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**CONTINUOUS AUDITING –
STATUS OF AND REASONS FOR CURRENT
ADOPTION LEVEL AMONG GERMAN INTERNAL
AUDIT DEPARTMENTS**

Thesis Notes

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1 Introduction

Over the past few decades, internal auditing has risen markedly in importance (Amling, Bantleon, 2007). Thus, many companies hold internal audit departments who have developed to become a reliable partner of management and supervisory boards. (Peemöller, Kregel, 2014). Yet in times of rapid change, internal audit departments need to undergo regular adjustments, so they can fulfil their duties and satisfy their stakeholders' needs. Moreover, they need to advance their auditing techniques, make effective use of technology, and react to the latest auditing trends. In many cases, the internal audit function needs to reinterpret its role and shift from its traditional, finance-oriented investigation role to a more progressive, company-wide consulting role (Peemöller, Kregel, 2014).

The academic world has come up with several new approaches to ease the internal auditors' struggle in accounting with all these developments. One such concept is Continuous Auditing (CA).

2 Continuous Auditing

CA has been discussed for more than 30 years in academic literature. According to the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA) (1999), CA is "a methodology that enables independent auditors to provide written assurance on a subject matter using a series of auditors' reports issued simultaneously with, or a short time after, the occurrence of events underlying the subject matter". More practically speaking, it is a risk-oriented, systematic

auditing methodology, assisted by the usage of IT tools, covering the ongoing, or at least highly frequent analysis of different kinds of data by identifying deviations to previously defined target levels simultaneously or shortly after the occurrence of an event (Wagner, Lieder, 2016).

CA holds several subdisciplines (e.g. Continuous Controls Monitoring, Continuous Risk Management and Assessment, Continuous Data Assurance) (Vasarhelyi, 2011). Also, it is often mentioned in close connection with the similar, yet separate disciplines of Continuous Monitoring and Continuous Assurance (Institute of Internal Auditors, 2005). CA is brought to life via processual approaches. Approaches discussed in theory mostly cover multiple stages, but come down to the same general steps (e.g. Abdolmohammadi, Sharbatouglie, 2005; Mainardi, 2011; Institute of Internal Auditing, 2015). At first, objectives are defined by the auditor. Based on these objectives, measuring points (e.g. KPIs or KRIs) are defined for the subject matter being audited. For each measuring point, target values are defined which will later be used as reference when actual values are measured. After measurements have been made for each measuring point, these can be compared to previously defined target values. In cases where target values are missed, follow-up activities will need to be performed by the auditor.

Although most definitions of CA do not require the use of technology, software solutions have eased auditors' efforts during the implementation of CA in practice (Flowerday, Blundell, von Solms, 2006). Several software architecture designs (e.g. Embedded Audit Modules, Monitoring Control Layer) are discussed in theory and applied in practice.

In this context, several programming languages (e.g. Extensible Business Reporting Language, Unified Modelling Language) have gained in popularity and are increasingly being used for CA solutions (Lin, Lin, Liang, 2010).

Academics have found a range of advantages that the application of CA provides. Among others, CA increases the efficiency and effectiveness of the audit process by reducing audit costs and enhancing overall audit quality (Grasegger, Weins, 2012; Marks, 2009). It helps companies to comply with law and regulations (Woodroof, Searcy, 2001). It allows handling large volumes of data and thereby enables auditors to approach subjects previously not auditable (Chan, Vasarhelyi, 2011). Due to its strict processual approach, it also strengthens auditors' independence and helps to clarify auditors' responsibilities (Institute of Internal Auditors, 2005).

Before CA can function properly, barriers previously identified by academics need to be overcome. Diverse and heterogeneous data can make it difficult to apply CA as data needs to be standardized in many cases (Li, Li, 2007). Also, IT and training investments can be necessary to implement CA (Baksa, Turoff, 2010). As CA represents a methodology significantly different from traditional auditing, disruptions in daily operations of internal audit departments can occur (Hoffer, 2007). Furthermore, the rigid procedures that are required by CA interfere with the need for flexibility in daily auditing operations (Sun, 2012).

Vasarhelyi, Alles, Kuenkaikaew, and Littley (2012) see CA as the ultimate stage of internal auditing. Their underlying assumption is that the internal audit function of a

company matures over time and becomes more and more sophisticated in its structures and processes. Specifically, they assume that internal audit functions pass through several stages (i.e. traditional – emerging – maturing – full continuous), starting at a level with uncoordinated audit activities and ending at a level with strictly structured, automated audit activities.

3 Research objectives

Despite the promising nature of this concept, academics do not establish a clear picture regarding the extent of usage of CA. Two studies find that companies make wide use of CA (i.e. PwC, 2006; Galvanize, IIA, 2008). On the contrary, five other studies provide proof that the adoption of CA is low (i.e. Gonzalez, Sharma, Valletta, 2012; Vasarhelyi, Alles, Kuenkaikaew, Littley, 2012; Tumi, 2013; Moturi, Gaitho, 2014; Vasarhelyi, Kuenkaikaew, Littley Williams, 2015) Consequently, present publications do not give a clear indication about the extent of CA usage. Nor do they distinguish among any subdisciplines of CA or company-specific criteria. Furthermore, detailed empirical research regarding the level of CA adoption among German internal audit departments has not been conducted so far. Thus, the first objective of this research is:

RO_A: To identify and analyse the current status of CA adoption among German internal audit departments

In relation to RO_B, research literature has brought forward a range of influencing factors which either support or restrict the use of CA in practice (e.g. Grasegger, Weins,

2012; Taylor, Murphy, 2004). However, the strength of these factors has not been subject to empirical research in much detail. Also, dedicated research regarding the reasons for or against CA among German internal audit departments has not been conducted yet. Therefore, the second objective of this research is:

RO_B: To discover the reasons behind the current CA adoption level

4 Material and methods

To account for both objectives, this thesis covers two main investigations as well as one preliminary research. Main research A covers all steps to analyse the current state of the CA adoption among internal audit departments in German companies. Given the considerable extent of uncertainty arising from findings in theory, a preliminary research is carried out to clarify the general understanding of CA in practice and to help specify further research activities for main research A. Main research B tries to find out reasons for the current state of adoption.

Research dilemma 1

As mentioned above, evidence regarding the adoption rate of CA is inconclusive. Current investigations also exhibit a strong focus on the U.S. market. Few research articles concentrate on specific countries (e.g. China, Libya) (e.g. Hua, 2007; Tumi, 2013) or have a global focus (e.g. Gonzalez, Sharma, Galletta, 2012). Explicit findings regarding the level of CA adoption in Germany are not present. Although empirical evidence is ambiguous, there is a tendency towards a low adoption rate. Thus, it is assumed that

the CA adoption rate among German internal audit departments is low. The first hypothesis for this research therefore is:

H₁₋₁: The overall CA adoption rate among German internal audit departments is low.

Research dilemma 2

CA can be applied to several subjects. Risks and controls are the prime subjects validated with CA, but transactions or data are also popular subjects of CA. Even corporate projects or activities by a third party (e.g. suppliers) are occasionally found to be subject to CA. Yet, there is no scientific research which investigates the degree of CA adoption and accounts for different CA subjects at the same time. Instead, research articles utilise the multifaceted nature of CA and consider CA as one large discipline. As there is hardly any empirical evidence regarding subject-specific adoption rates, it is difficult to establish hypotheses indicating a specific trend in either direction (low adoption rate vs. high adoption rate). Moreover, there needs to be certainty about the existence of further potential CA subjects. More information needs to be collected as part of the preliminary research at first.

Research dilemma 3

There is no empirical research which validates whether the CA adoption rate is dependent on company-specific or internal audit function-specific characteristics. Yet, literature implies that a certain composition of companies and their internal audit functions supports the adoption of CA. For this research, suitable company-specific or internal audit function-specific parameters need to be defined for later

validation. From the literature review, the ‘level of regulation’ and the ‘degree of IT expertise within the internal audit function’ are derived as suitable parameters. Other potential company-specific or internal audit function-specific parameters are hard to make out by a pure analysis of present literature. The preliminary analysis will thus aim to identify further parameters.

Research dilemma 4

In respect to RO_B, researchers have found a range of negative factors which potentially restrict companies in their decision to apply CA. However, dedicated research investigating the strengths of reasons restricting CA adoption is non-existent, especially regarding the internal audit departments of German companies. For better manageability, these compromising factors are grouped and allocated to the following five factor groups: ‘weak framework conditions’, ‘insufficient skills’, ‘imprecise results’, ‘lack of resources’, and ‘missing support’.

To determine whether these factor groups are significant reasons why companies decide not to adopt CA, the following hypothesis is postulated:

H₄₋₁: Factor groups ‘framework conditions’, ‘skills’, ‘results’, ‘resources’, and ‘support’ have a significantly negative influence on the adoption of CA.

Preliminary research

To overcome the shortages identified in present literature, the overall research is supplemented by a preliminary research. It aims at exploring the topic of CA in practice,

beyond any information found in the literature. By doing so, the risk of distortions in later research results is supposed to be minimised. Thus, a qualitative approach is chosen. This not only does justice to the high complexity of CA, but also allows a deeper analysis than a quantitative analysis would do.

Internal auditors represent the primary user group of CA. Therefore, internal auditors are chosen as the target population for the preliminary research. Data will be collected via qualitative interviews with members of the internal audit functions from eight German companies from five industries (3x Information and Communication, 2x Finance and Insurance, 1x Manufacturing, 1x Trade, and 1x Other Services) located across Germany. Based on a convenience sampling approach, these companies have been in regular contact with the researcher on a professional level and were addressed directly by the researcher to verify their willingness to participate in the study.

The interviews were carried out in an open format, meaning that only three research questions were communicated to the interviewees in a straightforward manner. Other questions posed by the researchers were a spontaneous result out of the discussions with the interviewees. Due to its qualitative nature, a questionnaire with a set of specific questions was not applied.

The interviews brought to light that CA is understood in very different ways. Although all eight respondents understand it as a form of auditing technique, the provided explanations varied significantly and hardly matched the academic definitions mentioned above. None of the

respondents was able to summarize the definition of CA in one sentence. Instead, most of them quoted elements of CA (e.g. automated journal entry tests, tool-assisted analyses of authorizations in IT systems, automated status updates of companies' projects) without explicitly referring to CA as an independent discipline.

The preliminary research revealed the following results:

- CA is understood in very different ways. It became obvious that some respondents were uncertain about whether they had CA in place or not.
- Provided answers support findings by other researchers that 'risks', 'controls', and 'data' can be regarded as prime CA subjects. Additionally, results show that 'projects' can be considered as a further CA subject.
- Given answers shed light on three further parameters, namely 'size of the internal audit department', 'size of the company', and 'geographical expansion'.

The findings of the preliminary research complement the insights from the literature review. Consequently, the following hypotheses are derived:

Table 1: Dilemmas and hypotheses of main research A and main research B

Main Research A:	
Current status of CA adoption	
Dilemma 1: No clear indication regarding level of CA adoption in practice	
<i>H₁₋₁: The overall CA adoption rate among German internal audit departments is low.</i>	
Dilemma 2: No scientific findings covering subject-specific levels of CA adoption	
<i>H₂₋₁: The adoption rates of CA subjects ‘risks’, ‘controls’, ‘data’, and ‘projects’ significantly differ from the overall CA adoption rate.</i>	
Dilemma 3: No scientific findings regarding the effect of company-specific or internal audit function-specific parameters on CA adoption	
<i>H₃₋₁: The CA adoption rate is significantly influenced by the company-specific parameters ‘level of regulation’, ‘size of company’, and ‘geographical expansion’.</i>	
<i>H₃₋₂: The CA adoption rate is significantly influenced by the internal audit function-specific parameters ‘degree of IT expertise within IT audit function’ and ‘size of internal audit department’.</i>	
Main Research B:	
Reasons behind current CA adoption level	
Dilemma 4: No scientific findings regarding strength of factors compromising the application of CA in practice	
<i>H₄₋₁: Factor groups ‘framework conditions’, ‘skills’, ‘results’, ‘resources’, and ‘support’ have a significantly negative influence on the adoption of CA.</i>	

Source: Own resource

Research approach

For main research A, data was collected via a questionnaire which was distributed among internal auditors of German companies who form the main target group of CA. The questionnaire covers a total of 25 closed questions and is split into three parts.

The first part has 17 questions which, in sum, address H_{1-1} and thus aim to find out the overall degree of CA adoption. To allow a distinct testing of hypothesis H_{2-1} , each question is allocated to a group corresponding to the CA subjects (i.e. controls, risks, data, projects) or to a fifth group called 'general'. The second part of the questionnaire contains six questions. These are designed to collect information about the internal audit function-specific and company-specific parameters and thus address H_{3-1} and H_{3-2} . The third part of the questionnaire covers the remaining two questions which aim to verify whether the respondent is active as an internal auditor or employed in internal audit activities in another way. Via a judgmental sampling technique, the questionnaire was distributed among internal auditors and members from audit-like functions (e.g. risk managers, compliance managers, CFOs).

For main research B, data was collected via an online questionnaire. It covers a total of six survey questions. Five of these questions are rating questions, each of which covers one of the five factor groups assembling potential restriction factors found in CA literature. For each question, respondents are confronted with a statement about the factor group's effect on CA adoption. To answer, the respondents need to state to what extent they agree with the statements by selection one of five predefined answers (i.e.

strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree). The sixth survey question is an open-ended question which enables respondents to state further restricting factors. The link to this questionnaire was shared during a 1-hour long lecture about CA at an IT conference organised by the German chapters of the IIA and the ISACA in Düsseldorf, Germany.

5 Results

Main research A

Answers provided were assembled in an MS Excel-based spreadsheet. To determine the CA adoption levels as laid out in H_{1-1} and H_{2-1} , mathematical averages were calculated and interpreted on the basis of the four stages of the CA adoption model (i.e. traditional, emerging, maturing, fully continuous).

To verify how far company-specific or internal audit function-specific parameters relate to the extent of CA usage (H_{3-1} and H_{3-2}), several statistical tests were carried out. As a first step, the Kolmogorow-Smirnow test and the Shapiro-Wilk test were used to determine whether the company-specific and internal audit function-specific parameters (in this case used as independent variables) are normally distributed. Also, the Levene test was carried out to assess the equality/homogeneity of variances among the single groups (i.e. the answer options) of each independent variable. Based on the outcome of these tests, the Kruskal-Wallis test and the Mann-Whitney U test were applied to analyse how far single groups (of one independent variable) show a difference in the degree of CA adoption.

Finally, the Spearman rank correlation analysis was carried out to validate how far changes in company-specific and internal audit function-specific parameters lead to a change in the CA adoption levels.

Based on 78 valid questionnaires, the research found that, on average, German internal audit departments find themselves between stages 2-emerging and 3-maturing at 2.33. The overall CA adoption rate can therefore be considered as medium.

Moreover, the research found out that the CA adoption rate differs among the investigated CA subjects. The CA adoption rates for subjects 'controls' (2.50) and 'data' (2.57) exceed the overall CA adoption rate. The adoption rate for subject 'risks' (1.93) clearly falls short behind the overall CA adoption rate. Only the adoption rate for subject 'projects' (2.21) is comparable to the overall CA adoption rate.

Results also provide evidence that the CA adoption rate is supported by company-specific parameters. Larger companies and companies from industries with a higher level of regulation are more likely to use CA. The size of internal audit departments and the level of IT expertise among internal auditors do not play role when it comes to the use of CA. The same applies for the degree of geographical expansion of the company.

Main research B

The questionnaires of main research B were filled out during the conference and analysed afterwards. Only fully completed questionnaires (i.e. answers were provided for all five obligatory questions) were considered. Provided

answers were allocated a number according to their rank (strongly disagree = 1; somewhat disagree = 2; neither agree nor disagree = 3; somewhat agree = 4; strongly agree = 5). Based on these numbers, average agreement rates were calculated per question. An average agreement rate of 3.0 or higher was considered as significant. A total of 21 questionnaires were completed.

While factor groups 'resources' (3.9) and 'support' (3.4) are found to have a significantly negative influence on internal auditors in their decision to adopt CA, factor groups 'framework conditions' (2.3), 'skills' (2.9), and 'results' (2.9) are found not to have a significantly negative influence on the adoption of CA.

Main research B also sheds light onto further reasons why companies do not adopt CA. Two respondents claimed that their internal audit functions lacked resources to approach CA. Another respondent understood CA to be a topic which is not primarily allocated to internal audit departments. Instead, he saw the responsibility for CA as resting with first line or second line departments. Moreover, one respondent noted down that providing assurance was not the ultimate objective of the internal audit function. Instead, auditors' activities were supposed to be focussed on increasing efficiency. Yet another respondent quoted that his internal audit function feared to approach something new.

An overview of the results is shown in the following table:

Table 2: Summary of results of main research A and main research B

Main Research A: Current status of CA adoption		
Dilemma 1: No clear indication regarding level of CA adoption in practice		
<i>H₁₋₁</i>:	Findings: The overall CA adoption rate among German internal audit departments is on a medium level (2.33).	Result: Rejected
Dilemma 2: No scientific findings covering subject-specific levels of CA adoption		
<i>H₂₋₁</i>:	Findings: The adoption rates of CA subjects ‘risks’ (1.93), ‘controls’ (2.50), ‘data’ (2.57), and ‘projects’ (2.21) significantly differ among each other and from the overall CA adoption rate (2.23).	Result: Confirmed
Dilemma 3: No scientific findings regarding the effect of company-specific or internal audit function-specific parameters on CA adoption		
<i>H₃₋₁</i>:	Findings: Parameters ‘level of regulation’ and ‘size of company’ are found to have a significant influence on CA adoption. Parameter ‘geographical expansion’ is found not to have a significant influence on CA adoption.	Result: Rejected

H₃₋₂:	Findings: Both parameters ‘degree of IT expertise within IT audit function’ and ‘size of internal audit department’ are found not to have a significant influence on CA adoption.	Result: Rejected
Main Research B: Reasons behind current CA adoption level		
Dilemma 4: No scientific findings regarding strength of factors compromising the application of CA in practice		
<i>Q₄: What factors primarily cause companies to refrain from adopting CA?</i>		
H₄₋₁:	Findings: Factor groups ‘resources’ and ‘support’ are found to have a significantly negative influence on the adoption of CA. Factor groups ‘framework conditions’, ‘skills’, and ‘results’ are found not to have a significantly negative influence on the adoption of CA.	Result: Rejected

Source: Own resource

6 Discussion

This research discovered that German internal audit departments find themselves between stages ‘2-emerging’ and ‘3-maturing’. In comparison to other research articles, this finding is surprising. Five out of nine investigations covered in the literature review present results which are below the level of CA adoption identified in this research. This difference may be explicable by methodological

reasons (e.g. a time gap between the investigations, samples which differ in nature and size, or research instruments which differ in detail). However, differences may also stem from the nature of the respondents in this research.

The finding that internal auditors are more likely to apply CA in the area of controls is not surprising. Since the introduction of the Sarbanes-Oxley Act in the year 2002, a lot of research has been performed on internal controls and multiple frameworks (e.g. COSO) have been established. When implementing internal controls, companies can refer back to these frameworks as well as existing guidelines, interpretations, and practice aids. Due to the extended availability of best practices and master control descriptions, fewer steps are needed to implement CA in the field of controls (compared to risks or projects, for example). The comparably high adoption rate for data may be based on the growing popularity of data analytics among German internal auditors. These allow internal auditors to evaluate large data volumes which bring forward insights in areas not auditable before (Audicon, 2021).

The results of this research provide evidence that internal auditors apply CA during their evaluation of projects. However, the extent of these CA-based activities is not as extensive as for controls and data. One reason why projects are not on the same level as controls or data could be due to a lower degree of standardisation of projects. Although projects follow a common structure, the content of each projects differs. Designing appropriate KPIs therefore represents a major challenge to internal auditors and requires an increased effort from them.

Risk management is central to companies. It is therefore all the more surprising that the subject 'risks' ranks lowest among all CA subjects. These results do not necessarily prove that companies do not account for risk management, but that CA is not applied in the field of risk management by internal auditors. This could be based on the fact that Continuous Risk Management and Assessment primarily relies on KRIs (instead of KPIs used for other subjects) and that the applicability of KRIs in practice is not as straightforward as KPIs.

CA is found to be used to a larger extent in companies from highly regulated industries which is in line with the findings of Khargi of 2010 and KPMG of 2011. Internal audit departments are increasingly confronted with regulatory requirements and CA proves helpful to address these regulatory requirements due to its strong focus on high risk areas.

A lack of resources as well as missing proper support from management and other departments were found to be the prime reasons not to adopt CA. These findings are in line with findings by Vasarhelyi, Kuenkaikaw, and Romero (2010) as well as by Khargi (2010) who point out that support provided by management and the organisation as a whole are of great importance for the adoption of CA.

7 List of own publications

Conference Proceedings

Wagner, Johannes M. (2015): *Acceptance of Corporate Governance in Germany and Austria*. In: Székely, Csaba; Kulcsár, László (Eds.): *Structural Challenges - Cycles in Real Business: International Scientific Conference on the occasion of Hungarian Science Festival*. November 12 2015, Sopron, Hungary. University of West Hungary Faculty of Economics, ISBN: 978-963-334-265-7, pp. 582–591.

Wagner, Johannes M. (2016): *Continuous Auditing - The Future of Internal Audit?* In: Soliman, Khalid S. (Ed.): *Proceedings of The 27th International Business Information Management Association Conference*. May 04 2016, Milan, Italy. International Business Information Management Association (IBIMA), ISBN: 978-0-9860419-6-9, pp. 3244–3252.

Wagner, Johannes M. (2016): *Key Risk Indicators as Means for Financial and Operational Risks Mitigation in Purchase Process*. In: Škare, Marinko (Ed.): *Proceedings of the Second International Scientific Conference for Doctoral Students and Young Researchers*. May 13 2016, Eisenstadt, Austria. University of Applied Sciences Burgenland, ISBN: 978-3-9502452-9-5, pp. 120-138.

Wagner, Johannes M. (2016): *KRI Adoption as Part of Continuous Risk Monitoring and Assessment among Internal Audit Departments in Germany*. In: Soliman, Khalid S. (Ed.): Proceedings of The 28th International Business Information Management Association Conference. November 09 2016, Seville, Spain. International Business Information Management Association (IBIMA), ISBN: 978-0-9860419-8-3, pp. 3573-3577.

Wagner, Johannes M. (2016): *Continuous Auditing: Die fortlaufende Variante der Datenanalyse*. In: Kulcsár, László; Resperger, Richárd (Eds.): Europe: Economy and Culture - International Scientific Conference - Joint event of the Hungarian Science Festival. November 10 2016, Sopron, Hungary. University of West Hungary Faculty of Economics, ISBN: 978-963-334-298-5, pp. 759-766.

Scientific Journals

Wagner, Johannes M. (2015): Acceptance of Corporate Governance in Germany and Austria. In: *Gazdaság és Társadalom* 2015 (4), ISSN: 08657823, pp. 53–65.

Wagner, Johannes M. (2017): Empirische Studie zum Umsetzungsgrad von Continuous Auditing in deutschen Innenrevisionen. In: *Zeitschrift Interne Revision, Fachzeitschrift für Wissenschaft und Praxis* 2017 (1), ISSN: 0044-3816, pp. 14-25.

Gorschenin, Eugen; Jacka, Casten; Thorwarth, Martin; Wagner, Johannes M. (2018): Einsatz von Continuous Auditing anhand eines Modellunternehmens. In: *Zeitschrift Interne Revision, Fachzeitschrift für Wissenschaft und Praxis* 2018 (3), ISSN: 0044-3816, pp. 140-144.

Jacka, Casten; Persie, Klaus; Schledewitz, Helena; Wagner, Johannes M. (2018): Mehrwert von Continuous Auditing. In: *Zeitschrift Interne Revision, Fachzeitschrift für Wissenschaft und Praxis* 2018 (5), ISSN: 0044-3816, pp. 237-243.

Guidelines

Wagner, Johannes M. et al. (2019): *ISACA German Chapter - Leitfaden Datenanalyse im Prüfungsprozess*. Berlin, Germany: dpunkt Verlag. Download from: https://www.isaca.de/sites/default/files/isaca_leitfaden_online_ausgabe_2019.pdf

Other

Wagner, Johannes M.; Lieder, Henning (2016): Presentation: *Digitalisierung der Internen Revision*, held at: 12. DIIR-IT-Tagung, Frankfurt am Main, May 23 2016.