando um desgaste com o outro órgão. Você manda a primeira vez, manda a segunda e na terceira vez começa a vir uma serie de repetições, que já foram explicadas anteriormente, mas via de regra aparece como um falso positivo no caso né? Então isso acaba gerando uma descrença no trabalho, desacredita na trilha. Isso é um cuidado que sempre precisa se tomar na hora de se falar da AC. É preparar bem os resultados antes de enviar para os órgãos (E6)

Thus, decreasing the number of false positives seems important for this partnership to be retained and to improve the acceptance of CA within GAPES. E6 explains that this can be done through greater preparation (validation) of the results, before sending them to human resources divisions.

For models with more accurate and precise results (Deterministic Audit Trails and Death Audit Trail, for example), auditors' perception is that human resources divisions appreciate more CA recommendations, as reported by E2.

With the staff I've been in contact with (...) they appreciate it, have liked it, they even ask me about the results and they respond effectively and very quickly, in my opinion. (E2)

Com o pessoal que eu tenho mantido contato (...) o pessoal gosta, tem gostado, me cobram inclusive em relação ao resultado do cruzamento e atendem efetivamente e de forma bastante rápida, na minha opinião. (E2)

E2 comments confirms previous evidence, that false positives lead human resources divisions away from CA and that more accurate models bring them closer. More precise models can improve human resources divisions efficiency (for instance, CA can avoid reimbursement process that usually takes a lot of time from staff), without generating much effort for them. E2 adds that “they like the security of having this control – more people working to avoid the mistake.”

Support of senior management is also important for the construction of this relationship between the audit and auditees, as E1 highlights, especially when it is necessary for State Departments human resources divisions to act as oriented or demanded by the auditors.

Another issue is that the hierarchical participation for the audit is very little involved. For important situations we do not see. When you have an important situation and you go from auditor to management, or from management to management, you close the payroll and leave it there. The lack of action by the hierarchy is also an issue, for example, director with director is very important (E1)

Outra questão é que a participação hierárquica para a auditoria é muito pouco envolta. Para situações importantes a gente não vê. Quando tem uma situação importante e se passa de auditor para gerência, ou de gerência para gerência, fecha a folha e fica por aí. A falta de atuação da hierarquia também faz falta, por exemplo, diretor com diretor é muito importante (E1)

CA can bring the auditor closer to relevant events and the number of possible false positives is extensively reported in the literature. However, no studies discussed it deeply on how an eventual partnership with the auditees could benefit this model, leading them to potentially accept a greater number of false positives.

In addition, internal auditors' interviews shows that this partnership (which can be deepened through awareness-raising and the reduction of false positives) can be fundamental for improvements in the CA and consequently a more extensive use and greater satisfaction with it. This partnership can influence model inputs (in the elaboration of new audit trails based on legislation) and model outputs (more timely responses and meeting CA demands).

This conclusion can be summarized in the speech of E3 and E5:

It is important to keep in touch with the human resources divisions so that they are partners in this ongoing monitoring work, especially because their role will be essential. If there is no quick and agile feedback from the sector there, it will not work (E5)

É importante manter contato com as setoriais para que eles sejam parceiros nesse trabalho do monitoramento contínuo, até porque o papel deles vai ser essencial. Se não houver um retorno rápido e ágil, do setorial lá, a coisa não vai funcionar (E5)

I think that, sometimes, we have partnerships, right? With the other side, to assist in our work, we form partnerships. We need information that sometimes we don't know and they do know, to give us and improve our analyses (E3)

Eu acho que assim, a gente tem as vezes parcerias né? Com o outro lado, para auxiliar no nosso trabalho que a gente faz parceria. A gente precisa de informações que às vezes a gente desconhece e eles conhecem, para nos passar e melhorar nossas análises, (E3)

The use of CA and the results sent to the human resources divisions can also serve as input for improving the methodology, when there is a partnership in which human resources divisions provide feedback on these results, as listed by E3.

I need [the feedback] even to - if it's new audit trail - to confirm if I'm not wrong on the audit trail, if there's something I can improve, because there are situations that aren't what I previous understood. So, I need to have some contacts in the human resources divisions that help me identify these situations and give me feedback, (E3)

Eu preciso [do feedback] até para - se são trilhas novas - para confirmar se eu não estou errado na trilha, se não tem nada que eu possa melhorar, pois tem situação que não é aquilo. Então eu preciso ter alguns contatos nas setoriais que me ajudam a identificar essas situações e me dar um feedback, (E3)

With all observations in the field and comments from interviewees, we design the model present in Figure 24, which demonstrates the main elements on the Facilitating Conditions within the CA model operationalized in GAPES. In addition, it is noteworthy that we understand, based on research results, that the expression “Facilitating Conditions” may not adequately represent the purpose of this category within the UTAUT. Discussions on this nomenclature (Organization Conditions, instead of Facilitating Conditions) are presented in the section about discussions of the research propositions.

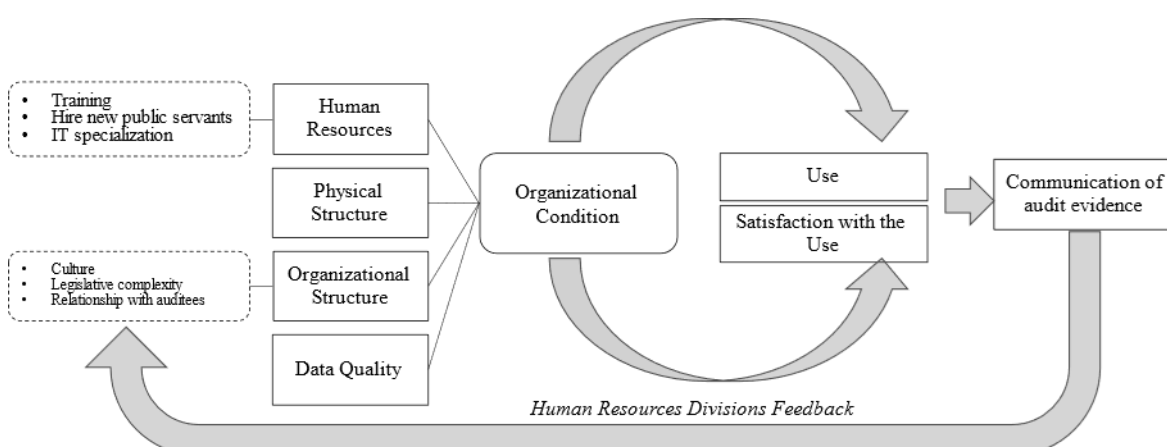


Figure 24 - Facilitating Conditions and relationship with use and satisfaction

4.4.4 Continuous Audit and Social Influences

Social influences, as shown in the literature, is a factor that can interfere with the acceptance of CA. Results on this category are more inconclusive than other categories (such as performance expectancy and effort expectancy). In fact, internal auditors' reports do not allow us to infer that these influences have a very large impact on the acceptance of the CA, although some situations could be extracted from the interviews.

what compromises the most is the lack of commitment. The person does not want to fight for the audit causes to make a good impression. The person does not want to do the auditing role (E1)

o que compromete mais é a falta de comprometimento. A pessoa não quer lutar pelas causas da auditoria para ficar bem na foto. A pessoa não quer fazer o papel da auditoria (E1)

E1's report demonstrates that auditors could not commit properly if he wants to maintain a positive image with other public servants. As GAPES internal auditors usually audit other public servants, this in fact could be an issue for audit independence.

Field observations showed that this does not seem to be a serious problem to the point of interfering with the CA's performance, although the personnel audit is indeed a delicate area, since it can occur in many cases where auditors visualize situations of their own colleagues. However, inconsistencies found by the CA of colleagues were observed in the field and they did not seem to be an obstacle to correcting these problems.

E3's report reinforces that negative views from human resources divisions about his work in the CA do not interfere.

people in the human resource divisions think I'm annoying because I charge until I get the answer. I don't give up, I can be with audit evidence for 6 months, but at least once a week I will bother them. They will have to explain to me why they can't fix the problem (E3)

o pessoal do setorial me acha chato porque eu cobro até ter a resposta. Eu não desisto, eu posso estar com ela há 6 meses, mas pelo menos uma vez por semana eu vou incomodar. O cara vai ter que dizer porque não está vendo (E3)

E1 also reports that it is bad for the organization to have a personnel auditing body and not be aware of relevant situations (in the example, the positive variation of R\$ 900 thousand in a server's paycheck). This means that the model is important to prevent negative damage to the audit image.

Regarding the social influences of co-workers, auditors also reported some situations. colleagues understand how important [the CA] is, and to the extent of its specificity, working the CA in their area is one of the guidelines of the audit. (...) This importance

is to reciprocate within the board. I don't want to believe that someone doesn't think it's important (E1)

os colegas entendem como importante [a AC], e na medida da sua especificidade, trabalhar a AC em sua área é um dos nortes da auditoria. (...)Essa importância é reciprocado dentro da diretoria. Não quero acreditar que alguém não ache importante (E1)

associating the use of modern technologies in the audit is a way to improve the image. We think *auditor* as one of those old accountants, who work with gigantic pile of files, with legislation, with tables full of processes, those things, and this would be an old image of the auditor. CA for bringing new technologies, bringing statistical tools, and more modern tools, is a way for you to rejuvenate the auditor's image (E2)

associar a utilização de tecnologias modernas na auditoria é uma forma de melhorar a imagem. O Auditor a gente pensa naqueles contadores antigos, que trabalham com arquivos gigantes, com legislações, com mesas cheias de processos, essas coisas, e essa seria uma imagem antiga do auditor. E AC por trazer novas tecnologias, trazer ferramentas estatísticas, e ferramentas mais modernas, é uma forma de tu rejuvenescer a imagem do auditor (E2)

E8 reports another view and the possible negative impacts of the CA on the audit's image.

I always felt, even when I went to work in other managements (...) people have a vision of GAPES that was never good, you know? One thing I noticed working in our central human resource division is that people have the same vision that a sector, or [the central human resource division] has, our co-workers also have of us. They think that any error on the payroll, whatever it is, we must detect. So, in the perception of our own colleagues, we are responsible for everything, you know. If you miss something "Oh, GAPES you didn't see it". (...) As auditors they know that they will not be able to enclose everything, but they think that GAPES has to encompass everything. Did you understand? They think the payroll is not complex. (...) Maybe it's because of the continuous monitoring or maybe the way it was done before, that we didn't work with these audit trails. (...) (E8)

eu sempre senti, inclusive quando eu fui trabalhar em outras gerências (...) as pessoas têm uma visão da GAPES que nunca foi boa entendeu? Uma coisa que eu percebi trabalhando no nosso órgão central é que as pessoas têm a visão, a mesma visão que um setorial, ou [o órgão central] tem, os nossos colegas de trabalho também têm da gente. Eles acham que qualquer erro da folha, qualquer que seja a gente tem que detectar. "Ah teve uma decisão judicial que foi implementada com interpretação equivocada". Então na cabeça dos nossos próprios colegas, nós somos responsáveis por tudo, entendeu. Se deixa alguma coisa passar "Ah a GAPES que não viu". (...) Eles também como auditores e cada um atuando na sua área, eles sabem que não vão conseguir cercar tudo, mas eles acham que a GAPES tem que cercar tudo. Entendeu? Eles acham que a folha é simples. (...) Talvez seja por conta do monitoramento contínuo ou talvez a forma que era feito antes, que a gente não trabalhava com essas trilhas. (...) (E8)

In this way, people who do not have complete knowledge about CA may have a mistaken view that the model can assure 100% of the payroll. Because of that, when internal auditors miss a problem in payroll, the image is more negatively impacted than normal.

In E3's view, the impacts generated also have repercussions in the media and society's perception also seems to be important, in his view.

even by what we see in the media, right? The impact that society sees is that the internal control system is working, that someone is monitoring problems... that there are wrong situations, or errors in public spending, someone is assuring... and society, although she doesn't know in detail what a continuous audit is, she knows that someone is doing a job of monitoring, right? (E3)

até pelo que sai na mídia né? O impacto que a sociedade verifica é que esta existindo controle, que alguém esta verificando.. que se tem situações equivocadas, ou erros dentro do gastos públicos, alguém esta vendo... alguém esta de olho e esta pegando... e a sociedade ela, embora não conheça no detalhe o que é auditoria continua, mas ela sabe que alguém esta fazendo um trabalho de olhar né? (E3)

E3 reinforces, however, that he does not think that society or human resources divisions truly understand how CA is performed (or even exists). The same perception was reported by E4.

Even with the human resources divisions, I always explain that we... when we send the analysis that it was carried out via continuous monitoring, a continuous audit of events... that are repeated monthly (the analysis). But I've never received feedback saying, "well your CA is perfect. Several things are coming". It's always the perception that is the audit, in more general terms. (E3)

Inclusive assim com os órgãos eu sempre explico que nós... quando a gente encaminha as análises que ela foi feita via um monitoramento contínuo, uma auditoria continua das situações ne.. que são repetidas mensalmente (a análise). Mas nunca recebi um feedback assim dizendo, "po a AC de vocês esta perfeita. Está chegando varias coisas... é sempre auditoria ne, em termos mais gerais mesmo. (E3)

Work has been done to publicize this and when it comes to another person or State Department, he understands it as a positive thing. Maybe they don't know exactly what it's made of, but it has this positive aspect. (E4)

Têm sido feito um trabalho de divulgação disso e quando chega em outra pessoa ou órgão, ele tem isso como positivo. Talvez eles não saibam exatamente o que é feito, mas ela tem esse aspecto positivo. (E4)

The audit that does not use extraction techniques, data analysis, mining, it is doomed to be in the past. So, the fact that we are trying to develop a more CA robust model, I think it brings an image advantage to the audit, for sure. (E5)

A auditoria que não usar técnicas de extração, de análise de dados, de mineração, ela está fadada a ficar no passado. Então o fato de a gente estar tentando criar esse modelo de AC, acho que isso aí traz uma vantagem de imagem para a auditoria, com certeza. (E5)

CA is even more timely, it is more assertive. So, it sure helps a lot in our image. Undisputed. (E8)

AC é mais tempestiva, ela é mais assertiva. Então com certeza ajuda muito na nossa imagem. Incontestável. (E8)

The ease with which CA generates quantifiable results (financial benefits) is also highlighted as an important element of CA for creating a positive image to others.

Eventually, when you identify a situation that was wrong, it generates a correction, generates a return. This return on CA is generally easy to quantify, understand? Often an operational audit is carried out, a procedure changes, but you have no way of quantifying what will go forward and what will improve. Now in the CA, you identified a system problem, it was parameterized wrong. This generates savings of R\$ 100 thousand per month, in a year it is R\$ 1.2 million. That goes into the report, and this is easy to quantify and this ends up generating an image benefit (E7)

Eventualmente quando você identifica uma situação que estava equivocada, isso gera uma correção, gera um retorno. Esse retorno na AC é geralmente fácil de ser quantificado entendeu? Muitas vezes faz uma auditoria operacional, muda um procedimento, mas tu não tem como quantificar o que aquilo vai pra frente e vai melhorar. Agora na AC não, tu identificou um problema de sistema, estava parametrizado errado. Isso gera uma economia de R\$ 100 mil por mês, em um ano é R\$ 1,2 milhão. Aquilo vai para o relatório e isso é fácil de quantificar e isso acaba gerando um benefício de imagem (E7)

E3 emphasizes that the way these results are presented must be improved, so that the image can be further improved within the organization.

Our result presentations are too poor, I think if we could take this data and convert it into a better way to show it. I'll just give you an example. Ah, the result that we got on this subject here, I don't know, duplicity of an State Department, how much of weaponry could have been purchased for the military police, for example? Show both the manager and society as well. I think something like that is missing (...) it can have considerable value that society needs to know, and we don't take advantage of it. It would be an income statement or something. For society to understand and show the benefits to society. "This is a result that the State is monitoring and is not spending too much and it is showing that someone is working on it, right (E3)

a gente faz uma apresentação muito simples, eu acho que se a gente conseguisse pegar esses dados e convertesse em uma forma de mostrar melhor. Vou dar só um exemplo simples. Ah o resultado que a gente pegou esse assunto aqui, sei lá duplicidade de um órgão, quanto que poderia ter sido comprado de arma para a polícia militar, por exemplo? Mostrar tanto para o gestor como para a sociedade também. Eu acho que faltava uma coisa dessa (...)pode ter um valor considerável que a sociedade precisa saber e a gente não aproveita isso. Seria uma demonstração do resultado, alguma coisa assim. Para a sociedade entender e que traga benefícios para a sociedade. Que ela esteja vendo que aquilo ali é a auditoria. "Isso aqui é resultado que o Estado está vendo e não está gastando demais e está mostrando que alguém está trabalhando nisso né (E3)

In general, there is a unanimous perception that CA generates improvements in the image of internal audit. However, it is not evident whether these image improvements are motivating factors for auditors to accept more CA within GAPES. In terms of CA, social influences can be seen from: i) human resources divisions; ii) internal auditors' managers (especially top managers); and iii) society.

4.4.5 Continuous Audit and the Quality of Systems

The different systems used by GAPES that operationalize or help CA were evaluated: i) SIGRH, as a payroll management system; ii) the SGPE, as the electronic process system; iii) the ACL as the audit analytical tool; iv) BoaVista and Extractor as the database and the platform used to execute the trails in SQL; and v) and all systems (Email, Whatsapp) used for the communication and follow up process.

Problems in SIGRH were reported by auditors.

Sometimes we try to access an enrollment in the SGRH, when he has positions in two State Departments, or he is from one and is receiving for a position in another and there is no information. Sometimes I cannot find it in SIGRH, I consult the Transparency Portal. (E8)

Às vezes a gente tenta acessar uma matrícula no SGRH, quando ele trabalha em dois órgãos, ou ele é de um e tá recebendo cargo em outra e não consta informação. Às vezes eu não consigo localizar no SIGRH eu consulto o Portal da Transparência. (E8)

If SIGRH were properly fed with the complete information, the audit could do more robust work. More robust monitoring. It is something that depends on the State Departments doing their part, so that the CA can move forward. (E1)

Se o SIGRH fosse devidamente alimentado com as informações completas, a auditoria poderia fazer trabalhos mais robustos. Cercar melhor o trabalho, o monitoramento. É uma coisa que depende de que os órgãos façam sua parte, para que a AC seja capaz de avançar. (E1)

These problems seem to occur due to the lack of information in SIGRH (which may be due to the non-completion of this information by the State Departments in the payroll). It would be necessary to understand if some important fields in SIGRH should be mandatory, as some of them are not.

A possible solution to this problem would be to have closer relation with the human resources central divisions and State Departments human resources divisions when parameterizing the systems, as reported by E1.

The audit would be much more effective in defining the system's parameterization. We tried many times, together with the [central human resources division], for our management to participate in the parameterizations of the system when a new legislation is approved. Because then you could already help to do the analysis to avoid being wrongly parameterized. (E1)

A auditoria teria bem mais efetividade na definição da parametrização do sistema. Se tentou muitas vezes, junto com o [órgão central], para que nossa gerencia participasse das principais parametrizações do sistema, quando sai uma nova lei. Pois ali você já auxilia a fazer a análise para evitar que seja parametrizado e ficado alguma situação de fora. (E1)

Another problem that affects the SIGRH concerns the structure of the state and its constant reforms.

In the public administration you have a lot of reforms, right, every 4 years the governor changes, then he wins, reforms, extinguishes State Departments, creates others and the system [SIGRH] does not follow this. It should, but it doesn't. It must be agile and flexible to assimilate changes and the system has to adapt to reality, not the other way around. And here what has been happening is that the reality that has to fit into the little boxes of the system, and that shouldn't be the case. (E6)

No setor público você tem muita reforma né, a cada 4 anos troca o governador, daí ele ganha, faz uma reforma, extingue órgãos, cria outros e o sistema não acompanha isso. Deveria, mas não acompanha. Ele tem que ser ágil e flexível para assimilar as mudanças e o sistema tem que se adequar a realidade, e não o contrário. E aqui o que vem acontecendo é que a realidade que tem que se enquadrar nas caixinhas do sistema, e não é isso né. (E6)

Regarding the SGPE, which is the system that manages all processes within the State, auditors reported improvements in relation to previous years.

It facilitated, because most processes are in the SGPE digitally right? It used to be more complicated (...) in the past you used to look at a retroactive payment. Then there was "SAP process number" and before that there was no digitalization. The physical process should be in SAP [inside the physical building], you had no idea (...) by the regulations now it should be [in the SGPE], even the calculation should be there. You can check if it is correct, if it is within the parameter. So, the monitoring allied with the digitization of the SGPE was important. This also goes through the human resource division that input the information, it being in the SIGRH (...) because sometimes it is also not. Today it SIGRH have much more information than 10 years ago, because 10 years ago you couldn't find any information. (E4)

agora facilitou, pois, a maioria dos processos estão no SGPE digitalmente né? Antes era mais complicado (...) antigamente tu olhava lá um retroativo. Daí estava lá "processo SAP número tal" e antes não tinha digitalização. O processo físico deveria estar na SAP, tu não tinha noção (...) pelas normativas deveria estar [no SGPE], até o cálculo deveria estar lá. Tu já consegue ver se está correto, se está dentro do parâmetro. Então realmente o monitoramento aliado com a digitalização do SGPE foi importante. Isso passa também pelo setor que colocou a informação, ela estando no SIGRH (...) porque as vezes também não está. Hoje em dia está bem mais do que há 10 anos atrás, pois há 10 anos atrás tu não achava informação nenhuma. (E4)

E5 also points out that any entry on the payroll, which is not automatic, which is not parameterized, must have a process in the SGPE.

About data analysis and analytical tools, E6 comments.

We have a [good] tool. We could be working with what we've already have, you can't make much progress on the ACL issue in terms of the divisions feedback. We have the ACL that works. It doesn't answer 100% [or our problems], but it has been working for some time. It is obvious that technology we always have to try to improve and there are some ACL tools that we still haven't been able to implement, especially the part of the result [communication and follow up]. There it needs to evolve a bit. (E6)

Ferramenta a gente tem. Tem como trabalhar como a gente vinha trabalhando, não consegue avançar muito na questão da ACL em questão do retorno dos órgão, nessa parte de administração de resultados. Nós temos o ACL que atende. Não atende 100%, mas ele tem dado resultado há algum tempo. É obvio que tecnologia a gente sempre tem que procurar melhorar e tem algumas ferramentas do ACL que a gente ainda não conseguiu implantar, principalmente essa parte de resultado. Ali precisa evoluir um pouco. (E6)

For the processes of communicating audit findings, internal auditors also report difficulties.

We use e-mail to contact the State Department, until we have a platform for communication, which I hope we have as soon as possible, but while we don't have it, contact is also by e-mail, or eventually by Whatsapp (...) mainly during the pandemic, we ended up using [Whastapp] a lot. People working from home, you had to get the public servant contact to clarify something or even notify you that there is a certain inconsistency that needed to be regularized. Even for the time we have, before closing the payroll you have to try to remove it [the incorrect payment]. If you detect that something is irregular, you need to have an agile, quick contact. (E5)

E-mail a gente utiliza para contato com os órgãos, até que se tenha uma plataforma para comunicação, que espero que a gente tenha o mais breve possível, mas enquanto não se tem, o contato também é por e-mail, ou eventualmente por Whatsapp (...) principalmente nesse período da pandemia, a gente acabou utilizando bastante [Whastapp]. Pessoal trabalhando home office, você tinha que conseguir o contato do servidor para conseguir esclarecer alguma coisa ou até notifica-lo que tem determinada inconsistência que precisava ser regularizada. Até pelo tempo que a gente tem, antes de rodar a folha você tem que tentar retirar. Se detecta que algo está irregular você precisa ter um contato ágil, célere. (E5)

The notifications were basically by E-mail, for being more agile, and something else was sent via electronic process, via SGPE. I took the result, created an Audit Information [type of document] based on the legislation, telling what the problem was in that situation and forwarded it to the State Department to give feedback or make the correction that needed to be made. (E6)

As notificações eram basicamente por E-mail, por ser mais ágil, e alguma outra coisa enviava via processo eletrônico, via SGPE. Pegava o resultado, criava uma Informação [tipo de documento] com base na legislação, contando qual era o problema daquela situação e encaminhava para o órgão dar o retorno ou fazer a correção que precisasse ser feita. (E6)

Internal auditors also reported limitations of the current tools used for the communication process. E6 reports the absence of an effective communication tool that would allow the integration of personnel management in the CA process.

About Extrator and BoaVista, internal auditors report that they often need to carry out tests to identify whether the data that comes out of them are in fact reliable, as reported by E3.

First, I see if this data is reliable. If there's no problem of lack of information there... to meet what I'm going to analyze... then being reliable and complete I execute my audit trail, the trails I've been executing, or new ones I'm going to make (E3)

Primeiro, eu vejo se esses dados estão íntegros. Se não tem nenhum problema de falta de informação ali... pra atender ao que eu vou analisar... então estando íntegros e completos eu faço a minha trilha, as trilhas que eu tenho montado, ou novas que eu vou fazer (E3)

Based on interviewees, documents and observation field, we could conclude that although the different systems meet at least partially the current needs, there is room for

improvement in all systems. It was also highlighted that the digitization of processes (SGPE) opened an interesting field of analysis, still little explored, as evidenced by field observations. The SGPE has documents predominantly in .PDF format that complement or integrate the data contained in the SIGRH. This database is not yet technologically explored by internal auditors (with text mining techniques, for example). The analyzes carried out today in the SGPE are fully manual and are used by internal auditors to validate some information.

Although the Quality of Systems (a category originated from D&M) has been worked on as a separate category from the Facilitating Conditions (a category originated from UTAUT), our results shown that in order to avoid overlapping of elements, we suggested that they should be understood as a single category. In fact, the quality of the system must be inserted within the physical structure of the model, and the data used by the CA. In this way, the System Quality is inserted in Figure 24 within the category of Facilitating (Organizational) Conditions, as shown in Figure 25.

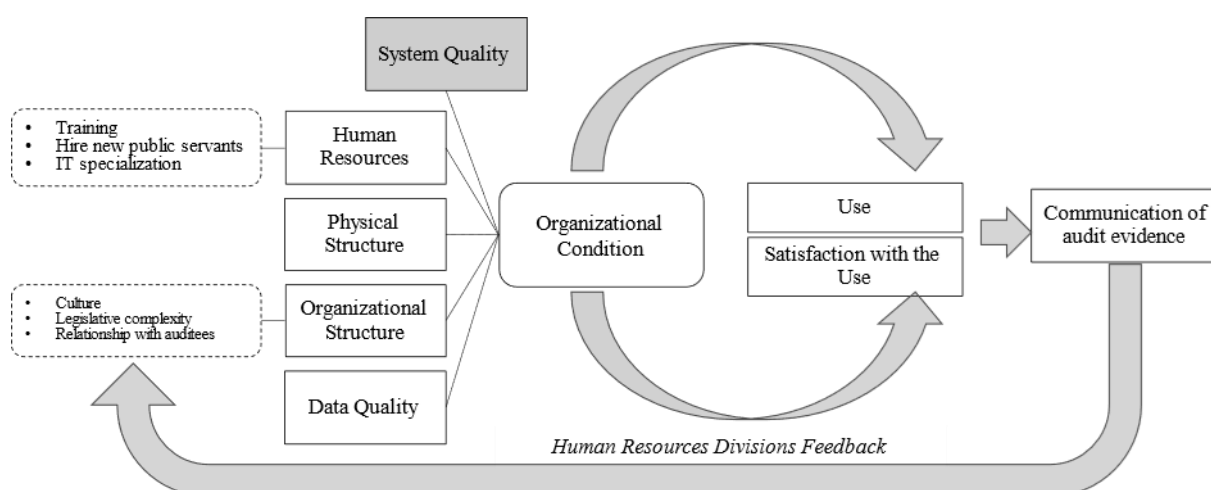


Figure 25 - System Quality and Facilitating Conditions

4.5 NET BENEFITS OF CONTINUOUS AUDIT

No system, when adopted and accepted within organizations, generates benefits without any associated negative impacts (DeLone & McLean, 2003). Different benefits and negative impacts associated with the use of CA by GAPES were evidenced.

These impacts were divided into ten categories of analysis:

- i. Financial benefits and cost-effectiveness;
- ii. Reflections on the efficiency of the internal audit;

- iii. Relationship of internal auditors with organizational data;
- iv. Impact on information supporting audit planning;
- v. Impacts on internal controls;
- vi. Accuracy and false positives;
- vii. Continuous, permanent and timely control of the CA;
- viii. Comprehensive control;
- ix. Role overlaps between internal audit and internal control;
- x. Auditor independence.

With this overview, it is evident that the elements found in this dissertation are more comprehensive than those identified only in the literature and therefore go beyond the propositions presented.

4.5.1 Financial Benefit and Cost-benefit of Continuous Audit

Auditors' reports and internal documents show that the CA has achieved positive financial returns for the Executive Branch of the State of Santa Catarina (PEESC), and that the CA makes it easier to measure these returns than traditional audits.

the result that is shown annually to the personnel audit management. The amount and amounts saved to the state or potentially saved. (...) With the summary of our annual work, we did not have this before [traditional audits]. Neither the mapping of values, which we do now (E3).

o resultado que é demonstrado anualmente para gerencia de auditoria de pessoal. A quantidade e os valores economizados para o estado ou potencialmente economizados. (...) Com o apanhado dos nossos trabalhos anuais a gente não tinha isso anteriormente [auditorias tradicionais]. Nem o mapeamento dos valores, que a agora a gente (E3).

The financial results achieved by the performance of the CGE and by the CA model of GAPES can be seen below. In 2021, in financial benefits alone, CGE earned BRL 186,477,811. Considering that during this time an average of 50 auditors worked at the CGE, the work of each auditor contributed to savings, on average, of the amount of R\$ 3,729,556 with the activities performed throughout the year, according to IN CGE 38/ 2022 (DOC 11). Of this amount, R\$ 73,195,029 were amounts avoided or credits to be reimbursed, according to the management report (DOC 2) evidenced exclusively by the work of the CA, that is, almost 40% of the total financial benefits saved to the public budget by the CGE. With this, it is possible to perceive that in fact the CA brought a very robust financial benefit for PEESC.

Interviewees' statements also allow highlighting that internal auditors are satisfied with the ease of measuring financial benefits through the CA model. This characteristic is also contrasted with the dissatisfaction that some internal auditors (especially the more data-oriented ones) have about the slowness and difficult measurement of the financial benefits arising from the results of traditional audits.

Financial benefits achieved with the CA are easy to measure, and generates positive results in the image of GAPES, internal audit and CGE. This is because these financial benefits are more tangible to be seen than other non-financial benefits, such as the optimization of processes or the improvement of a certain internal control.

The present dissertation also evidenced CA cost-benefits from a financial point of view. In this sense, we found that CA is an advantageous methodology both financially and from the point of view of its cost-benefit. To get to this conclusion it was also necessary to analyze the costs involved in this model. Due to some limitations, the total costs were estimated, although it is understood that they reflect the reality witnessed. The main costs are related to the remuneration of the staff involved in the methodology; physical costs such as machinery and physical space; and the costs of the software used by CA.

Regarding the costs of GAPES, it is noteworthy that in 2021, 6 internal auditors and an audit manager worked directly with the CA. One of these internal auditors retired in mid-2021. Although they all work on the CA model directly, some data-oriented auditors work practically exclusively with the use of analytical audit techniques and are responsible for all extractions, transformations and loads of the data that are available to the CA. The other auditors also carry out traditional audits throughout the year, in accordance with the Annual Audit Planning (PAA) (DOC 6).

In addition, 1152 man-hours were provided for the execution of the payroll monitoring activity in 2021, according to DOC 6. Considering the number of hours and the gross salary per hour of each internal auditor cost in 2021 an average of R\$ 117 (R\$ 25790.00 of gross monthly remuneration divided by 220 hours per month), the total cost of these public servants for the CA model in 2021 was R\$ 134,784. In addition, as already mentioned, two data-oriented auditors work at GAPES in activities predominantly focused on CA, totaling a gross cost of R\$ 670,540. Their total gross remuneration was considered, although these auditors also participated in other activities. To get this information we used data from the Transparency Portal (DOC 7). The total cost with personnel involved in CA is R\$805,324 in 2021.

CA uses some systems, such as ACL, QlikView, Extrator and BoaVista. The cost of these tools is all shared with other managements and State Departments and for this reason these costs become practically irrelevant for the analysis, but it is estimated that they reach a value for GAPES of R\$ 60,000 per year.

In addition, there are the costs of the physical structure of GAPES. GAPES is currently located in the Administrative Center of the State of Santa Catarina, in a room of approximately 150m² and for this reason, exact costs are difficult to measure. The room is quite old and with structural problems. In this way, a value of R\$ 90,000 per year (R\$ 7,500 per month) was estimated in case of rent payment. As an example, a 45m² room in a similar region cost around R\$2,500 per month.

Adding the costs of physical structure and personnel structure, the total amount is R\$ 955,324, indicating a positive net result of R\$ 72,239,705, that is, amounts avoided or to be reimbursed to PEESC in the approximately amount of R\$ 12 million per GAPES internal auditor.

The cost-benefit issue is also highlighted by E3.

It's not a lot at R\$ 1 billion [monthly value], but it's a public expense being wasted that shouldn't be wasted. But there is also the issue of cost-benefit and risk management. Is it worth put a lot of effort and time to identify R\$ 100 thousand in a payroll [of R\$ 1 billion] or not, right? (E3)

não é muita coisa em R\$ 1bi [valor mensal], mas é um gasto público que está saindo que não deveria sair. Só que também, tem aquela questão de custo-benefício e gestão de risco disso. Se vale a pena perder muito trabalho para identificar R\$ 100 mil em uma folha ou não né? (E3)

Documents and interviews make us conclude that even though CA may in some cases not present voluminous results, the CA proves to be quite advantageous, demonstrating that the model is an important investment for the internal audit, at least for the payroll area. However, being cost-effective does not necessarily mean that the model is in fact efficient, as efficiency is more related to using currently available resources in order to maximize outputs, regardless of the net financial results achieved.

Furthermore, it is known that a significant portion of gains with auditing and internal control are mostly of a qualitative nature, difficult to measure financially; however, easily perceived in the improvement of work processes, in the improvement of performance and operational results, in the reliability and timeliness of information, in the improvement of the

organizational culture, in the integrity and professional ethics, in the institutional image, among other gains (IN CGE 38 /2022).

Discussions about the impacts of CA on these elements are highlighted below.

4.5.2 Continuous Audit Efficiency

In addition to the financial benefits, efficiency is an element that many theoretical studies claim will occur due to the implementation of CA (O'Reilly, 2006, Chan et al., 2018, Bradford et al., 2020). What the results show is that improvements in efficiency depend on the stage of development of the CA model and also on the type of model executed.

The initial part of implementation is usually more expensive. It becomes efficient if there is continuity in the methodology. (...) This cost, I imagine, putting the CA within a routine, which will no longer need all the auditors involved in the CA. You can allocate two/three auditors in the routine to do the maintenance of this work, it will be very cost-effective. If continuity does not exist, then we will have a high cost of CA. We need to understand it as an investment, and the costs of this investment are spread over time. (E2)

A parte inicial de implementação é normalmente mais custosa. Torna-se eficiente desde que exista a continuidade da metodologia. (...) Esse custo, eu imagino que colocando a AC dentro de uma rotina, que não vai precisar mais de todos os auditores envolvidos na AC. Pode colocar na rotina dois/três auditores para fazer a manutenção desse trabalho, ele vai ficar com um ótimo custo-benefício. A questão é que se não existir essa continuidade, aí teremos um custo elevado da AC. A forma que temos que analisar é um investimento, e os custos desse investimento são diluídos no tempo. (E2)

E2 highlights the importance of the continuity of the model so that the investments made return and with that the model becomes efficient, generating more results with less necessary inputs. In the example, E2 highlights that the continuous use of CA reduces the number of auditors needed to maintain the model. This is because CA allows you to automate audit procedures, such as automatic verification of business rules. At GAPES, these business rules are viewed mainly through legislative aspects that need to be analyzed. The automation of CA in GAPES occurred mainly using the ACL, and later via the execution of SQL trails in BoaVista itself. These findings reinforce what the literature presents, that new technologies allowed the automation of various activities, reducing costs of continuous reporting (Bumgarner and Vasarhelyi, 2015).

As can be seen from internal documents, field observations and interviewees' reports, CA at GAPES has already sought to develop projects to improve CA that were not continued. Two examples were: i) projects to implement analytical dashboards to support GAPES (); ii)

construction of dozens of audit trails (in SQL) that were not definitively integrated into the CA (DOC 9). These two projects involved financial and human resources, and because they were interrupted early, they were not able to have an impact on the efficiency of the audit.

The CA efficiency was also analyzed considering the two main models currently implemented within GAPES: i) the Continuous Monitoring Audit Trail; and ii) the Deterministic Audit Trails model (including the Death Audit Trail).

The reports of E5, E7 and E8 allow us to identify that the way in which the CA is operationalized has an influence on the perception of efficiency caused by the methodology. Almost all internal auditors understand that the model based on deterministic audit trails is more efficient than the model of analysis of variances. Auditors explain why.

They weren't deterministic audit trails, they were variations and we had to look at that big list of type of payments. I never actually found that productive (E7).

Não eram trilhas determinísticas de auditoria, eram variações e a gente tinha que olhar aquela lista grande de rubricas. Eu nunca achei aquilo produtivo na verdade (E7).

The continuous monitoring model [of variations above R\$3500] was not efficient. You used to spend a lot of time and we have a reduced staff. Then you spent a lot of time for the auditor to analyze, 20 or 30 paychecks. Most were false positives. So practical result was quite few. Efficiency was not what we could say about the model. In the deterministic audit trails model, you already have a larger scale, right, it will sweep the entire database. What we need is to build more audit trails to really expand the scope, right? (E5)

O modelo de monitoramento contínuo [de variações acima de R\$ 3500] não era eficiente. Você dispndia muito tempo do auditor e nós estamos com a equipe reduzida. Daí você dispndia muito tempo do auditor para analisar, 20 ou 30 contracheques. Maioria era falso positivo. Então o resultado era muito pequeno. Eficiência não era o que a gente podia dizer sobre o monitoramento. O modelo de trilhas determinísticas você já tem uma escala maior né, vai varrer todo o banco. O que a gente precisa é ir construindo mais trilhas para realmente ampliar essa margem né? (E5)

With this model of deterministic audit trails, we have been saving time. These are more specific cases, we certainly had a gain and with this gain of time we have availability to do other activities. With the deterministic trails model, you don't analyze a lot of things, you send them to the human resources divisions so they can answer you, right? They should answer. So, it's not you searching for what happened on a case-by-case basis and often you don't have the information in the system itself. You wasted a lot of time, so you ask whoever did it and who will be able to explain it to you (...) finding any inconsistency in the monitoring model by variations was like finding a needle in a haystack, it was not efficient (E8).

com esse modelo de trilhas determinísticas, a gente tem ganho tempo. Já são casos mais específicos, com certeza a gente teve ganho e com esse ganho de tempo a gente tem disponibilidade para fazer outras atividades. Com o modelo de trilhas determinísticas, muita coisa você não analisa, você encaminha para o setorial para que ele te responda né? Ele que tem que responder, não tu ficar procurando caso a

caso o que ocorreu e muitas vezes você não tem a informação no próprio sistema. Você perdia muito tempo, então você demanda quem fez e é quem vai poder te explicar (...) achar alguma inconsistência no modelo de monitoramento por variações era como se fosse achar uma agulha em um palheiro, não era eficiente (E8).

Differences in terms of efficiency of the Deterministic Audit Trail model for the Continuous Monitoring Audit Trail model (variations) can be seen in Figure 26. While the deterministic model demands much more effort at first (validation stage), the Monitoring Trail requires a greater effort later. However, once automated, the deterministic model requires little maintenance and thus gains in scale. The non-continuity of the model entails costs that may not be paid in the short term, making it inefficient.

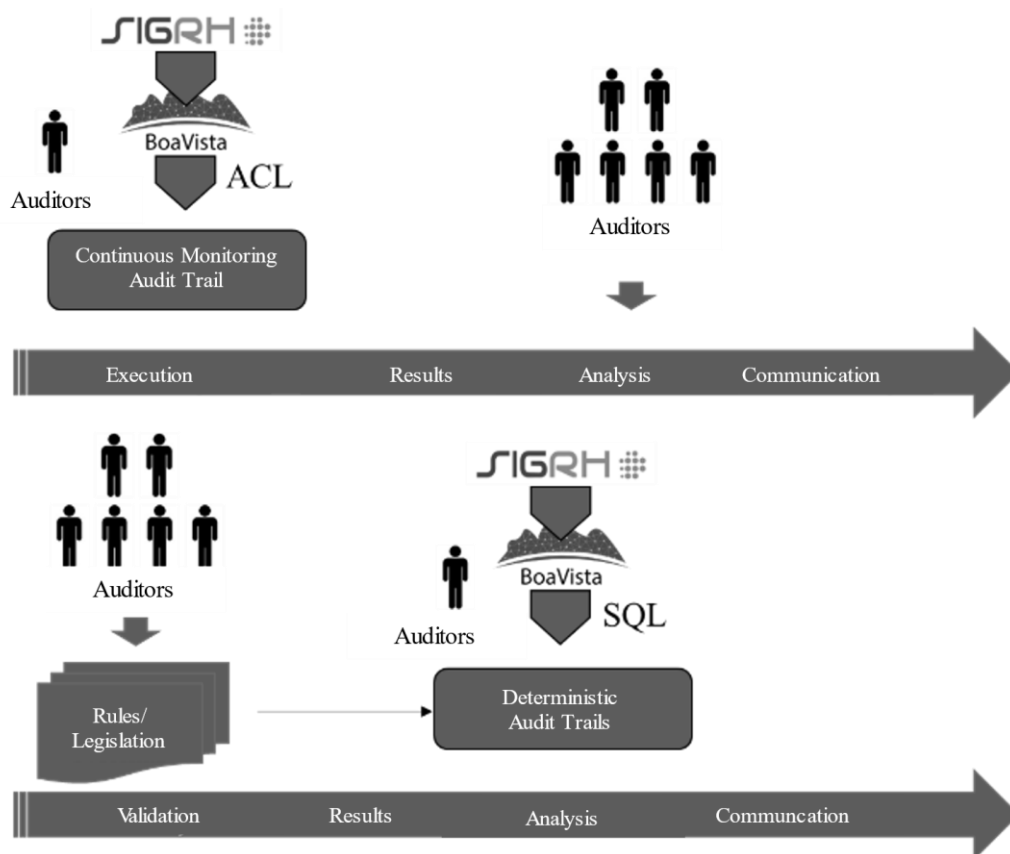


Figure 26 - Efficiency Differences between CA models

Aspects related to the efficiency of CA in the variations model can be highlighted below. The model points to a large list of enrollments, thus covering many possible inconsistencies, however, it causes a high number of false positives, which demands a lot of time from the internal auditors and presents only few results (exceptions). The deterministic model, on the other hand, has a larger scale, with a gain of time for the auditors, since the

findings are sent directly to human resources divisions, without prior analysis. This analysis is done during the validation stage.

The positive impact on efficiency in the deterministic trails model is related to scale gains, due to the analysis of the entire bank; time savings for audit, especially as the findings are more specific and accurate (taking less analysis time). As they are previously validated, the findings can be sent to human resources divisions, which also frees up time for the auditors.

In addition to these elements that characterize one or another model, there are elements identified that affect the efficiency of CA and that are not easily resolved internally by GAPES. These problems occur mainly due to situations outside GAPES, which are not easy to control in the current scenario. E1 and E6 highlight this situation.

The Continuous Monitoring model is not efficient, because nothing happens. Not because audit notes are unfounded, but because the pending issues only accumulate. It's inefficient because the issues get bigger and bigger, you must demand the manifestation of the [legal State Department], in some cases. [Analysis from] this Department, in general, takes a long time (E1).

O modelo de monitoramento não é eficiente, pois de concreto não acontece nada. Não por impropriedade dos apontamentos, mas porque as pendências apenas se acumulam. É ineficiente pois os assuntos se avolumam e além de se avolumar, você tem que demandar a manifestação do [órgão jurídico], em alguns casos. Esse órgão, de maneira geral é moroso (E1).

given the tools we had, I thought it was efficient. The problem was always with the operational staff that we were stuck in that question of the result, right? Not because of lack of tools, but because of lack of legislation. The human resource divisions do not feel today in PEESC obliged to comply with the recommendation of the audit, right? The big problem was the lack of feedback, right? The feedback length time also ends up extrapolating what is reasonable (E6).

dado as ferramentas que tínhamos eu considerava que o processo era eficiente. O problema era sempre com o final, que a gente ficava preso naquela questão do resultado né? Não por questão de falta de ferramentas, mas sim por questão de falta de legislação. O órgão não se sente hoje no Estado obrigado a cumprir determinação da auditoria né? O grande problema era a falta de retorno né? O tempo do retorno também acaba extrapolando o razoável (E6).

The inefficiency reported by E1 and E6 concerns the lack of solution of audit recommendations and in the delay to solve the problems evidenced by CA. This inefficiency, therefore, does not directly concern how the model is operationalized, but has effects on it. This aspect is related to a cultural aspect of the organization, which has already been presented as a possible barrier to the use of CA. Awareness-raising with human resources divisions can be important to improve this aspect.

Thus, to improve the efficiency of the CA, GAPES needs to solve two important issues: i) increase the response rate from human resources divisions (sector and the central

body); and ii) improve the timeliness that these divisions fix and answer to the appointed issues. A system that allowed an automatic communicating of findings would be a possible solution, although this solution would still potentially run into cultural problems of the PEESC, as E1 emphasizes.

It could be much better if the response time for handling audit notes was reduced. (...) If you have this automatic form of communication (...) But these issues of not being resolved immediately, it will not be resolved with the system, the problem is cultural (E1).

Ele poderia ser muito melhor se o tempo de resposta para o tratamento dos apontamentos fosse reduzido. (...) Se tiver essa forma automática de comunicação (...) Mas essas questões de não se resolver na hora, não vai ser resolver com o sistema, o problema é um pouco cultural (E1).

E3 and E4 list other situations that could help in a more efficient model.

to be fully efficient, you would have to know all the personnel legislation, all the situations that exist. What we are doing now already is a considerable advantage to what we did before in relation to the traditional audit (E3).

para ser totalmente eficiente, teria que conhecer toda a legislação de pessoal, todas as situações que existem. O que a gente já está fazendo já traz uma vantagem considerável ao que a gente fazia antes em relação a auditoria tradicional (E3).

it can be better, I think it can, but it is efficient (...) especially if there are more automation, more software (E4).

pode ser mais, acho que pode, mas ele é eficiente (...) principalmente se tiver mais automatização, mais softwares (E4).

The situations listed by E3 and E4 are: i) knowledge of the entire legislation (so that deterministic audit trails can be created for each one of these situations) and ii) more automation and more software's. Although these aspects have been reported by the auditors, it is not possible to identify whether this would in fact make the model more efficient. What can be observed, however, is that with the current knowledge and tools available, a migration to a model more focused on deterministic trails, according to reports and field observations, would make the model more efficient, and consequently, would make the internal audit itself more efficient.

Freeing up auditor's time is another gain from CA, as reported by E3, E5 and E7.

I think that we had a very large evolution of the auditors' working time, to take on other jobs. We've already had some gains that way. Although the number of auditors in our management decreased, we managed to gain time with several other jobs that would have to be done with the traditional audit, which would take even longer and the workforce was not enough (E3)

eu acho que a gente teve uma evolução muito grande de tempo de trabalho dos auditores, para pegar outros trabalhos. Já ganhamos assim com isso. Embora diminuiu a quantidade de auditores na nossa gerencia, nós conseguimos ganhar tempo com vários outros trabalhos que teriam que ser feitos com a auditoria tradicional, que levariam mais tempo ainda e a força de trabalho não era o suficiente (E3)

Another point is the time gain for the auditor (...) so from the moment we manage to run the audit trail and forward the results to human resources divisions, so that the sector can verify the origin of that payment or not. We'll have more time, right? Instead of going into the system and looking at paycheck by paycheck, I'm returning the situation to the human resource division so they can tell me if it's irregular or not, and if it's irregular, let it tell me why it's irregular. This will free up auditors to carry out operational audits, to give advice [consulting]. You start to gain quality, time to be able to think, to be able to plan the audits, which we ended up doing in a rush (E5).

Outro ponto é o ganho de tempo para o auditor (...) então a partir do momento que nós conseguimos rodar a trilha e encaminhar os resultados, para que os setoriais que verifiquem a procedência ou não daquele pagamento. Nós vamos ganhar tempo né? Ao invés de entrar no sistema e ficar olhando contracheque por contracheque, estou devolvendo lá para o setorial para que ele me diga se está irregular ou não, e se estiver irregular que ele me diga por que está irregular. Isso vai liberar os auditores para fazer as auditorias operacionais, para dar o assessoramento, responder consultas. Você começa a ganhar qualidade, tempo para poder pensar, para poder planejar as auditorias, coisa que a gente acabava fazendo meio no atropelo, na correria (E5)

This model that we are following now of creating audit trails and keeping the one we created up to date is the best model for us right now. Because it will take less time and we will go straight to the problem (...) It will greatly optimize our time, although creating audit trails, validating audit trails, keeping them updated will always take time, right? I think that this model of deterministic audit trails will free up the auditors a lot (E7)

Esse modelo que estamos seguindo agora de criar trilhas e manter a que criamos atualizadas é o melhor modelo para gente agora. Porque vai tomar menos tempo e a gente vai direto ao problema (...) Ela vai otimizar muito o nosso tempo, apesar de que a criação das trilhas, a validação das trilhas, a manutenção delas atualizadas sempre vai tomar um tempo né? Eu acho que esse modelo de trilhas determinísticas vai liberar bastante os auditores (E7)

In this way, gains in time were highlighted, and that the use of CA allowed GAPES to continue with its work quality even when its staff was reduced. E7, however, comments that maintenance of these audit trails is what should take up the time of the internal auditors, although he emphasizes that even so, this model through deterministic trails will free up time for the auditors.

Finally, CA also allows in loco visits to be reduced or even eliminated, which also implies generating more results with fewer inputs used, that is, making the entire process more efficient, as can be seen in E3's speech.

[with the help of the CA] you will hardly send an auditor [to a visit on site] with a data analysis to do a work that does not really have the precise inconsistency, but so,

if you make very well-founded, very well-structured audit trails, in a well-closed, well-analyzed and validated model (E3)

[com auxílio da AC] dificilmente tu vai mandar um auditor [in loco] com uma análise de dados para fazer um trabalho que não tenha realmente a inconsistência direcionada, mas assim, desde que tu faça trilhas muito bem fundamentadas, muito bem estruturadas, em um modelo bem fechado, bem analisado e validado (E3)

The different comments by internal auditors demonstrate that there is no consensus on the efficiency of CA within GAPES. CA efficiency largely depends on the way it is implemented, its continuity and the way it is operationalized (its different models). Our findings complements the current literature on the subject, which generally understands that CA improves the efficiency of internal auditing (Eulerich et al., 2019). Accepting that these findings are always carried out under the assumption of a robust model (full automated) and operating properly, then the results of the present research do not contradict the theoretical assumptions. The aspects of greater automation and its impacts on efficiency can even be observed in the speech of internal auditors. The details of the aspects highlighted that relate to the efficiency of CA are shown in Figure 27.

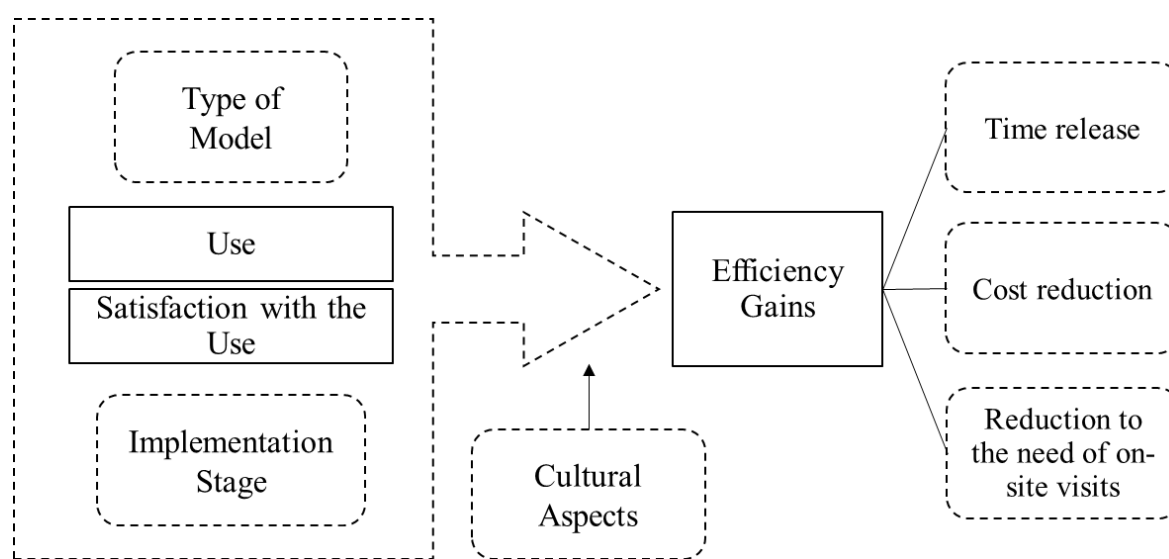


Figure 27 - Efficiency Gains

We conclude that two major characteristics impacts CA efficiency: i) the type of the CA model; and ii) the implementation stage. We also found that some cultural aspects have an influence in these characteristics. Failure to correct problems in a timely manner and the absence of feedback for audit recommendations are some characteristics related with cultural problems in PEESC. The non-existence of a legislation that obliges human resources divisions to comply with internal audit recommendations is also an issue reported by internal auditors.

The efficiency of CA can be visualized by three main elements: i) freeing up internal auditors' time for other activities; ii) cost reduction; iii) reduction in the need of on-site visits.

4.5.3 Accuracy and False Positives

The accuracy of the CA findings is reported as a positive factor by internal auditors, especially in the Deterministic Audit Trails model. A high number of false positives, however, is reported as a negative factor, and was reported more by internal auditors in relation to the Continuous Monitoring model.

E2 reports that the accuracy of the audit findings will depend on the model used or the level of technique used. E6 also emphasizes that the characteristics of the model will influence the accuracy of the CA findings.

The better the technique used to develop the audit trail, the more accurate it is. As accurate as the quality of the data and the use of techniques to perform the audit trail. (E2)

Quanto melhor for a técnica utilizada para desenvolver a trilha de auditoria, mais preciso é. Tão preciso quanto a qualidade dos dados e a utilização de técnicas para realização para a trilha de auditoria. (E2)

Sometimes the CA [generates accurate results], but it depends on the level of work of using audit trails, right? Sometimes if you don't adjust the audit trail very well it ends up generating a huge mass of results, and many times it's unnecessary, which is just a false positive. So, the CA methodology has to refine well the audit trail. If you don't refine well, it will end up causing you an even bigger problem, which is an excess of data analysis. A mass of data to evaluate you that will not bring any good result. (E6)

Às vezes a AC [gera resultados precisos], mas depende do nível de trabalho da utilização de trilhas né? Às vezes se tu não ajustar a trilha bem ajustada ela acaba te gerando uma massa enorme de resultados, e muitas vezes que é desnecessário, que é só falso positivo. Então a AC tem que trabalhar bem a questão das trilhas. O que tu vai trazer de resultados, se não vai acabar te acarretando um problema maior ainda, que é um excesso de análise de dados. Uma massa de dados para te avaliar que não vai trazer resultado nenhum. (E6)

the new model of deterministic audit trails executed on the definitive payroll, I believe that the result is already accurate, right? It is executed, it brings a result, it is a result of the work of our monitoring, which then goes to the State Departments to fix the problem for the next month (E7)

o novo modelo de trilhas determinísticas executadas a partir do momento do fechamento da folha, ai eu acredito que o resultado ele já é certo né? Rodou, caiu, é um resultado do trabalho do nosso monitoramento, que aí vai para os órgãos corrigirem para a folha seguinte (E7)

According to E2 and E6, the calibration (adequate validation) and the type of the model are fundamental aspects for the CA to generate accurate results. The opposite is true: inadequate

model calibration will have negative effects on CA, by generating a very large mass of data, which will require an excess of work, with few results for the internal audit.

E3 further explores the importance of model calibration, especially through proper validation.

[accuracy] depends on the level of tests you do, right? (...) even if you do a lot of work, tests, so as not to catch inconsistencies, I don't know, that we were unaware of at first, in a first analysis. You can't always guarantee 100% in CA, I think there may be a situation that was not mapped by your analyses, by the tests. You test and the situation appears, then you correct [the audit trail], until you reach perfection (...) today we want to do this, the complete automated routing without going through a pre-analysis by the auditor. We have a risk, right? To send [the audit findings] to human resources divisions and for them to see that this is not an inconsistency. The audit trail seems ok, but it is not, there may be something that we were not able to perceive (E3)

[a precisão] depende do nível de testes que tu faz né? (...) mesmo que tu faça todo um trabalho, testes, para não pegar inconsistências, pode sei lá, que a gente desconhecia em um primeiro momento, em uma primeira análise. Não dá para garantir 100% nunca em AC, eu acho que pode ter situação que não foi mapeada pelas tuas análises, pelos testes. Tu vai testando e vai aparecendo situação, daí tu vai corrigindo [a trilha], até chegar à perfeição (...) hoje a gente está querendo fazer isso, o encaminhamento automatizado completo sem passar por uma pré-análise do auditor. A gente corre o risco disso né? De chegar na setorial e eles verem que isso não é erro. A trilha esta redonda, mas não está, pode ter alguma coisa que a gente não conseguiu perceber (E3)

E3 in fact showed a great concern not to send a high number of false positives to human resources divisions. This is because, according to his experience, a high number of false positives impairs the relationship with the audited divisions, causing negative effects also for the proper operation of the CA. Therefore, as he reports, before relying on a CA model that automates the communication of findings, it is necessary to be very confident that the audit trail is in fact generating a low number of false positives.

E3 comments about the difference between results achieved by traditional audits and results achieved by CA. Traditional auditing sometimes takes a long time to be conclude (as observed in the field, sometimes can take years) and audit reports recommendations are usually long and extensive.

when we did more traditional audit, we only had like, I don't know, 5-6 audits a year. Auditees sometimes didn't answer our questions, didn't complied with our recommendations, it was a snowball that never ended. The answers and reanalysis of these reports come and go. The processes were gaining volume and the result did not come, we were not achieving the expected result. Because the inconsistency was not addressed, or an incorrect payment were not stopped being made. With the CA, we were able to demonstrate with absolute certainty that the result was undue and managed to show the manager at the State Department that he was having undue payment. And another thing, we were able to map this monthly, then annually, the amount that the state managed to unduly pay (E3).

quando era auditoria mais tradicional, se resumia a sei lá, 5-6 auditorias por ano, que elas ficavam pendentes de respostas, de atendimento das recomendações, era uma bola de neve que não acabava nunca. As respostas e as reanálises desses relatórios ficavam para lá e para cá. Os processos iam ganhando volume e o resultado não vinha, não chegava o resultado. Porque não era atendido a inconsistência ou deixado de pagar um valor que estava recebendo irregularmente. Com a AC isso a gente conseguiu fazer com o que fosse demonstrado já com absoluta certeza de que o resultado era indevido e conseguia mostrar para o gestor lá do órgão que estava tendo pagamento indevido. E outra, a gente conseguia mapear isso mensalmente, depois anualmente, o valor que o estado conseguiu de valores deixar de pagar indevidamente (E3).

It is noticeable in E3's speech the frustration with the delay and the lack of visualization of concrete results with the work of the traditional audit, when compared with the certainty and precision of recommendations made from CA. E3 also points out that CA allows the financial benefits achieved to be mapped and demonstrated more easily than traditional audits.

Thus, although the accuracy of the results can be an important characteristic of CA (a benefit), an inadequate CA model or with insufficient validations can generate the opposite effect, thus creating an associated negative effect. Dai & Vasarhelyi (2020) highlighted that false positives are one of the possible problems related with CA adoption. We found that these false positives could be an issue, but depends on how CA is designed.

Negative effects due to an inadequate CA model can be visualized in the form of i) increase in the number of auditor's working hours unnecessarily, and consequently affecting the efficiency of the model; ii) increase in the number of false positives that are to human resources divisions, and consequently negatively affecting the relationship between the auditor and the auditee, discrediting the auditor's work. E3 comments that he had a lot of problems doing audit trails and forwarding these false positive situations to human resources divisions. As E3 comments "They could really discredit your work". That's why today E3 reinforces the importance of improving and properly validating audit trails as much as possible. Details can be seen in Figure 28.

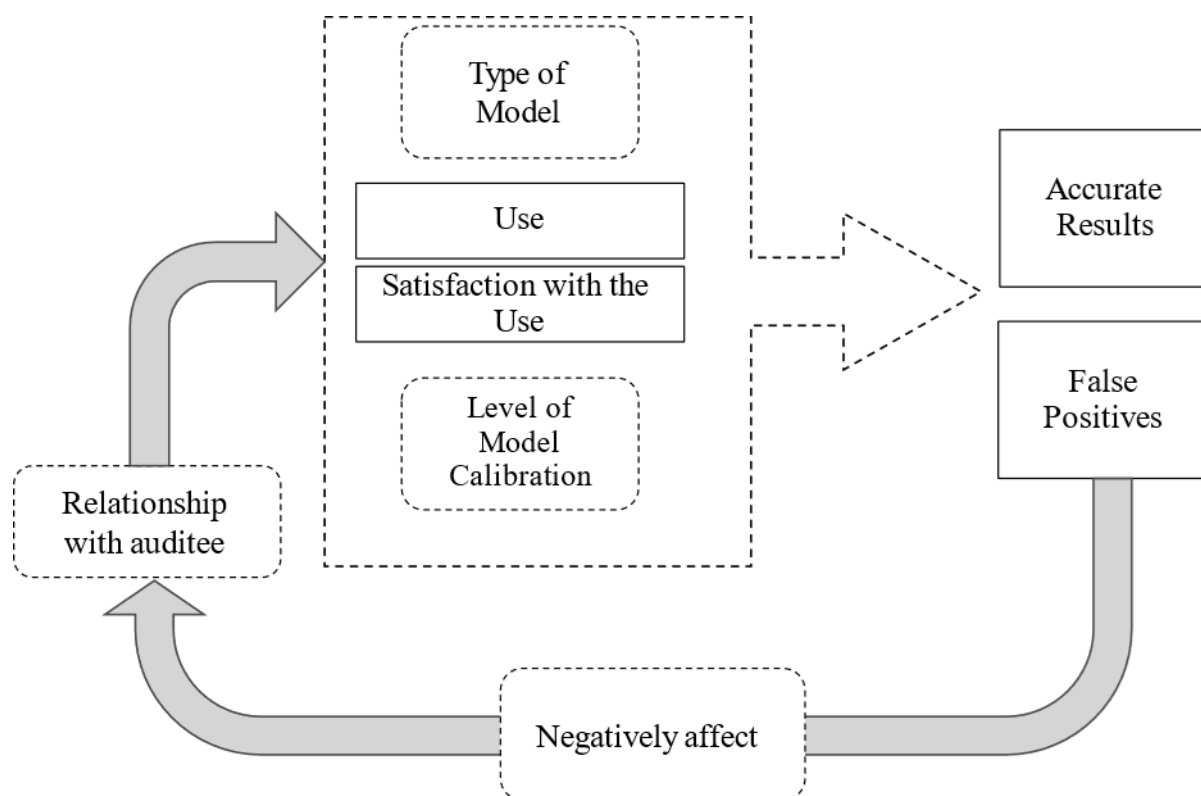


Figure 28 – Precision of Results x False Positives

4.5.4 Agility of the Continuous Audit: Continuous and Permanent Control

One of the most widespread aspects about CA in the literature concerns the agility that the model offers in correcting organizational problems. Several articles theorize on how the CA is timelier than the traditional model and brings the audit closer to relevant events (Eulerich & Kalinichenko, 2018, Moffitt et al., 2018). The benefit of being a continuous and permanent control arising from the CA was reported by all the auditors, and it is a very important feature in the CA of GAPES.

the difference between having or not having CA is that you are sure that the expense will be monitored. It is a way for auditors to have reasonable control, without having to planning (in PAA) every year to displace a large group of auditors to evaluate the expense. (E2)

a diferença entre ter ou não ter a AC é tu ter uma segurança de que a despesa não vá ficar correndo solta sem que ninguém faça nenhum tipo de observação. É uma forma dos auditores terem algum tipo de controle razoável, sem que seja necessário colocar todo ano no PAA para colocar um grupo grande de auditores pra fazer a avaliação da despesa. (E2)

The CA already gives the result as quickly as possible for the State Departments to act (...). It would take us a long time to do on-site visits doing the traditional audit, right? (E3)

A AC já dá o resultado o mais rápido possível para os órgãos tomarem as providências (...). A gente levaria muito tempo indo in loco fazendo a auditoria tradicional né? (E3)

The CA is to be more agile, right? The intention of on-site audit is that it ends in 3 months, it is an goal of the audit and the CA, should be fast, right? “Let's solve it here, if possible, solve it today, or at the most this week”, so it's quick. And they don't have all this protocol that the traditional audit has. It's very different, so much that I wouldn't have the visit on-site [in the CA]. We already solve it, send the audit note or call and solve it in a timely manner (E8).

essa AC ela é para ser mais ágil né? A intenção da auditoria in loco é que se encerre em 3 meses, é um objetivo da auditoria e essa continua ela é rápida né? Vamos resolver ela aqui, se possível já resolve hoje, ou no máximo essa semana, para que seja rápido. E elas não têm esse protocolo todo que tem a in loco. É bem diferente, tanto que não teria a visita in loco ne [na AC]. A gente já resolve, já envia a nota de auditoria ou já liga e já resolve tempestivamente (E8).

Reports from internal auditors demonstrates how the characteristic of observing personnel expenses continuously and the agility of the model are important characteristics of the CA. They also point out that due to these characteristics, on-site visits are not desirable in this model.

Internal auditors at GAPES today have the possibility to execute the CA model both during the preliminary processing (preview payroll), that is, before the payments to the public servants are made, or after the definitive payroll, that is, right after the payment is made for Santa Catarina public servants. As reported and observed in the field, the execution in both moments has advantages and disadvantages, as reported below.

E1, for example, argues that the greatest gain of CA is when the analyzes are carried out during the preview payroll, that is, concomitantly with date input carried out by human resources divisions. E6 also reports that the timeliness of CA is an important factor, especially in the PEESC payroll scenario, and explains why.

With CA that you are having permanent control, a vision of what is happening, simultaneously. This monitoring [during preview processing] is the best moment, this CA. It is an important moment of follow-up, much more certainly than a posteriori (E1).

É com AC que você está tendo controle permanente, uma visão do que está acontecendo, de forma simultânea. É o melhor momento esse monitoramento [durante o processamento da prévia], essa AC. É um momento importante de acompanhamento, muito mais com certeza do que a posteriori (E1).

In the payroll, it is especially important, because the procedure here in SC for reimbursement to the treasury is painful, it is costly. So, for example, if it's a payment that is perpetuated for 6, 7 months or 1 year. So, if you identify it later, you will have to determine the entire period that was paid, determine the amount, inform the public servant. Public servant can have the counter-reason, he will make an assessment if he is right or wrong. Many times, internal audit is right but the public servant doesn't

want to reimburse the value. He may feel that he received it in good faith and does not have to return it. This generates an administrative process, there is a lot of bureaucracy involved (E6).

Na folha de pagamento ela é especialmente importante, pois o procedimento aqui em SC para ressarcimento ao erário ele é penoso, é custoso. Então por exemplo, se é um pagamento que se perpetua por 6, 7 meses ou 1 ano. Dai se tu identificar depois tu vai ter que apurar todo esse período que foi pago, apurar o montante, cientificar o servidor. Servidor tem que dar a contra-razão, vai fazer avaliação se está certo ou se está errado. Muitas vezes está certo mas o servidor não quer devolver. Ele pode achar que recebeu de boa fé e não tem que devolver. Isso gera um processo administrativo, é desgaste, é burocracia (E6).

The biggest advantage of using information from the preview payroll is to allow the identified problems to be corrected by human resources divisions even before the payments are made. Preventing incorrect payments helps the public administration to avoid lengthy reimbursement processes. In some cases, the undue amounts paid do not return to the public budget, since there is some juridical understanding that when the public servant receives undue amounts in “good faith”, these amounts do not necessarily need to be reimbursed to the State.

On the other hand, executing the model even in the preview has its challenges. This is a period of the month in which the payroll human resources divisions are usually already overloaded with work and sending multiple issues at this time can end up overloading their work even more. It seems to be one of the reasons for the lack of feedback from them on some audit notes sent by the CA over the last few years, according to auditors' comments.

You sent 50/60 inconsistencies to [an State Department that has a large number of public servants] per month. Just about absence leaves issues. Man, I send and they didn't respond. Then it was already spending a month charging there and I already had another one ready for the same month and I was already forwarding it. They would answer “Gee, but I can't deal with the other one yet” and that there was a snowball and it grew and they couldn't respond to a situation and there was already another one that I was sending (...) from other trails that I had a lot of false positives. So, eventually they got tired. I sent 100 situations, the guy found only 3 inconsistencies, I had conflicts with that (E3).

Tu mandava 50/60 inconsistências para a [um órgão que possui um grande número de servidores] por mês. Só de afastamento. Cara, passava e eles não respondiam. Ai já estava passando um mês cobrando ali e eu já estava com outra pronta do próprio mês e eu já encaminhava. Eles respondiam “Pô mas não tô dando conta da outra ainda” e aquilo ali ficava uma bola de neve e foi crescendo e eles não davam conta de responder uma situação e já tinha outra que eu tava mandando (...) de outras trilhas que eu tive muito falso positivo. Então ia muita coisa e aquilo cansava. Mandava 100 situações, o cara achava só 3 com erro, eu tive conflitos com isso (E3).

Thus, while in some cases the findings can overwhelm human resources divisions when sent in a timelier manner, in other cases this timeliness does not seem to be a problem, as reported by E2.

In the case of Death Audit Trail, updating the database by those responsible for the HRs [human resources divisions] was done quickly. I noticed that I requested it via Audit Note on a given day, and around 5 to 10 days later, the issue with the public servants who were there, but had already died, was effectively removed from the payroll [SIGRH]. But depending on the case and the audit trail developed, it may take longer due to an eventual analysis than the HR and [central human resource division] (E2).

No caso de cruzamento de falecidos, a atualização da base de dados por parte dos responsáveis dos RHs [Recursos Humanos das setoriais] era feita de forma rápida. Eu percebi que solicitava via Nota de Auditoria em determinado dia, e em torno de 5,10 dias depois, efetivamente já era tirado da folha o caso de servidores que estavam lá, mas já tinham falecido. Mas dependendo do caso e de trilha desenvolvida, pode levar mais tempo em função de uma eventual análise que as setoriais de RH e da SEA [Órgão central da Folha de Pagamento] (E2).

E2 emphasizes that audit notes made by the Death Trail are usually resolved in a timely manner, at least about the exclusion of public servants from the payroll. However, in addition to removing the public servants from SIGRH, human resources divisions also need to request the reimbursement of undue amounts, when applicable. This reimbursement process can lead to the same issues reported by E2, such as a lack of timely correction. As CA cycle is only completed when the problems are corrected and the reimbursement duly effected, these situations can hinder the agility and timeliness of the CA.

The experiment carried out by Gonzalez & Hoffman (2018) demonstrates that timely and frequent notifications about possible fraud is not always beneficial to reduce fraud within organizations. This benefit depends on whether the capacity of the control system is strong or weak. In addition to Gonzalez & Hoffman (2018) findings, our findings highlight three other reasons that influence how timely and agile the CA will be: i) the type of audit trail; ii) the size and complexity of State Department; and iii) the amount of audit notes send. Our findings suggest that to visualize benefits due to the agility of the CA, bringing internal auditors closer to relevant events is in fact a necessary measure, but not sufficient for the success of the CA. The summary of what was evidenced in this section can be seen in Figure 29.

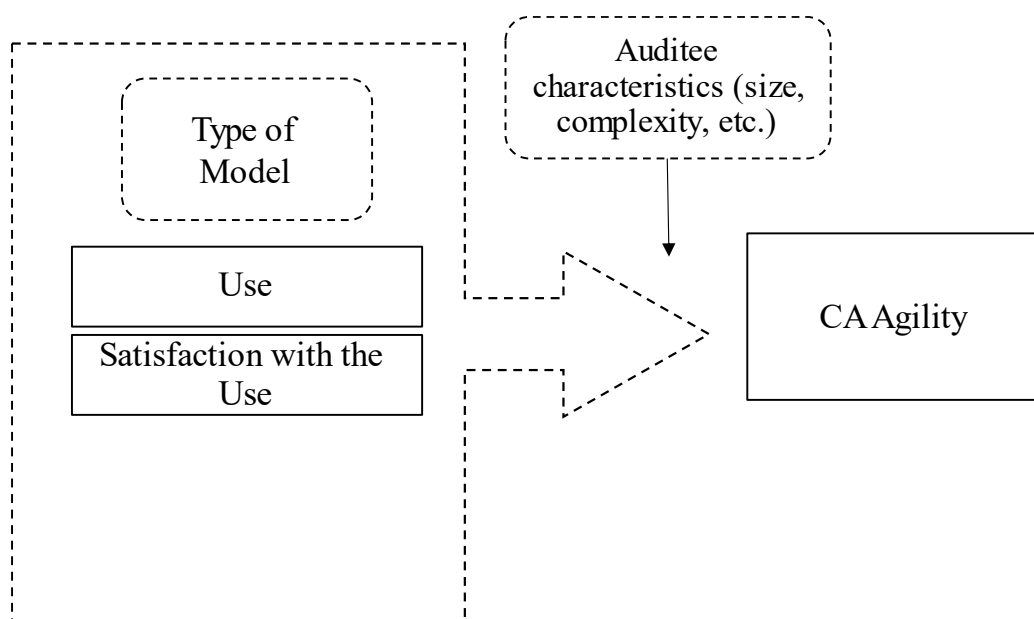


Figure 29 - Continuous Audit Agility

4.5.5 Relationship of Internal Auditors with Organizational Data

Internal auditors were asked how CA influences its relationship with organizational data (payroll data), and whether improvements were noticed in this data (due to monitoring work) over time.

E2, E3 and E4 report the data relationship with the internal auditors within GAPES.

Here in GAPES, specifically, people already had a certain relationship with the data. So, I don't know if it had this modification [with data relations] here. Perhaps a greater intimacy has occurred. But here at GAPES there has always been a certain intimacy between auditor and data. That's why they realize the relevance of this data. Outside GAPES, there are auditors who can work without using data like we do. It is a great challenge to try to bring these auditors closer to data (E2)

Aqui na folha, especificamente, as pessoas já tinham uma certa relação com os dados. Então eu não sei se aqui gerou essa modificação. Talvez uma intimidade maior tenha ocorrido. Mas aqui na GAPES sempre existiu uma certa intimidade entre auditor e dados. Por isso eles percebem a relevância desses dados. Fora da GAPES tem auditores que conseguem trabalhar distanciado de dados. Isso é um grande desafio tentar aproximar esses auditores dos dados (E2)

data [usage] opened up a universe of information that I was unaware of within the payroll. It helped me a lot for other jobs, to question [the central human resources division] about payments, situations that even they were unaware of. When you look at the data inside, right man, that gives you a vision of possible reflections in other situations, right? (E3)

os dados me abriram um universo de informação que eu desconhecia dentro da folha de pagamento por exemplo. Ela me auxiliou muito para outros trabalhos, para questionar [o órgão central] sobre pagamentos, situações que até eles desconheciam. Quando tu olha o dado lá dentro né cara, aquilo ali te deixa com uma visão do reflexo que aquilo vai ter em outra situação né? (E3)

At GAPES, everyone does [analysis via reports], but for example, the [data-oriented auditor], who is always extracting this data, has always done this. He's a little more familiar how to do it [in SIGRH]. (E4)

Na GAPES todos fazem [análises via relatórios], mas por exemplo, o [auditor voltado a dados], que ele está sempre puxando esses dados, sempre fez isso. Ele tem um pouco mais de familiaridade com os caminhos. (E4)

In my view, GAPES is certainly the audit division that most uses these CA techniques. Using computer, data extraction, has always been and still is the one that uses the most. (E5)

Com certeza a GAPES é, na minha visão, a gerência da Auditoria Geral que mais usa essas técnicas de AC. Utilizando computador, extração de dados, sempre foi e ainda é a que mais utiliza. (E5)

E2 reports that internal auditors understand the relevance of data and perceive the positive impacts of using this data daily, while audit managements that do not have this relationship have greater difficulty in seeing such benefits. In his speech, E4 also highlights that the internal auditors had knowledge about SIGRH and its reports, sometimes more in-depth than the human resources divisions responsible for the payroll. This demonstrates how CA enhances the auditors' relationship with data in managements that opt for this continuous model, since data is the essence of any CA model.

Another characteristic of the information that was expected to be driven by the CA concerns the timeliness with which the auditors demand the organization's data. E2 reports the situation.

Many auditors from other managements don't mind getting data three years late, four years late. This is something that is within the normal range for these auditors. In GAPES, it is possible to see that auditors have the necessity for more current data. It is a distinctive feature of GAPES, as it has always had access to the human resources database here. And there was always the mentality of working with this data. Even eventually, one or the other does not have this ability, but they know that the data exists (E2).

Muitos auditores de fora não se importam em receber dados com 3 anos de atraso, 4 anos de atraso. Isso é algo que está dentro da normalidade para esses auditores. Já na GAPES, é possível ver a necessidade de dados mais atuais. É uma característica diferenciada da GAPES, até em função de que aqui sempre teve acesso a base de RH. E sempre se teve a mentalidade de se trabalhar com esses dados. Mesmo eventualmente um ou outro não tendo essa habilidade, mas eles sabem que os dados existem (E2)

E2 demonstrates the necessity of GAPES internal auditors for more timely data, and how these perceptions contrast with other audit divisions, demonstrating that CA actually

modifies the relationship of internal auditors with organizational data, at least in terms of relevance and timeliness.

As expected, the relationship of internal auditors with data depends on how much the auditor understands about analytical tools for audit. More data-oriented auditors better understand the relevance of this information for CA purposes and are more concerned about having this information in a timelier manner, as it can be seen in the speech of E7. We validate these comments with field observations.

Perhaps those who are working directly with Extrator, with the development of the audit trails, may be more familiar with it, but those who don't use it in daily basis [does not change the relationship much]. (E7)

Talvez quem está trabalhando diretamente com o Extrator, com o desenvolvimento da trilha, talvez tenha mais familiaridade, mas quem não mexe [não modifica muito a relação]. (E7)

In addition, it was identified that the use of CA had an impact on the quality of the organization's data, as reported by several internal auditors.

Over time and with the experience I have, I think the data started to improve, right? You started questioning the data, using data analysis. So, I think data is becoming better because of various analyzes and situations that they are adjusting, right? (...) I think that the CA help a lot with this too, right? It may not even be a financial inconsistency, but it can bring it to the person's record and adjust. I think that the CA can help for these purposes to improve the data (E3)

Com o tempo e com a experiência que eu tenho, eu acho que os dados começaram a melhorar né? Tu começou a questionar os dados, com o uso da análise de dados. Então assim, eu acho que estão melhorando com base em várias análises e situações que eles estão ajustando né? (...) eu acho que a AC tem muito a ajudar nisso também né? Pode até não ser inconsistência financeira, mas pode trazer para o cadastro da pessoa e ajustar. Eu acho que a AC só tem a ajudar para esses fins de melhorar os dados (E3)

The monitoring model helps to reduce these errors, as much as we find an error here or there, there are fewer and fewer errors, because those errors pointed out tend not to be repeated (E4)

O modelo de monitoramento ajuda a reduzir esses erros, por mais que a gente ache um erro aqui ou outro ali, cada vez tem menos erros, pois aqueles erros apontados costumam não se repetir (E4)

Some data flaws were effectively corrected as a result of our alerts, our correction requests over the years (E7)

Algumas falhas nos dados foram efetivamente corrigidas em decorrência dos nossos alertas, dos nossos pedidos de correção ao longo dos anos (E7)

Because then you see that the tendency is that with the CA these payment deviations, these errors, decreases. There will come a time when audit trails will be executed and almost nothing will come as result from it. And that's the intention. (E8)

Porque daí você vê que a tendência é que com a AC esses desvios de pagamentos, esses erros, é diminuir. Vai chegar um tempo em que vai chegar trilhas e não vai cair quase nada. E a intenção é essa. (E8)

Eliminating or reducing these errors makes data used for CA purposes more reliable. E8 reports that eventually CA will no longer encounters problems, and that would be the goal. Although, when that happens, it will no longer be possible to see the financial benefits as seen today, an adequate CA model operating and not detecting problems means that the State's payroll is well protected.

We conclude that the relationship between GAPES internal auditors and organizational data became stronger as CA model evolved. Auditors understand the relevance of these data and the importance of having timeliness data for audit purposes. Even though currently GAPES has access to data in a relatively timely manner, internal auditors continue to seek an even greater timely access, via data mirroring (the complete replication of SIGRH database). As a result, internal auditors would have access to daily updated data – which is not the case today. The findings of the section can be seen in Figure 30.

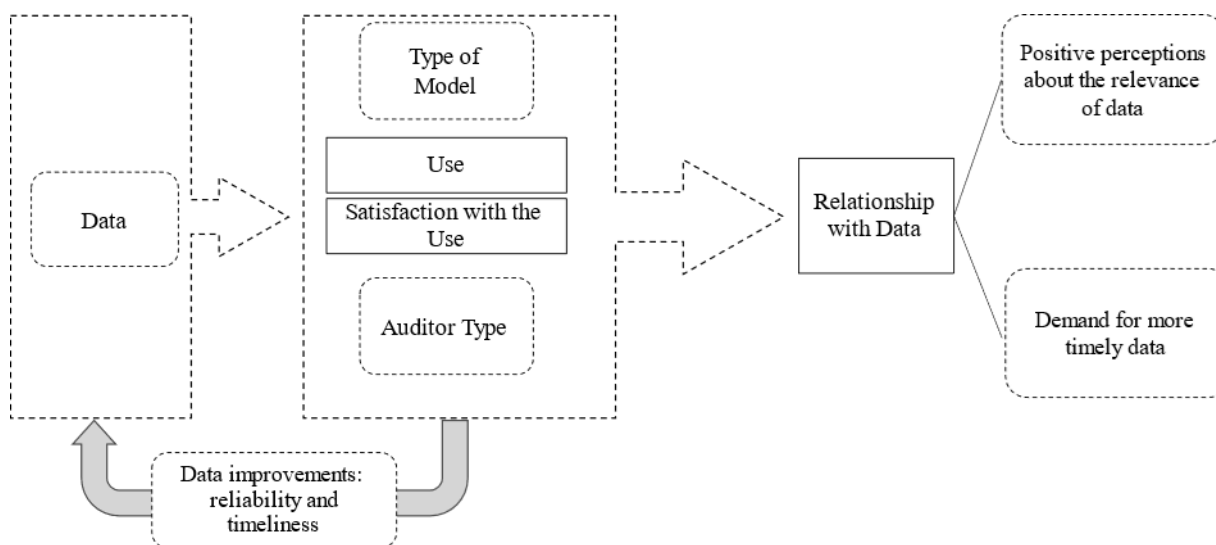


Figure 30 - Internal Auditors and their relationship with data

4.5.6 Continuous Audit and Supporting Information for Audit Planning

Literature has shown that CA can assist in the planning of traditional audits (Eulerich et al., 2020), by providing a view of the organization's problems, as well as a continuous analysis of organizational risks (Bumgarner & Vasarhelyi, 2018).

Although theorized and emphasized that the information generated by the CA can assist in audit planning, CA information will only be used for planning purposes in a robust

model that is capable of properly store and organize audit finding - which does not currently occur at GAPES.

Mapping audit findings will help to plan the audit. It ends up being a source of planning. Now leveling [information about CA findings with internal auditors] is important for those in the management area. Everyone who has found inconsistencies in CA should write down, in order of relevance, address the issues. (...) The work we perform opens a range of information that allows us to plan new audits (E1).

O mapeamento desses achados é que vai ajudar a planejar a auditoria. Acaba sendo uma fonte de planejamento. Agora nivelar e uniformizar [os achados de auditoria com os auditores internos] é importante para quem está na área de gestão. Todo mundo que tem esse tipo de constatação deveria deixar mapeado e por ordem de relevância ir enfrentando os assuntos. (...) Os trabalhos que a gente desempenha abrem um leque de informações que permite planejar novas frentes de trabalho (E1).

The results that remain on the audit trails [exceptions], findings from audit trails, ends up signaling lack or internal control deficiencies, and it is a good indicator for traditional auditing (E2).

Os resultados que ficam das trilhas, aquilo que cai nas trilhas, acaba sinalizando faltas de controle ou deficiências de controle, e isso é um bom indicador para a auditoria tradicional (E2).

For GAPES it [CA] is useful not only to eventually find any inconsistency or irregularity, but also for us to define an action plan, an audit plan. Identify which State Departments still have problems, which demand more in complex situations that we can help them (...) Continuous monitoring gives us a vision of where to act with more certainty, with more property, even because we are few auditors (E4).

Para a GAPES ela [a AC] é útil não só em eventualmente encontrar alguma inconsistência ou irregularidade, como também no futuro para gente definir plano de ação, plano de auditoria. Identificar quais as secretarias que continuam com problemas, que demandam situações mais difíceis que a gente pode atuar (...) o monitoramento nos dá a visão de onde atuar com mais certeza, com mais propriedade, até porque nós somos poucos auditores (E4).

you could identify a State Department that is experiencing more inconsistencies on the payroll, then you can use this as an audit planning (...) at the end of each year we could have a risk matrix, to point out which State Departments be audited (E5).

Eu acredito que na tabulação dos resultados você pudesse identificar um órgão que está ocorrendo mais inconsistências na folha, daí você pode usar isso no planejamento da auditoria (...) no final de cada ano temos uma matriz de riscos, para apontar quais os órgãos que devem receber auditoria (E5).

I think that many times the result of CA is a source of information for the development of traditional audit, for sure (E6).

eu acho que muitas vezes o resultado da AC é fonte de informação para desenvolvimento de trabalhos tradicionais, com certeza (E6).

As we previous demonstrate, auditors reinforce the idea that, in addition to other benefits, CA can also help in the audit planning. However, in GAPES information resulting

from CA findings is used only based on the auditors' feeling and own judgement, who do not have a proper mapping and organization of this information. E1 reports that a leveling about of CA findings would be important, and that this leveling should occur monthly. Field observations showed that the lack of leveling on the information regarding the CA findings harms the model in some ways: i) the same inconsistency can be analyzed by different auditors; ii) the same problem can be sent more than once to human resources divisions; iii) the insights from audit findings and that could be used to support audit planning are lost.

As the CA dynamics can turn this in an issue, internal auditors suggest holding monthly closing meetings so that inconsistencies identified by the CA can be discussed by all internal auditors.

In my opinion, every month there should be a closing meeting. Some subjects usually you don't even know what the colleague did, if he did, if there was any important decision, you don't even know. Periodic leveling of knowledge is the best way to change the direction of work. There was only one moment in my experience when a manager did this, and it was very interesting. (E1)

Na minha avaliação, a cada mês deveria ter uma reunião de fechamento de trabalho. Alguns assuntos normalmente tu nem sabe o que o colega fez, se fez, se teve alguma questão importante, você nem fica sabendo. O nivelamento periódico do conhecimento é a melhor forma de modificar o direcionamento do trabalho. Teve um único momento na minha vivência que uma gerente fazia isso, e era bem interessante. (E1)

Increasing the automation of the current CA model could potentially solve this problem and this perception are shared among some internal auditors. Auditors associate a more automated model with a greater organization of information for planning purposes, as reported by E7.

the more automated, the more organized information we have, the more we can plan our audits for the following years, right? (...) it also generates a large amount of information that allows you to plan your work from one year to the next, right? (...) With this automation we can plan specific audits in those secretariats, in those matters. I think it can be a game changer [a more automated CA](E7)

quanto mais automatizada, mais a informação organizada a gente tem, mais a gente consegue planejar as nossas auditorias para os anos seguintes né? (...) também te gera uma grande quantidade de informações que te permitem de um ano para o outro planejar os teus trabalhos né? (...) Com isso vamos planejar auditorias específicas naquelas secretarias, naqueles assuntos. Eu acho que pode ser um divisor de águas [uma AC mais automatizada] (E7)

As already highlighted in the literature (Bumgarner & Vasarhelyi, 2018), a CA that generates accurate results can become a source of information for risk analysis for audit planning purposes. In GAPES, internal auditors perceive that the model based on Deterministic Audit Trails can be more effective to map these information from CA findings, since each audit trail points out specific problems.

with this CA [based on Deterministic Audit Trails] we can even have a foundation to carry out our risk analysis. It helps us to schedule our audits too. (...) we evidence, there is an audit trail that is always finding inconsistencies. So, we know that more specific audit must be done in that type of payment or in that business process. (E8)

com essa AC [trilhas determinísticas] a gente consegue ter base inclusive pra fazer a nossa análise de riscos. Ela ajuda pra que a gente programe nossas auditorias também. (...) a gente vê, tem uma trilha que sempre está caindo casos e cai vários casos. Então a gente sabe que tem que ser feito um trabalho mais específico naquela rubrica ou naquele processo. (E8)

Finally, comments about CA potential to steers the audit towards a risk-based audit planning was cited modestly by respondents. As E5 reports, the CA allows the identification of existing weaknesses.

I think it is possible, yes, to work on these two ends, in planning and assist in the risk management work to the extent that you can identify where the fragility is (E5)

Acho que é possível sim, trabalhar nessas duas pontas, no planejamento e também auxiliar no trabalho de gestão de risco na medida que você consiga identificar onde está a fragilidade (E5)

We conclude that results obtained with the CA enables the planning of traditional audit work and the mapping of organizational risks for planning purposes. However, this will only occur if there is a model robust enough for these results to be properly structured. Field observations show that, to date, even using a model for at least two decades, GAPES has not yet managed to reach this level of maturity and, therefore, CA findings are used in a poorly structured way within the Annual Audit Planning.

For now, internal auditors using knowledge from CA results based on the auditors' judgements about the most recurrent problems in the CA's work. Three solutions are suggested to allow the use of CA information for planning purposes: i) CA automation; ii) design of a system that allows grouping and organizing CA findings; iii) periodic and monthly meetings with all internal auditors, with the aim of leveling knowledge on the problems that have been founded by CA. Figure 31 shows the systematization of the presented above.

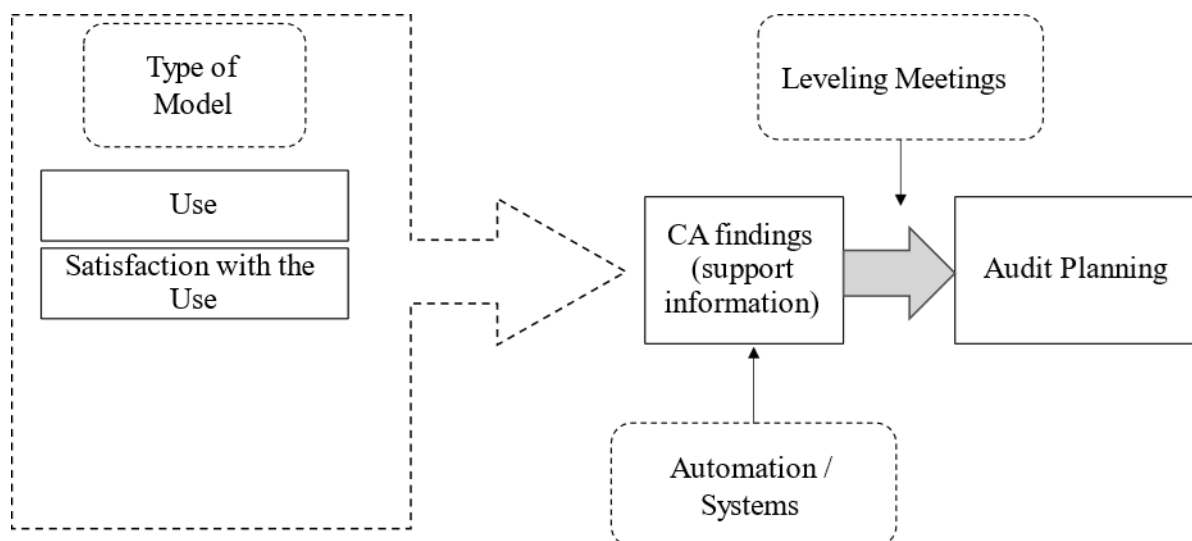


Figure 31 - Support Information's and Audit Planning

4.5.7 Impact on Internal Controls

The possible identification of internal control weakness is reported as a benefit of CA by all internal auditors. The pedagogical aspect of the CA is particularly noteworthy, as the continuous monitoring signals to the human resources divisions that someone (internal auditors) is continuously and permanently monitoring the payroll.

The pedagogical aspect, it always produces results. Because you can imagine, State Departments knowing about our constant work, so much still happens, imagine if this structure didn't exist. (E1)

O aspecto pedagógico, ele sempre produz resultados. Porque tu imagina, os órgãos sabendo da nossa atuação constante, ainda acontecem tanta coisa, imagina se não existisse essa estrutura. (E1)

if you notice that a certain inconsistency is due to an incorrect system feeding, or it is missing or there is a lot of error when preparing the payroll, you can design internal controls, you can establish or suggest, go to the State Department and suggest the implementation of internal controls that could avoid or mitigate that type of error. (E5)

se você constata que determinada inconsistência por conta de uma alimentação incorreta do sistema, ou está faltando ou está acontecendo muito erro na hora de elaboração da folha, você pode criar controles, você pode estabelecer, sugerir, ir no órgão e sugerir a criação de controles que evitem ou que mitiguem aquele tipo de erro. (E5)

The pedagogical aspect reported by E1 can be considered an informal control considerable important for any organization. However, it was expected that the CA would also

generate more direct impacts on the internal controls of State Departments, since it often highlights problems that frequently occur on the payroll. As E3 reports, for the CA to improve internal controls in the human resources area, some organizational obstacles need to be overcome.

with the identification of problems and referrals to State Departments, we already have a situation of identifying what and where are the failures of internal controls from human resources divisions, of the Departments, are, to be able to do a specific audit, perhaps to help or improve the internal control that is failing. It's just that, we've been getting results for a long time, and we still haven't been able to focus well on it, we haven't been able to demonstrate in the audit how to use it. (...) For example, every month we identify issues with undue paid leave after processing the payroll, irregular payments. There have already been some meetings with human resources divisions on how to improve this, but fixing the workflow there depends on [the central human resource division], formatting a routine solution for the human resources, it has not start. So, the audit using data, it identifies these situations, it can already have a position on the inconsistencies, but it needs to discuss with the human resource divisions and the central human resource on how to improve these controls related with these inconsistencies (E3).

com a identificação dos problemas e os encaminhamentos para os órgãos, a gente já tem até uma situação de identificar o que e onde estão as falhas dos controles das setoriais, dos órgãos, para poder fazer trabalhos específicos, talvez de auxiliar o controle ou melhorar o controle que está falhando. Só que assim, há bastante tempo que estamos pegando resultados e ainda não conseguimos focar bem nisso, não conseguimos demonstrar na auditoria como usar isso. (...) Por exemplo, identificamos todos os meses as situações dos afastamentos pago após o processamento da folha, pagamentos irregulares, já teve algumas reuniões com os setoriais e com [o órgão central] para como melhorar isso, mas o fluxo lá que depende do [o órgão central], formatar uma solução de rotina dos RHs, não saiu do lugar. Então assim, a auditoria de dados, ela identifica essas situações, já consegue ter um posicionamento das inconsistências, mas precisa trabalhar com os setoriais e com [o órgão central] em como melhorar esses controles dessas inconsistências (E3).

E3 explains that the CA results could be used to visualize possible internal control failures, but that during all these years, a robust CA model was not achieved to allow this kind of impact. Internal documents demonstrate that some practical implications from CA can be seen as improvements in internal controls, especially those regarding SIGRH parameters improvements (DOC 14). Although, as observed, these implications are not always so easy observed.

E3 lists that some obstacles occur because the suggestions for improvements in the systems (SIGRH), for example, are not adopted or implemented by the central human resources division.

Although CA in GAPES has not yet managed to impact internal controls in the expected way, E6 reports that the CA by itself allows the creation of a control layer, without the need to reduce SIGRH flexibilization with ties that can sometimes hinder the management of the payroll.

the more we make the system inflexible [with too many controls], the less flexible they become, right? So, this ends up generating stress on human resources staffs. Sometimes there are many situations that are not provided for in the legislation and the person must resolve them. And when we increase the inflexibility of the system, people complained that they couldn't input the situations. So we had to look for a way (...) through audit trails, some flags, so that we could verify before the problem occur [be paid]. It was a path to let the system be more flexible for the staff who work in the payroll (...) and on the other hand being able to maintain reasonable control over that database (E6).

quanto mais a gente engessa os sistemas, menos flexível eles ficam né? Então isso acaba gerando stress lá na ponta. Às vezes tem muitas situações que não está previsto na norma e a pessoa tem que resolver. E quando a gente engessa muito o sistema o pessoal reclamava que não conseguia colocar as situações. Então a gente tinha que procurar uma maneira (...) por meio de trilhas, alguns indícios, problemas, que a gente pudesse trabalhar antes do problema ir para a folha de pagamento. Era uma maneira de não engessar totalmente a ponta, pessoal que faz a folha (...) e por outro lado conseguir manter um controle razoável sobre aquela base de registros (E6).

Thus, although theoretically CA has great potential to improve internal control practices related to the PEESC payroll, that was still not the case in the present scenario. CA still is not mature enough to consistently map possible problems with internal controls and has only been able to improve internal controls indirectly.

4.5.8 Comprehensive Control and Scale of Operation

Comprehensive control was also listed as a benefit of CA by several auditors. Respondents showed that the CA can serve to surround payroll expenses in an automated way, gaining scale of action.

The main thing, thinking about a CA model implemented and working, is to bring guarantees that the structure, the basics of the expense, is being completely controlled. If there is no CA, we keep 70%-80% of all expenses completely uncovered, for years until (...) when we have a properly implemented CA, the basics can be done in a very automated way. (...) We are sure that although traditionally we will analyze 20-30% of the expense, the other 70-80% will be observed by the CA in a pre-defined way and evaluated in terms of risk. At some point, the risk was evaluated, criteria were defined, and all the expenses with CA were assure (E2)

O principal, pensando em um modelo de AC implementado e funcionando, é trazer garantias de que a estrutura, o básico da despesa, está sendo controlado de forma completa. Se não tem AC, a gente fica com 70%-80% de toda a despesa completamente descoberta, por anos até (...) quando temos uma AC devidamente

implementada, o básico pode ser feito de forma bastante automatizada. (...) A gente tem uma segurança que muito embora tradicionalmente a gente vá analisar 20-30% da despesa, aqueles outros 70-80% vai estar sendo observada pela AC de uma forma pré-definida e avaliada em termos de risco. Em algum momento se avaliou o risco, se trabalhou critérios, e se trabalha toda a despesa com AC (E2)

if we audit without using the Continuous Monitoring, our audits would always happen by State Department, in a specific situation, go there, analyze, report, correct those little dots and that's the end of it. (E6)

se a gente trabalhasse de maneira que não tivesse essa parte de monitoramento, nossas auditorias iam ser sempre por órgão, em uma situação específica, vai lá, faz análise, relatório, corrigir aqueles pontinhos e ponto final. (E6)

I think that the biggest achievement with CA is being able to demonstrate and give assurance to managers and society that the payroll is being processed and payments are being made correctly, with the least possible deviation and when any error in system occur, the audit is somehow monitoring it, it's surrounding it with some kind of audit trail, of audit work. You can demonstrate that things are going well, there is not much financial lost, when there is an error, they are punctual and they are corrected (E7)

Eu acho que o resultado maior da AC é poder demonstrar e dar segurança aos gestores e a sociedade de que a folha de pagamento está sendo rodada e os pagamentos estão sendo efetuados de forma correta, com o mínimo de desvio possível e quando tem algum erro de sistema, a auditoria de alguma forma está pegando, está cercando com algum tipo de trilha, de trabalho de auditoria. Tu consegue demonstrar que a coisa está indo bem, está correndo bem, não tem muito dispêndio, quando tem erro são pontuais e são corrigidos (E7)

In internal auditor perceptions, internal audit gains scale and confidence in payroll transactions with CA. CA can also quickly transform an individual and sporadic analyze into a more complete and continuous assurance.

Internal auditors also reported improvements regarding this subject with the automation of processes and with the model using Deterministic Audit Trails.

if we continued with the old, manual model of variation [Continuous Monitoring Audit Trail], we would only be looking at a small portion of the payroll. CA allows you to reach a high percentage of this amount in the medium and long term, which is analyzed in some way, and from there, if you know how to sell it to the external public, demonstrate that you have a continuous, permanent work, that manages to look somehow, 50, 60, 70%, 80% of the amount of the payroll. This gives managers confidence that they are doing the right thing, right? (E7)

se a gente continuasse no modelo antigo, manual, da variação [Trilha de Monitoramento Contínuo], a gente estaria olhando só uma parcela pequena da folha. A AC te permite a médio e longo prazo atingir um percentual alto desse montante da folha que passa a ser analisado de alguma forma né e a partir dali, se você souber vender isso para o público externo demonstrar que tem um trabalho contínuo, permanente, que consegue olhar de alguma forma, 50, 60, 70%, 80% do montante da folha. Isso passa uma segurança para os gestores que eles estão fazendo a coisa correta né? (E7)

E7 also emphasizes that the CA brings more confidence to human resources divisions due to this comprehensive monitoring. Finally, the auditor's report that the CA also modifies audit procedures, making sampling, for example, unnecessary.

I think there's this sampling issue there, right? You already avoid sampling. You work with the entire population in the analysis (E3)

Eu acho que tem essa questão da amostragem aí né? Já evita a amostragem, tu trabalha com todo o universo da população na análise (E3)

I don't see any sense in using sampling anymore when the data are in the database. Sampling is not reasonable anymore; you look at the entire population. Sampling was widely used in traditional auditing as there was no access to the database. In the personnel area, it no longer makes much sense. You can work with the population. (E2)

eu não vejo mais sentido em usar amostragem, quando os dados estão em base de dados. Amostragem não é razoável mais, tu olha a população inteira. Amostragem era muito usada na auditoria tradicional pois não se tinha acesso a base de dados. Na área de pessoal, já não faz mais muito sentido. Você consegue trabalhar com a população. (E2)

This highlights another benefit of CA, which is its comprehensive control, allowing internal auditors to gain scale. This control may depend on which model is used and the degree of automation of the process. The CA also, as already highlighted by the literature, makes sampling unnecessary.

4.5.9 Continuous Audit and Impact on Audit Procedures

The reformulation of audit processes due to new technologies and the adoption of CA is highlighted by numerous studies (Issa et al., 2016). Thus, it was to be expected that a CA model would modify some traditional audit procedures, such as on-site visits or the use of sampling techniques. These findings are highlighted by E3.

[CA] already avoids sampling, right? You work with the entire population in the analysis (...) you don't need to spend resources on displacement of auditors or works that can only demonstrate situations that are false positives, that is, that would not have any result for the audit, which would not find inconsistent situations (...) [with CA] on-site visit on the traditional audit, they already go to the right place, right, in the exact situation [of the problem] (...) [with the help of the CA] you will hardly send an auditor with a data analysis to do on-site visit that does not really have an identified inconsistency (E3)

[A AC] já evita a amostragem né? Tu trabalha com todo o universo da população na análise (...) não precisa gastar com recursos de deslocamento de auditores ou de

trabalhos que apenas podem demonstrar situações que são falso positivos ou seja que não teriam resultado nenhum para a auditoria, que não encontraria situações inconsistentes (...) o deslocamento do auditor para a auditoria tradicional, eles já vão no local certo né, na situação exata [do problema] (...) [com auxílio da AC] dificilmente tu vai mandar um auditor com uma análise de dados para fazer um trabalho que não tenha realmente a inconsistência direcionada (E3)

It is quite consensual within GAPES that CA reduces the need for sampling, especially in the view of data-oriented auditors. E3 also highlights the impact of CA on the needs of on-site visits. According to internal auditors' vision, CA allows internal auditing to save resources, as it enables accurate results that direct the work of internal auditors, preventing unnecessary on-site visits. However, E3 reinforces that these impacts will only be perceived if the model is "well structured, well established, well analyzed and well validated, with well-founded audit trails". Thus, a poorly structured CA, which generates a large number of false positives, for example, should not have such significant impacts on the reduction of on-site visits. It is also possible to infer from E3's speech that the opposite may be equally true: a poorly structured CA model may lead internal auditors to unnecessary on-site visits, causing an impact completely opposite to that expected by a CA model.

Our findings show that benefits from CA regarding the reformulation of audit procedures are mainly related to: i) the elimination of the need to carry out sampling; ii) reducing the need for on-site visits; and iii) to give better guidance for internal audit when it needs to do on-site visits. These benefits will only be seen if a suitable CA model is being operated. A model that generates many false positives can cause noise in the information needed to define the on-site visits, thus negatively affecting the work of the internal audit.

It is noteworthy that not all information about PEESC's human resources is available within the system, and that is why it is unfeasible, for the time being, to carry out a CA that can identify all inconsistencies in the payroll. For example, through CA it is currently not possible to identify whether public servants are physically working in a specific location regarding some information inputted on SIGRH.

4.5.10 Continuous Audit and the Role of Management: Internal Audit Responsibilities x Internal Control

There is a lot of theoretical discussion about the risks of internal audit taking on responsibilities that should belong to management and how the CA handles this. One of these responsibilities may be related to internal control activities.

This possible overlap of activities is reported by some auditors. For example, in E7's view, some functions performed today by the CA should not be properly performed by the internal auditors.

Although it would not be an activity of our own [to execute audit trails and the current model], because we are the third line, that would be more the burden of the human resource division, the second line, [central human resource division] itself to do all this work of creating audit trails and execution to ensure the regularity of payroll payments, but as they do not and will not do so, we assumed this and will continue to do so. (E7)

Apesar de que não seria uma atividade propriamente nossa [de executar trilhas e o modelo atual], pois nós somos a terceira linha, isso ficaria mais a carga do órgão, a segunda linha, a própria GEREF fazer todo esse trabalho de criação de trilhas e execução para auferir a regularidade dos pagamentos da folha, mas como eles não fazem e não vão fazer a gente assumiu isso e vai continuar fazendo. (E7)

E7 highlights, however, says that human resources divisions should also perform those analysis. Some individual and GAPES characteristics were observed that facilitate the internal audit to be in charge of this type of activities, such as: i) the ability of GAPES to be able to visualize the entire organization through the data it has; ii) the ability of GAPES to replicate in a relatively simple way the analyzes of one State Department for all other State Departments of PEESC; and iii) the individual skills in data analysis that some internal auditors possess that would hardly be found today in divisions responsible for the payroll.

Sharing these attributions with management can be a step towards achieving a more robust model, as demonstrated by Codesso et al. (2020). In their research, authors demonstrate how the CA was built and operated for a long time by the internal audit department. With the maturity of the model, internal auditors started to share the CA operationalization with auditee areas. Internal auditors eventually became only responsible for the maintenance of CA, including any necessary adaptations to the used script (scripted in ACL Galavanize).

CA can generate unwanted impacts on management, as reported by E8. As the CA can perform tasks that are like tasks that should be done by the management (relate with internal control), staff responsible for human resources management often end up having distorted views on the role of internal audit.

So, they [human resources division] understand [the monitoring work] as good, but they have a distorted view about it, understand? That [with this CA work] “Oh no, audit that needs to find these issues”. [The central human resources division] has repeated this several times. “It's you, the audit, who have to find these issues” and it's not like that (...) it's not for them to stop doing their jobs, understand? It would be a reinforcement, because as they are the first and second lines, we would help in that

sense (...) So this clarification is lacking, or maybe they don't want to understand, because we always explain. Maybe they don't want to understand (E8)

Então assim, eles [setoriais] veem como bom sim [o trabalho do monitoramento], só que fica essa visão distorcida entendeu? De que daí [com esse trabalho da AC] “Ah não, auditoria que precisa pegar esses casos”. [O órgão central] já falou diversas vezes isso. “São vocês, auditoria, que têm que pegar esses casos” e não é assim (...) não é para que eles deixem de fazer os trabalhos deles entendeu? Seria um reforço, pois como eles são a primeira e a segunda linha, a gente ajudaria nesse sentido (...) Então falta esse esclarecimento, ou talvez não querem entender, porque a gente sempre explica. Talvez não querem entender (E8) (E8)

Thus, while these impacts are not entirely unexpected in an organization operating a CA model, they must be carefully analyzed. If auditees understand that they no longer need to perform their internal control functions, failures can arise. Although the CA serves as a reinforcement to the organization's internal control structure, it is not intended to completely replace it.

The findings commented by interviewee E8 can be triangulated with observations made in the field during meetings held in 2022 between GAPES and auditees. In two meetings, those responsible for internal control asked GAPES if with the CA model, they would be exempted from evaluating and controlling the positive variations that occur in the payroll of their departments – a function performed for many years by the internal control.

Thus, it is evident that the way in which the CA is operationalized, bringing the auditors closer to the relevant events, impacts the auditees' view of the real activity of the internal audit. It is also noticed that there may be an overlap of functions between the CA and the internal control (management).

4.5.11 Independence of Internal Audit

Proximity with relevant events, as reported by previous literature, could theoretically generate independence issues for the auditor. However, except for one internal auditor who comments about potential conflicts, all other auditors did not report any issues with a possible loss of independence using CA.

(...) we start to form a friendship, I don't know if this will create a problem (...) we started to focus on Departments with some people who are more responsible, who give us more support in the solution and in the answers, who follow up with us, right? But this friendship when it starts strong (...) Well, you call the person, the person calls you. You start to become almost friend with the person and sometimes you find her mistake, understand? Her mistake of not taking the appropriate action and the way you charge this person, because of friendship, starts to get a little no longer imposing,

right man? We say “No, I’ll wait for your answer” and the person thinks they can stay a while longer, a month, two months without answering. Then you charge there again, and the person starts to become unfriendly. You begin to have a situation that can generate a conflict between the auditor and the auditee. It was a friendship that the two of them were helping each other, but when things start to get out of line a little, it already becomes a conflict. At this point, there is a little difference from the traditional to the continuous (...) The problem is the charging, no one likes to be charged and when it becomes an CA routine, every month you send it. The person who is already on other tasks thinks “Again?”. (E3)

(...) a gente começa a pegar uma amizade, eu não sei se isso vai criando um problema (...) a gente começou a focar nos órgãos com algumas pessoas que são mais responsáveis, que dão mais apoio para gente na solução e nas respostas, que fazem o follow up com a gente né? Só que essa amizade quando começa a ficar grande assim. Pô tu liga para a pessoa, a pessoa te liga. Tu já começa a ficar quase amigo da pessoa e nisso tu vê as vezes erro dela, entendeu? Erro dela de não tomar a providência adequada e a forma de tu cobrar essa pessoa, por causa da amizade, começa a ficar um pouco não mais impositiva né cara? A gente fala “Não, eu aguardo tua resposta” e a pessoa acha que pode ficar mais um tempo, um mês, dois meses sem dar resposta. Ai tu cobra ali de novo e a pessoa já começa a mudar a amizade, o encaminhamento. Começa a ter uma situação que pode gerar um conflito do auditor com a pessoa. Era uma amizade que os dois estavam se ajudando, mas quando a coisa começa a sair um pouco de linha da cobrança, ela já se torna um conflito. Nesse ponto existe um pouco de diferença da tradicional para a continua (...) O problema é a cobrança, ninguém gosta de ser cobrado e quando se torna uma rotina de AC, todo mês tu vai encaminhar. A pessoa que já está com outras tarefas pensa “de novo e de novo”. (E3)

I think that in this relationship, some friendship situations can exist, but it is very difficult, you don't lose [independence]. (E4)

Eu acho que nesse contato, algumas situações de amizade podem existir, mas é muito difícil, não chega a perder [a independência] não. (E4)

E3 reported that due to the partnerships necessary for the success of the CA, this approach can generate certain conflicts. However, even E3 has the view that the existing regulations and the characteristics of the internal auditor are sufficient to inhibit a possible loss of independence.

The findings also point to a new fact that needs to be considered when discussing the CA's potential problems with audit independence. This fact concerns the characteristics of the CA methodology itself.

I really don't see a problem [in the issue of independence] because it is the machine that will search the database, that will check for inconsistencies, this creates an impersonality, right? You will not be subjective. If you go there in person and pick up you will select a sample, that's traditional auditing. "I need the working folders of 10 public servants, I want to take a look." Even if it's random, you'll look at the

documentation and someone might say it was biased (...). [In CA] it is the machine that is sweeping, and it is telling me that it has inconsistency. This generates, for us auditors, exemption. "The audit trail found this situation and I need you to identify me if it is ok" (E5)

Eu realmente não vejo problema [na questão da independência], até porque pelo fato de ser a máquina que vai varrer o banco, que vai verificar as inconsistências, isso cria uma impessoalidade né? Você não vai ser subjetivo. Se você for lá pessoalmente e pegar você vai selecionar uma amostra, isso é auditoria tradicional. "Preciso das pastas funcionais de 10 servidores, quero dar uma olhada". Mesmo que seja aleatório, tu vai olhar a documentação e alguém pode dizer que foi tendencioso (...). [Na AC] é a máquina que está varrendo e está me dizendo que tem inconsistência. Isso gera para nós auditores, isenção. "A trilha que identificou e eu preciso que você me identifique se está ok" (E5)

We work generating a gigantic mass of data and this is dealt with directly with all the State Departments, right? That's why automation is important, the more automated the process, the less personal it gets. There are audit trails there, which are legal impositions that end up becoming computing rules, business rules that go into the script, and that brings you a mass of results (...) I don't see any problem of independence in that. (E6)

A gente trabalha gerando uma massa gigantesca de dados e isso é tratado direto com todos os órgãos né? Por isso a automação é importante, quanto mais automatizado é o processo, menos pessoal ele fica. Tem as trilhas ali, que são imposições legais que acabam virando regras de computação, regras de negócio que vão para dentro da computação, e aquilo ali te traz uma massa de resultados (...) eu não vejo nenhum problema de independência nisso. (E6)

E6 reports that there is an inverse relationship between automation and the impersonality necessary for the auditors' work. Thus, the more automated the model, the more independence the internal auditors will have. Audit trails that are built accordingly to business rules, also increase the auditor's impersonality in CA work. This is because the audit trails used by GAPES' internal audit are mostly based on current legislation. Any deviation from these laws will be automatically detected by audit trails, creating impersonality in the process. As 100% of the data is scanned for each question, this shouldn't raise questions about persecution or similar situations.

It is evident that, contrary to what was expected, the CA model was able to increase the impersonality of the work of internal auditors, mainly through two ways: i) process automation; and ii) audit trails based on deterministic business rules.

4.6 DISCUSSIONS ABOUT PROPOSITIONS AND THESIS DECLARATION

Discussions about the theoretical propositions and the thesis are presented in this section. Regarding the first research proposition, important insights emerged from the present study. The first propositions says that **the impact on performance (relative advantage), the effort required, the facilitating conditions, the social influences and the quality of the system, drives the use and individual satisfaction of CA.**

Regarding Proposition 1, the impact on performance, from the point of view of advantage relative to traditional methods, is seen with some skepticism by non-data-driven auditors. Throughout interviews, internal auditors indicated that they do not understand CA as better than traditional auditing, but as a complementary methodology with different purposes. While this may be the case GAPES model, in theoretical terms there is much discussion about CA as a superior and more modern methodology than traditional methods and how performance expectancy should drive its acceptance (Nascimento 2017, Miranda, 2018). Thus, these relative advantages will only lead to greater use or greater satisfaction of CA in auditors with greater mastery of data analysis tools (data-oriented auditors).

As CA had already been used within GAPES for almost two decades, we asked internal auditors about existing expectations regarding a more robust and automated CA model. Having more time to perform other activities was one of the most outstanding aspects of this theoretical scenario. With more available time, internal auditors could provide consulting services to human resources divisions. Consequently, a more robust model should lead to higher satisfaction for CA. More automation, however, requires specialized human resources to be available, demonstrating that performance expectations and facilitating conditions are interconnected.

Nascimento (2017) and Miranda (2018) also demonstrated that effort expectations and facilitating conditions are important predictors of intention to use CA. Regarding the effort necessary for the operationalization of CA, our research makes some new and important contributions for the theory. The first point to be highlighted refers to the aptitudes or personal abilities inherent to each individual. Previous studies (Venkatesh et al., 2003, Nascimento, 2017, Miranda, 2018) do not directly question these skills, and a system being “easy to use” (measures usually used in previous studies) may not be directly associated with these individual skills. We also go beyond the findings of Vasarhelyi et al (2009), who demonstrated that auditors need to specialize in modern audit techniques and technologies for CA properly evolve.

Our results show that these skills are important elements and that they need to be analyzed separately within this category. Each individual ability will also be drivers of the use and satisfaction with the use of CA. Auditors with greater technology skills, especially in the data analytics area, tend to be more data-oriented than auditors who do not have such skills. Our findings are somewhat in line with Vasarhelyi et al. (2012) and Dai and Vasarhelyi (2020) that identified that knowledge about IT on the part of internal auditors is an important factor for the acceptance of CA.

We also found that individual efforts are not enough to increase use and satisfaction of CA. As a result, use and satisfaction with use are also influenced by collective efforts, since CA involves not only a technology, but a set of technologies and personnel for its proper execution. An example is an effort required to adjust SIGRH parametrizations, which often involves different actors (human resources divisions, human resource directory, and internal auditors) who need to collectively overcome different obstacles. Improvements in SIGRH generate a wider range of opportunities for internal auditors to deepen their analysis within the CA.

Different facilitating conditions were identified that influence the use and satisfaction with the use of CA. These conditions concern human resources, physical structure, and organizational structure.

Regarding human resources, hiring new public servants, including auditors specialized in IT (PEESC is lacking these professionals) and more training focused on the area of data science are important aspects that could increase use and satisfaction with the use of CA. Similar to Vasarhelyi et al. (2012), we identified that GAPES and CGE lack specialized IT auditors (both for support audit and for IT audit), and it has implications for the acceptance of CA. Miranda (2018) shows that training programs become useful to reduce barriers to use.

Vasarhelyi et al. (2009) state that to perform CA efficiently, auditors need a certain level of access to the system and organizational data via the IT department. Although our research has indeed shown how IT technical support is fundamental to the success of CA, some internal auditors have the perception that rather than depending on the support of a particular IT division, it would be more important to have specialized IT personal or with IT knowledge inside management that is performing the CA (in our study, GAPES). In fact, one of the data-oriented auditors migrated from a management specialized in data for GAPES precisely because he believed that this proximity to the core activity would help to maximize the gains of the CA.

The findings of Vasarhelyi et al. (2012) and Gonzalez et al. (2012) show that an adequate data structure (physical structure) are fundamental pillars of CA acceptance, and achieving this quality essentially depends on the support of top management. This dissertation improves this understanding, as it explores in greater detail how this barrier influences the acceptance of the model, and how top management support can be achieved. Top management needs to support internal audit mainly in providing and maintaining the data structure, through a necessary “director to director” dialogue, that is, between the CGE management and the management of human resources divisions and State Departments that are responsible for the data. As internal auditors are not the owners of the data they use in CA, without management support, access to data can have many challenges, and might have consequences for data quality and access to data without the necessary timeliness. The support of the CGE management for this purpose, however, seems to be conditioned to the understanding that these managers have about the importance of data for CA. It was identified, by interviews, documents, and observations that managers with greater knowledge of data tend to give greater importance and seek a more agile solution to these problems. So, we found that not only all internal auditors should have at least a basic understanding of databases, but top management should also have some knowledge if organizations want to improve their CA acceptance.

Our dissertation suggest that the acceptance of the CA concerns the quality of the data that are available to the internal audit. This dissertation did not measure how much data quality impact the acceptance of CA, as a quantitative study would be necessary to reach this conclusion, but the results presented allow us to state with a high degree of certainty that these data have a direct impact on acceptance of the CA, and that problems with this data eventually translate into losses for the CA.

Analyzing the organizational structure in which the CA is involved also allows a better understanding of how it will drive the acceptance of the CA. Peculiar characteristics of the public administration, such as legislative complexity and the total expanses with payroll, are embedded within this structure. The legislative complexity and the payroll expense relevance in the public budget drives internal auditors to use data for audit purposes. Although the legislative complexity can be a barrier for the model, which are often beyond the control of internal auditors, this complexity generates the need to develop deterministic trails that seek to verify such situations. The organizational structure and impact on the acceptance of CA will depend on each environment in which CA is operationalized.

The results presented here also emphasize the theoretical statements of West (2005), that many governmental organizations do not have technological barriers, but structural barriers specially related to organizational culture. These barriers need to be overcome to achieve greater use and satisfaction with CA use.

Regarding the quality of the systems and its relationship with the acceptance of the CA, it was noticed that problems in the SIGRH affect the acceptance of the CA by limiting the performance of the auditors when trying to find necessary information about certain payroll situations. In addition, the legislative complexity, and constant State Government reforms (Government Structure) also impact SIGRH, since a priori, the system should adapt to this reality, which is not always the case. These problems can be overcome when there is a closer relationship between the internal audit and the human resources managers, since as the CA potentially shows several problems, the partnership between GAPES and the audited divisions can help to improve this system. The digitization of processes in the SGPE, an advance made in PEESC in recent years, was reported as a driver of CA, driving auditors to use more data-oriented techniques. As for the analytical tools used (ACL and QlikView, mainly) there was a high level of satisfaction with them. It is important to note that these tools are only used by data-oriented auditors and, although they are important systems, they are not fundamental to the execution of the CA.

We found that characteristics identified in System Quality category presents differences from the elements in Facilitating (Organizational) Conditions, and therefore it should not be analyzed in isolation, as occurred in the present research. This is because the quality of the system is also intrinsically related to the quality of the input data for the CA. A separate analysis can be performed only for those analytical systems where this logic does not apply. Even so, it is understood that the quality of the system must be an element belonging to the Facilitating Conditions. Therefore, the adjustments in the proposition lead to the inclusion of the system's quality within the category of facilitating conditions. In view of the findings and discussions held, the first proposition of the thesis is reformulated:

Reformulation of Proposition 1: the impact on performance arising from greater automation, the effort required, related to individual skills and collective efforts, and organizational conditions (human resources, physical structure, organizational structure, and system quality) are interrelated elements that mutually affect and direct the acceptance of CA.

The second proposition of the research states that **individual characteristics, such as gender, age, experience and voluntariness of use, drives the use and satisfaction with the use of Continuous Auditing**

Several previous studies did not find relationships between individual characteristics and the use or satisfaction with the use of different technologies (Faaeq et al., 2013; Taiwo & Downe, 2013; Khechine et al., 2016; Dwivedi et al., 2016; Dwivedi et al. 2017). The present dissertation, due to its methodological limitations, cannot statistically infer whether these variables interfere with the acceptance of CA. However, it was noticed that auditors more related with undergraduate business degree, such as Accounting and Business Administration, seem to have a greater predisposition to use CA than auditors with undergraduate law degree. Past experiences also seem to influence the approach of these internal auditors to the area of data sciences, since all data-oriented auditors already had previous experiences related to databases, technologies, or similar knowledges before joining GAPES as internal auditors.

Therefore, the research proposal is reformulated:

Proposition 2: Professional background and experience with the data area have the potential to shape the use and satisfaction with the use of Continuous Auditing, while other individual characteristics such as gender, age and willingness to use do not have the potential to influence significantly the acceptance of the CA.

The third proposition of the dissertation proposes that **the use and satisfaction with the use of CA generate benefits and associated negative impacts for internal audit, and these benefits and associated negative impacts driven the extent, frequency, and quality of CA.**

As noted, much more than a single direction between use/satisfaction and the net benefits generated, the present dissertation showed that the net benefits also influence the extent, frequency and quality of the CA itself. The interrelationship between use/satisfaction and net benefits was not presented by DeLone and McLean (1992), but was presented by DeLone and McLean (2003).

Examples of these findings can be seen both in the interviewees' statements, documents and field observations. For example, CA can generate efficiency gains for internal audits and thereby free up more time for internal auditors to act. Having more available time, internal auditors could design and validate a larger set of deterministic audit trails, primarily targeting the extent and quality of CA.

CA usage over the years allowed the model to become more mature, allowing internal auditors to understand the fittest moment to perform the CA regarding its frequency. The frequency of CA has already occurred in a timelier manner than it is today. More frequent audits, however, generated adverse effects, such as i) a possible high number of false positives; and ii) a short period of time to carry out the analysis of the findings, both by the internal auditors and by human resources divisions.

In this way, it is understood that use and satisfaction with use lead to greater maturity of the model, and this maturity makes internal auditors understand, given the existing organizational conditions, the ideal frequency of execution of audit trails. In the case of GAPES, it was found that under current conditions, the best time to execute the audit trails is on the definitive payroll, as the execution of CA using preliminary information of the payroll (preview) generated many problems that under current conditions were difficult to overcome.

The fourth proposition of the research proposes that **the perception of the net benefits generated by the CA will be different depending on the type of participation that a certain auditor has within the CA.**

Our findings allow us to identify small variations in the perceptions of data-oriented and non-data-oriented auditors, although these variations have not been explicitly presented. By having a better understanding of the structure of the data, data-oriented auditors are able to perceive in a deeper way the existing problems and barriers to be overcome, and the eventual benefits or negative effects associated with these barriers. Data-driven auditors also have a greater ability to understand how CA allows for a more comprehensive audit. In this way, this dissertation adds new elements to the literature (see, Bradford et al. (2020)) on how different types of auditors perceive and influence the acceptance of CA.

Proposition 5 proposes that **the extension (use), frequency (use) and quality (satisfaction) of the CA driven results with greater accuracy and agility and affect the cost-effectiveness and efficiency of the audit.**

It was identified that the extent, frequency, and satisfaction with the CA drive the accuracy and agility of the auditors' work, depending on the way in which the models are operationalized. Although Seddon's (1997) study has observed that the use of technology is a necessary condition for visualizing its impacts, the use alone is not capable of causing these impacts. The results of our dissertation allow an alignment with DeLone and McLean (2003), that the use needs to be analyzed from the point of view of its extension, frequency, and quality.

Satisfaction with the CA, understood in this case as its quality, drives results with greater precision, as reported by internal auditors, affecting the cost-benefit of the audit, as more accurate results (and with fewer false positives) reduce the work of analysis by part of the auditors. The extension and quality of the CA also influence the reduction of errors in the databases and interfere with the agility of the CA. The benefits related to the agility of the audit, however, depend on the relationship with the audited human resources divisions, since the absence of a response from the CA recommendations can cause delays in the process. As a result, benefits and negative effects associated with increasing or decreasing the frequency of CA performance are perceived, as already reported.

It is noticed that the reasons that lead internal auditors to seek greater agility may be more peculiar than those listed in the literature. One of these reasons concerns the difficulty of often recovering amounts unduly paid to public servants. In this case, auditors are driven towards a more agile audit, although this model has proved to be less imprecise. On the other hand, the model shown to be the most accurate (Deterministic Audit Trails) proved to be less timely, as it is operationalized only after information from the definitive payroll is available. In this way, the frequency of CA drives faster results and reports, but can make them less accurate.

The questions raised by Alles et al (2002) about the economic demands of CA are answered with our dissertation: the benefits of the CA carried out at GAPES outweigh the costs on a scale of approximately 1 to 81. That is, for each real invested (cost) in CA, PEESC had a return (or potential returns) of R\$ 81 reais to the public budget.

The costs associated with CA were not identified as major obstacles by auditors in Vasarhelyi et al. (2012). However, in the view of some internal auditors, PEESC may not be willing to bear the costs inherent to the more complete use of the current audit tools used, which could lead to greater agility in the work, especially in the part of managing the results found by CA. Ahmi & Kent (2013) also found costs as a major limiting factor for CA development. In our research, we explore what are the potential impacts of this limitation. With that, it is demonstrated that the extension and the quality of the CA drive the cost-benefit of the CA, being able to bring excellent results for the organization. With the findings observed in this dissertation, adjustments are made to the research proposal:

Proposition 5: the extent (use), frequency (use) and quality (satisfaction) of the CA drive the model's accuracy and agility, interfering with the cost-effectiveness and efficiency of the audit.

In proposition 6, it was proposed that **the extent, frequency and quality of CA changes the way auditors use data to plan their audits, directing them towards a risk-based audit.** The use of CA for audit planning that directs internal auditors to a risk-based audit is still very incipient within GAPES. As the output (exceptions) from CA is not properly organized, internal auditors have difficulty to use this information to plan their audits. Even though they are using several analytical tools for many years, our findings do not allow us to reach the same conclusions as Eulerich et al. (2020), who showed that the importance given to data analytics leads to greater use of CA as a source of information for audit planning. In fact, GAPES internal auditors understand the importance of these tools, yet CA findings are not currently used to their full potential for planning purposes.

Although this proposition has not been empirically demonstrated, the auditors' reports allow us to infer that in scenarios where the CA has higher quality or robustness, its results/findings could serve as a support for audit planning and for risk assessment purposes.

Proposition 7: the extent (use), frequency (use) and quality (satisfaction) of CA modifies the relationship of internal auditors with the information generated by internal audit, boosting their perceptions regarding relevance, timeliness, and reliability.

Reports from the internal auditors allow us to identify that GAPES understands the relevance of the information used and generated by the CA, and therefore extensively seeks to improve organizational data. The more data-oriented internal auditors have had their relationship with the organization's data improved over the years, and therefore, have a more critical perception of the need to have timely data for audit purposes. Furthermore, even small errors in organizational data generate frustration on the part of internal auditors, also demonstrating empirically how they perceive the importance of reliable information, and how this perception has been shaped by the extent, frequency, and quality of CA. The more mature the model, the better the perceptions of internal auditors.

Thus, it is summarized that the auditors showed that organizational data are relevant sources for CA. In addition, there is a real concern about the need to have access to timely data, which a priori does not seem to be a feature present in other internal audit managements. As a result, the relationship between GAPES and organizational data over the years, on account of the CA, was reflected in better perceptions of the importance of this data, showing how the CA is reflected in more timely, relevant, and reliable data for the auditors, as already demonstrated

by other research in relation to different technologies (Fedorowicz & Lee, 1999; Petter et al., 2013, Drum et al., 2017).

Proposition 8: The inherent agility of CA has negative effects on the organization and these effects are mitigated or accentuated depending on the way in which audit alarms are managed within internal audit.

Negative factors associated with the inherent agility of CA were identified, about existing risks of a greater number of false positives and an overload of work for internal auditors and human resources staff. Proper management alarms associated with CA outcomes (anomalies and expectations) are also important. Our finds suggest that GAPES should create their own system or use some available tool to communicate, store and manage the follow-up process of CA results. In addition, demonstrating to human resources divisions the importance of CA results proved an important factor in the positive effects of the agility of the CA. The results contrast with those presented by other researchers, such as Kogan et al. (1999) who pointed out that the CA will only work if it is able to instantly access relevant events and their results. CA is not only working in GAPES, but we also found that less timeliness audits would bring more benefits to the internal audit in the currently scenario.

The findings of the present research reinforce the findings of Gonzalez and Hoffman (2018), who found that timely and frequent notifications to management about possible fraud are not always beneficial to reducing fraud within organizations. This benefit depends on whether the capacity of the monitoring system is strong or weak and can have a neutral influence (if they have a strong internal control) and a negative influence (if they have a weak internal control). Findings of our research advance this understanding, since in addition to having strong or weak internal controls, the size of the audited State Departments and the demand for work are factors related to the low reception of more timely (monthly, usually) notifications of CA findings.

Proposition 9: CA brings auditors closer to relevant events, and consequently brings the auditor closer to the internal control function, generating potential risks to the independence of internal auditors.

Although it is possible to identify potential risks about internal audit loss of independence and assuming internal control functions, we found that CA potentially generates more benefits than negative effects in this concern. Our findings help to clarify the questions raised by Bumargner and Vasarhelyi (2018), that the modern IT structure has generated

confusion about the functions that should be performed by internal audit and management. Internal auditors are still more technically capable of performing more extensive analyzes with the use of data (covering all State Departments at once) than the organization's management, especially because management still has several operational activities related to the payroll.

As already mentioned, the thesis was first declared as that **the acceptance of Continuous Auditing is influenced by individual expectations of internal auditors and by different organizational barriers and that the acceptance of Continuous Auditing is reflected in benefits for internal audit, although there are negative factors associated with its use.** Based on our findings, it is possible to refine this statement, adding new elements that can better demonstrate how the aspects of CA are much more interrelated.

In this way, the thesis statement is reformulated for: *the acceptance of the Continuous Audit is guided by individual efforts, collective efforts and organizational conditions (human resources, data quality, physical structure, organizational structure and system quality), which influence the benefits and negative factors associated (net benefits).*

Figure 32 presents the complete CA model according to the results found in this research.

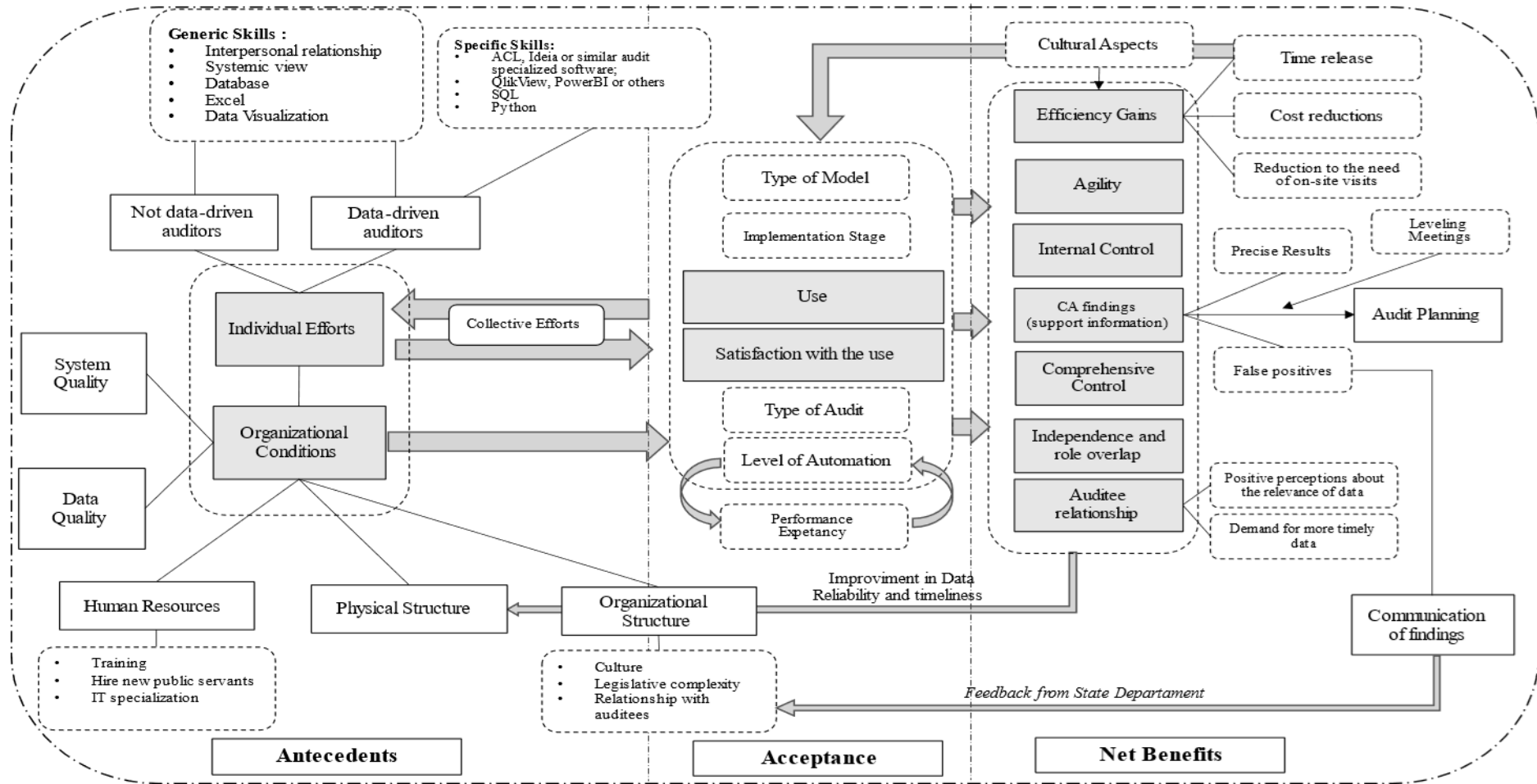


Figure 32 -Antecedents, Use, Satisfaction and Net Benefits of the Continuous Audit

The model in Figure 32 demonstrates the interrelation between antecedents of acceptance, acceptance (use and satisfaction with use) and the different net benefits from CA. The proposed model presents two elements that can act as barriers or boost the acceptance of CA, which are the organizational conditions and the individual and collective efforts to operationalize the methodology. At least in the public administration scenario, these seem to be the most important elements to understand how the use of CA will occur. Thus, it is necessary to have adequate organizational conditions, such as timely access to data and access to data that have some quality. In addition, some skills such as previous experience in data analytics are important so that at least some auditors can be more data-oriented and can take the lead in CA models. Previous research has reinforced the importance of performance expectancy as a variable that influences intention to use (Miranda, 2018, Nascimento, 2019). It was evidenced in the current scenario, that internal auditors perceive possible benefits in performance when the model becomes more automated. These benefits could be seen in efficiency gains and freeing up of working time. However, auditors also report that for greater automation, it would be necessary to have free time to automate some functions. Several benefits were identified, such as efficiency gains, work agility gains, among others. The associated negative effects could also be visualized. The CA will achieve benefits or will generate negative effects depending on the maturity of the model and some individual and organizational characteristics.

5 CONCLUSION AND FUTURE RESEARCH

This research aim is to analyze how the acceptance of Continuous Auditing occurs and how Continuous Auditing is reflected in net benefits for internal audit in a State Government, in the view of the Personnel Audit Management (GAPES). To achieve this objective, a case study was elaborated, conducted through semi-structured interviews, document analysis and field observations. We used Content Analysis to examine the data.

Objective 1: Understand how the Acceptance of the Continuous Audit occurs in the Personnel Audit Management (GAPES).

Our findings showed that the acceptance of CA within GAPES occurs mainly by two factors: organizational conditions and efforts required for its setup. Organizational Conditions mainly concern required human resources, including IT specialists and the existing organizational data structure (in terms of availability, access and quality). Another characteristic we found and that is not commonly mentioned in the literature concerns the existing relationship between audit and auditees. For an easier acceptance the model requires that internal auditors and auditees have a good relationship, as the auditees have great potential to assist in the creation of more Audit Trails, especially with their feedback.

Although Venkatesh et al. (2003) have used the nomenclature “Facilitating Conditions” based on previous studies, this expression seems inadequate, at least within the current scenario studied. Both favorable or unfavorable conditions lead auditors to use and feel more satisfied with the CA. For example, the quality of organizational data influences the use of CA. However, these data may be of higher or lower quality and therefore it would be unreasonable to assume that data quality is a Facilitating Condition. We propose that instead of using Facilitating Conditions, the expression Organizational Conditions should be used, thus capturing several elements that relate to existing conditions that lead to more/less use and more/less satisfaction with the use of CA.

We also found that for a wider acceptance of CA, collective and individual efforts are needed. These efforts need to be analyzed from the point of view of individual skills and the ability of those involved to act in harmony, thereby reducing collective efforts to accept CA.

Although CA can be operationalized both collectively and individually, this dissertation demonstrates that joint and targeted efforts tend to bring greater benefits to the organization than when they are operationalized individually. Individual characteristics do influence how much effort will be directed towards a more robust CA, but the characteristics

of the organization (GAPES) in which the methodology is inserted are fundamental to the success of the system. Other organizations can also initiate a CA methodology through isolated projects implemented and guided by only some auditors. These professionals should have skills and characteristics that make them more interested in data analysis technologies and tools when compared to other professionals in the same organization. However, our finding suggests that collective effort increases CA potential when opposed to just individual effort. This means that both data-driven and non-data-driven auditors need to have a deep understanding of the methodology and be capable of understanding their results.

Perceptions about how social influences interfere in the acceptance of CA were not so strongly evidenced. In addition, internal auditors understand that a more robust and automated model would lead to better performance. Furthermore, different from what was proposed, it is understood that the quality of the system should be approached as a category within the organizational conditions (or facilitating conditions, according to UTAUT).

Our findings also suggest that not all auditors involved in the methodology need to be experts in sophisticated technologies for the success of the system, although an understanding of databases and related technologies seems to be very important for the model to evolve faster.

Objective 2: Identify which are the net benefits of the Continuous Audit for the Personnel Audit Management (GAPES)

The survey results also allowed the identification of different benefits and negative problems associated with CA. Among the benefits, we highlight the financial achievements, efficiency gains through the availability of more time for internal auditors, and more accurate audit results. These benefits, however, are intertwined with the type of audit model. The deterministic model was highlighted as the most beneficial to the internal audit. In addition, it was highlighted that an inadequate model can generate a high number of false positives.

We also expected a negative impact related to the loss of independence on the part of the internal auditors. However, contrary to what we expected, internal auditors reported that the impersonality of the CA, due to its pre-defined and automated tests, even has positive effects on the independence of the internal auditor. In other words, we found that the CA is capable of solve at least partially independence issues in audit.

Objective 3: Analyze how the acceptance of CA is reflected in net benefits for internal audit within the Personnel Audit Management (GAPES).

Mixed elements of CA acceptance within GAPES were identified, with equally mixed effects on the net benefits gained by such a methodology. While all internal auditors understand the potential of the methodology, the scope, timelessness, and quality of the model drive the net benefits of CA. Using CA for several years has allowed internal auditors to reach a certain level of maturity. Because of that, we could imply that internal auditors would continuously develop a model that brings them closer to relevant events. In an unexpected way, the opposite happened in our study: the maturity of the model led internal auditors to realize that with the current organization conditions, it would be better to have a less timely model, but with more precise results.

The present research also concludes that the integration of the UTAUT model with the D&M must be carried out with caution, as some of the antecedents presented by Venkatesh et al. (2003) and the consequences presented by DeLone & McLean (1992, 2003) are not situated exactly within the same temporal spectrum. Many of the questions raised by UTAUT concern future intentions, especially regarding the performance expectations from the use of that technology which are largely confused with the visualization of the benefits found by D&M. If the researcher understands that the use of a certain system is not an end, and that the use can vary in terms of its quality, extent of use and satisfaction, as demonstrated by this research, then this obstacle can be overcome. Taking these aspects in consideration, the integration of the two models becomes adequate and brings important contributions to the literature on the acceptance and success of information systems and particularly for the acceptance and success of CA.

Given that CA is a methodology operationalized by a set of technologies and techniques, rather than a simple technology, as some previous studies have understood, it is not possible to carry out an application of UTAUT or D&M questionnaires without a deep adaptation of these instruments. One aspect that needs to be captured by these instruments is the proximity of auditors to the organization's data, as this proximity proved to be very important for the success of the model. *A priori*, more data-oriented auditors will have different perceptions than less data-oriented auditors. The justifications for this are diverse, but essentially stem from the fact that these auditors have a better understanding of the data structure and the skills needed to operationalize the technological part of CA.

Unbeknownst to us, this is one of the first studies to measure and quantify the financial benefits of CA and its costs inside the public administration. Although in approximate amounts,

they make it possible to identify significant and quantifiable benefits for internal audit and for the PEESC.

Although the literature has shown the evolution of Continuous Assurance, separately representing Continuous Monitoring of Compliance, etc., field observations have shown that the object of the audit will influence what should be the focus of automation and where it should evolve. An organization rooted in norms, laws and rigid rules (like most government organizations in Brazil) will be able to set up a theoretical framework where Continuous Compliance Monitoring is a key part of the model. The legislative complexity on the PEESC payroll makes the construction of these audit trails quite difficult and costly but is probably the most fitting model for them.

We conclude that the adoption and acceptance of CA within a governmental organization presents numerous challenges. It is also noticed that internal auditors have different perceptions about the pros and cons of this technique. Although these different perceptions have been evidenced, there was unanimity in the understanding that CA is of great value to the organization, as long as it is methodologically well structured and has adequate support from professionals who have extensive knowledge in IT areas.

Findings of our research open a vast field of possibilities for future research. Future studies can use the results of this research to improve the questionnaires usually used by UTAUT and by D&M in the context of CA. In this way, it will be possible to test whether the relationships proposed by the present research can in fact be empirically proven in the field. More in-depth explanations can also be sought on how the relationship between audit and auditee can be improved in governmental organizations, as these relationships have proved to be quite fruitful for internal auditing regarding the CA methodology.

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APPENDIX A – Presentation Letter

Dear Sir/Madam, greeting you cordially, we hereby introduce Marcelo Machado de Freitas, a student regularly enrolled in the Graduate Program in Accounting at the Federal University of Santa Catarina. The PhD student is carrying out research for the thesis, under the supervision of Professor PhD Fabrícia Silva da Rosa and with the supervision of Professor PhD Miklos Vasarhelyi. It is a case study entitled **Acceptance and Net Benefits of Continuous Audit in the Public Administration**.

In this regard, we ask you to support for the PhD student to carry out his research with your organization. It is worth mentioning that the data and information obtained will not serve any purpose other than this academic research, which will have a strictly scientific nature. The data provided will be described without disclosing the names of the people surveyed and the name of the entity may be kept confidential if you deem its necessary.

Any questions about the research can be obtained from the secretariat of the Graduate Program in Accounting, UFSC, by e-mail to the course ppgc@contato.ufsc.br or from Prof. PhD Fabrícia Silva da Rosa, by e-mail fabricia.rosa@ufsc.br or with PhD student Marcelo Machado de Freitas, by e-mail mmf.marcelofreitas@gmail.com.

Certain that we can count on the collaboration of you and of this organization, we anticipate thanks.

Yours sincerely,

Profa. Fabrícia Silva da Rosa
Universidade Federal de Santa Catarina

APPENDIX B – Study Protocol

STUDY SUMMARY

TITLE

Acceptance and Net Benefits of Continuous Audit in the Public AdministrationT

RESEARCH PROBLEM

How does Continuous Auditing acceptance occurs and how does it reflect into net benefits for internal audit?

STUDY OBJECTIVE

General Objective:

Analyze how the acceptance of Continuous Auditing occurs and how Continuous Auditing is reflected in net benefits for the internal audit in a State Government, in the view of the Personnel Audit Management (GAPES).

Specific Objectives:

- a) Understand how the Acceptance of the Continuous Audit occurs in the Personnel Audit Management (GAPES);
- b) Identify which are the net benefits of the Continuous Audit for the Personnel Audit Management (GAPES);
- c) Analyze how the acceptance of CA is reflected in net benefits for internal audit within the Personnel Audit Management (GAPES).

RESEARCH PROPOSITIONS

Proposition 1: the impact on performance (relative advantage), the effort required, the facilitating conditions, the social influences and the quality of the system, drives the use and individual satisfaction of CA.

Proposition 2: Individual characteristics, such as gender, age, experience and voluntariness of use, drives the use and satisfaction with the use of Continuous Auditing

Proposition 3: The use and satisfaction with the use of CA generate benefits and associated negative impacts for internal audit, and these benefits and associated negative impacts driven the extent, frequency, and quality of CA.

Proposition 4: the perception of the net benefits generated by the CA will be different depending on the type of participation that a certain auditor has within the CA.

Proposition 5: The extension (use), frequency (use) and quality (satisfaction) of the CA driven results with greater accuracy and agility and affect the cost-effectiveness and efficiency of the audit.

Proposition 6: The extent, frequency and quality of CA changes the way auditors use data to plan their audits, directing them towards a risk-based audit.

Proposition 7: the extent (use), frequency (use) and quality (satisfaction) of CA modifies the relationship of internal auditors with the information generated by internal audit, boosting their perceptions regarding relevance, timeliness, and reliability.

Proposition 8: The inherent agility of CA has negative effects on the organization and these effects are mitigated or accentuated depending on the way in which audit alarms are managed within internal audit.

Proposition 9: CA brings auditors closer to relevant events, and consequently brings the auditor closer to the internal control function, generating potential risks to the independence of internal auditors.

RESEARCH METHOD

RESEARCH DESIGN

About the objectives: descriptive

About the procedures: study case

Regarding the approach of the problem: qualitative

OBJECT OF STUDY AND SUBJECTS OF THE RESEARCH

Object of the Study: Gerência de Auditoria de Pessoal da Controladoria Geral de Santa Catarina (GAPES). (Personnel Audit Management)

Participants of Study: internal auditors that participated in the Continuous Audit model.

RESEARCH INSTRUMENT (SEMI-STRUCTURED INTERVIEW)

See APPENDIX C

DATA COLLECTION

Interviews, documents and observation.

Interviews: with the internal auditors, with interviews lasting between 30 minutes and 1h30. It will be possible to repeat the interview if necessary. The participants will not be identified, being recognized in the course of the work as “Interviewee 1”, “Interviewee 2”, and so on.

Documents: audit reports, audit trails, performance reports, informative manuals, internal processes related to continuous auditing, among others. The documents will be requested in advance, and the organization is responsible for authorization and access to them. Financial values will not be identified and disclosed, unless they are explicitly allowed by the organization and essential to the understanding of the analyzed case.

Field observation: unstructured.

DATA ANALYSIS

Content analysis based on theoretical categorization.

ETHICAL PROCEDURES

This research is governed by general principles relating to (i) informed consent, (ii) the concern not to harm the organization and the people who work in it and (iii) maintain the confidentiality of the people and areas analyzed, whenever required. In specific terms, the following procedures will be adopted to ensure confidentiality of research participants and the company:

- a) There will be no identification of the participants. Persons and areas will be designated by means of codes that preclude any risk of identification. In addition, expressions that may put this identification at risk will not be used.
- b) The researchers undertake to maintain confidentiality regarding any eventual confidential information collected during the observations made.
- c) Only the researchers involved will have access to the interview records.
- d) Recordings of interviews will only be made according to the knowledge and agreement of

the interviewee.

- e) The recordings will be destroyed after five years of completion of the research.
- f) If transcripts are made, the interviewee will have the opportunity to make changes to the answers given to questions that may make him/her uncomfortable.
- g) Information obtained through documents will also have the same confidential treatment.
- h) The organization will define what kind of documents can be accessed inside and outside its environment.
- i) Information obtained through observations will also be treated confidentially.
- j) All observations made will be presented to the organization, when relevant.
- k) The working papers (without identification) will be kept for five years in a safe environment, in the possession only of the researchers involved in the research.

Florianópolis, 2022/ ___ / ___

In accordance.

Interviewee name: _____

Interviewee signature: _____

Marcelo Machado de Freitas – PhD Candidate
Universidade Federal de Santa Catarina

Fabírcia Silva da Rosa, PhD. - Supervisor
Universidade Federal de Santa Catarina

APPENDIX C – Interview Instrument

Interview number:

Date:

Local:

Block 1 - Characterization of the respondent:

Name:		Position:	
Age:		Experience in Public Administration:	
Education background:		Experience as Internal Audit in CGE:	

1.1) Could you comment about your trajectory and your main assignments carried out in to GAPES?

1.2) How do you see the role (functions) of Internal Audit in the State of Santa Catarina?

1.3) Have you worked with data analysis before? In GAPES or in other activities?

Block 2 - Acceptance (Intention to use, use and satisfaction) of the Continuous Audit

Continuous Audit is a type of audit that produces results virtually simultaneously or within a short period of time after a relevant event has occurred. An example of a relevant event on the payroll could be the death of a certain employee. Its operationalization is based on the proper use of different technologies.

2.1) Could you comment on how the Continuous Audit takes place at GAPES?

a) Your role in the process;

b) Your satisfaction;

i) the paper is suitable;

ii) what could be different;

Block 3 - Background of the Acceptance of the Continuous Audit

Individual reactions to acceptance (intention to use, use and satisfaction) of Continuous Auditing techniques. The individual reactions analyzed here refer to the expectation of performance, the expectation of effort, the facilitating conditions, the social influences and the quality of the system used.

3.1) Could you comment on how the Continuous Audit is useful for your role as an auditor?

- a) Advantages over traditional methods;
- b) Improvements perceived after the use of Continuous Auditing techniques;
- c) Comparing with the work done by other colleagues (who do not use CA techniques);
- d) Comparing with the work done by other managements (which do not use CA techniques)

3.1.1) Do you consider that a more robust CA model (more automated, for example) could impact the performance of your activities?**3.2) Could you comment on your difficulties regarding the use of Continuous Auditing techniques (data extraction, data analysis, etc.)?**

- a) In carrying out...
 - i) filtering data in a database;
 - ii) data crossing;
 - iii) creation of continuous audit trails (script);
- b) In learning the techniques mentioned above;
- c) What personal barriers exist to using Continuous Auditing techniques?
- d) What organizational barriers exist to using other Continuous Auditing techniques?
- f) Personal skills that help / hinder the use of Continuous Audit Techniques

3.3) Explain how other people in the organization view Continuous Auditing.

- a) the audited (human resources divisions);
- b) the central human resource division;
- c) other auditors that are not part of the Continuous Audit methodology;
- d) the senior management of the CGE (General Auditor and Controller);
- e) the Governor

3.4) Does the use of Continuous Auditing bring any appreciation of the audit work (in terms of image) to the organization? Exemplify.

3.5) Do you see that the organizational conditions are sufficient to operationalize the Continuous Audit? Exemplify.

- a) people and their qualifications
 - i) knowledge of the business;
 - ii) knowledge of the analytical technique;
 - iii) what would happen if people with data knowledge left management?
 - iv) did you take any course/post in the area of information systems?
- b) software and systems;
- c) top management support
 - i) management;
 - ii) general auditor and controller;
 - iii) governor.

3.6) What general knowledge is important for Continuous Audit to function properly within internal audit.

- a) database;
- b) SQL;
- c) programming languages;
- d) Excel;
- e) Softskills;
- f) etc.

3.7) What systems/software are used by you to carry out your work during the Continuous Audit (execution of audit trails, analysis of audit trails, communications of findings)? How are they used?

- a) how manual/automatic are the procedures...
 - i) execution of trails;
 - ii) trail analysis;
 - iii) sending the findings.

b) comment a little about which systems you use and how you use them? (SIGRH, Excel, Access, Clickview, ACL, E-mail, SGPE, etc.)

Block 4 - Net Benefits

Positive or negative impacts, individual or organizational, that occur when implementing a technology. Net benefits refer to the fact that no outcome is completely positive without there being some negative consequences involved (DeLone & McLean, 2003)

4.1) Do you consider the Continuous Audit model efficient? Explain your answer.

- a) reduced/increased costs;
- b) reduced/increased working time;
- c) increased/reduced productivity;

4.2) How does the CA model help in planning traditional audits?

- a) provides data;
- b) points out risk situations;

4.3) How does CA differ from the traditional audit model in relation to audit procedures? How does AC modify these procedures?

- a) sampling;
- b) displacements;
- c) substantive procedures;
- d) control tests;
- e) physical counting/third party confirmation/inspections/etc.

4.4) Do you consider that CA generates accurate results? Explain.

- a) false positives;
- b) false negatives;

4.5) Do you consider that the CA uses complete data? Explain. How was the integrity of this data altered on account of the CA? How could the CA have contributed to improving the data on the payroll?

- a) Extractor/BoaVista;
- b) SIGRH/SGPE

4.6) How has your relationship to organizational (payroll) data been modified by the CA?

- a) relevance;
- b) timeliness;
- c) reliability;
- d) control tests

4.7) Do you consider that the payroll has many errors? Why? How does CA improve these errors?**4.8) How do you see the influence of monitoring on the issue of auditor independence?**

- a) independence between auditor and auditee;
- b) auditor becoming part of the control.

APPENDIX D – Free and Clarified Consent Term

You are being invited to participate in a survey whose general objective is to analyze how the acceptance of Continuous Auditing occurs and how Continuous Auditing is reflected in net benefits for internal audit in a State Government, in the view of the Management of Personnel Audit (GAPES).

This research is associated with the research project for the development of the Thesis of doctoral student Marcelo Machado de Freitas, from the Graduate Program in Accounting at the Federal University of Santa Catarina (UFSC), under the guidance of Prof. PhD Fabricia Silva da Rosa. For this research we will adopt the following procedures: interviews, unstructured observation and document analysis.

During the interview, unpleasant aspects of their knowledge and behavior can be evoked, as well as generating discomfort, annoyance or fatigue. In any of these or other uncomfortable situations, you can stop participating, without any prejudice or embarrassment, for that, just ask the researcher to end the interview. If you have any questions about the procedures or the project, you can ask the researcher for more information at any time.

The researcher will treat his/her identity with professional standards of confidentiality and privacy, and in case of obtaining photographs, videos or voice recordings, the materials will be under the property of the responsible researcher. Your name or material indicating your participation will not be released without your permission. The results of this work may be presented at scientific meetings or journals, indicating only the results obtained as a whole, without revealing your name, institution or any information related to your privacy. This document is signed by the nominated researchers for your safekeeping, as it is a document that provides important contact information and guarantees your rights as a research participant.

Brazilian law does not allow you to have any financial compensation for your participation in research. The expenses necessary to carry out this research are the responsibility of the researchers and, therefore, the participant will not have any burden nor will he receive any value for the participation. However, in the event of extraordinary and/or unforeseen expenses, the participant will be indemnified and reimbursed by the researchers in full upon proof. The responsible researchers, who also sign this document, undertake to conduct the research in accordance with the recommendations of Resolution CNS 510/16, which deals with ethical precepts and the protection of research participants.

You can contact the researchers Marcelo Machado de Freitas by e-mail mmf.marcelofreitas@gmail.com com. I read this and obtained from the researchers all the information that I thought was necessary to feel enlightened and to choose freely and spontaneously to participate in the research.

Marcelo Machado de Freitas
Researcher

Participant

I, _____, born in ____/____/_____, can be contacted by phone number () _____. I was informed of the objectives of the study Acceptance of Continuous Audit and Net Benefits in the Public Administration in a clear and detailed manner and clarified my doubts. I agree that the materials and information obtained related to my person may be used in activities of an academic-scientific nature, provided that the preservation of my identity is ensured. I know that at any time I can request new information and modify my decision to participate, if I wish, so I declare that I agree to participate in this study and have received a copy of this Free and Clarified Consent Form.

APPENDIX E – Field Report

Identification	Document Type	Format	Pages
DOC 1	Free and Clarified Consent Term (signed)	PDF (Scanned)	1-8
DOC 2	Financial Benefits Report (<i>Relatório Demanda GOV 2021</i>)	Word	9-10
DOC 3	CGE document referring the mirroring of SIGRH data (<i>Informação CGE 1150/2021 sobre Espelhamento</i>)	PDF	20-23
DOC 4	CGE internal document about problems with data (Ofício CGE 2022 - Problema os Dados)	PDF	24-32
DOC 5	Communication and follow up spreadsheet (TRILHA_Monit_Rem_202012 – <i>Planilha de Comunicação e Follow Up</i>)	Excel	32-33
DOC 6	Audit Annual Planning (PAA CGE Anexo I)	PDF	34-40
DOC 7	Transparency Portal 2022/07 (<i>Portal de Transparência 2022/07</i>)	PDF	41-42
DOC 8	Analytical Dashboard Implementation (<i>Implementação de Dashboard Analítico</i>)	PDF	43-50
DOC 9	Audit Trails Created Report (<i>Implementação de novo modelo de monitoramento da folha de pagamento Trimestre julho-setembro/2022. CGE IN 312/2022 - Relatório de Trilhas Elaboradas</i>)	PDF	51-71
DOC 10	Permanent Inventory of Audit Trails (<i>Inventário Permanente de Trilhas</i>)	PDF	72-264
DOC 11	IN CGE 38	PDF	265-280
DOC 12	Interview transcription (<i>Transcrição das Entrevistas</i>)	PDF	281-392
DOC 13	Interview validation by Email (<i>Validação da Transcrição por email</i>)	PDF	393-400
DOC 14	Improvements in interna control (<i>Melhoria nos Controles</i>)	PDF	400-402
DOC 14	Field Reports notebook (<i>Relatos de Campo - livro</i>)	PDF (Scanned)	403-415
DOC 15	Digital Field Reports (<i>Relatos de Campo - digital</i>)	Word	416-425