

The Probative Value of Audit Evidence

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The State of the Art and Avenues towards a General Theory

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Any comments are highly appreciated!

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Abstract: Auditors must assess whether financial statements present fairly the actual state of a firm's affairs. However, this state usually does not exist when the audit is carried out and can no longer be observed by the auditor. Rather, the auditor is dependent on audit evidence to draw conclusions about the affairs in question. Professional auditing standards require auditors to assess evidence critically, including consideration of possible fraud. Audit quality directly depends on correctly evaluating the probative value of evidence, which is indispensable for a correct reconstruction of the affairs in question.

However, no established theory on this vital auditing problem is available. Prior research is scattered and for the most part not even noticed by today's auditing research. Scientific progress in this field requires a thorough synthesis of the scattered findings as a preparatory step for any future research. Therefore, this paper offers (1) a conceptual framework of the determining factors of audit evidence's probative value and (2) a systematic review of the relevant auditing literature. Conceptual frameworks are an important research instrument for theory development and for directing future research. Accordingly, the paper concludes with an outline of future research opportunities.

Key words: Auditing Theory, Audit Evidence, Probative Value, Reliability, Persuasiveness, Conceptual Framework, Literature Review

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“Objectively obtaining and evaluating evidence is the essence of auditing.”

(AAA, Committee on Basic Auditing Concepts, 1973, p. 2)

1. Introduction: The probative value of evidence as a crucial question in auditing

1.1 The problem of reconstructing an unobservable reality

Recent financial statement manipulations such as by *Enron*, *Worldcom*, or *Parmalat* revealed that information provided by financial statements does not always correspond with reality. At least in the most recent case of *Parmalat*, as well as in the cases of *Comroad* and *FlowTex* in Germany, management counterfeited documents and receipts for non-existent assets or transactions. These scandals illustrated clearly that it is not sufficient to rely on documents, receipts, or management representations to be what they seem at first glance. Rather, the auditor must go beyond the façade and question the truth of any information received. Responding to these developments, standard setters have tightened professional auditing standards. Their reaction was to strengthen the requirement of professional skepticism, of a critical evaluation of audit evidence, and of explicitly considering the possibility of fraud.¹ Independent of possible manipulations, auditors are required to judge whether financial statements provide a true and fair view of the audited entity’s financial position, results of operations, and cash flows.²

However, there is no theory or any well-founded framework of criteria, which would assist the auditor in fulfilling his task to correctly evaluate the truth of information that serves as audit evidence. So, standard setters and auditing research have just shifted the problem to the auditor. The auditor is practically left alone and must resolve the problem “somehow” on his own.

To comply with professional standards, the real situation and the real transactions of the entity must be considered explicitly during the audit. It must be verified that the financial statements not only correctly (i. e. GAAP-conforming) reflect the contents of accounting records and receipts, but also accurately represent the underlying state of affairs. In other words, there must be a systematic comparison between the actual affairs (the “relevant reality”) and the state of affairs asserted by management within the financial statements (see Figure 1 below). The financial statements’ assertions are available to the auditor and can be directly perceived, while the underlying reality cannot. Financial statements predominantly refer to past facts and transactions that ordinarily do not remain in existence until the audit, so they can no longer be perceived directly by the auditor.³ From the auditor’s point of view, these past transactions are hidden behind an imaginative wall as illustrated in the figure.

¹ See AU 316; ISA 240; ISA 500.10; Proposed SAS “Audit Evidence”, paragraph 9. The proposed SAS on audit evidence will supersede SAS No. 31 “Evidential Matter”, AU 326, when approved.

² See AU 110.01; ISA 200.2 and 14.

³ Financial statements also contain future-related information. For example, the reported provisions reflect the management’s expectation of future financial obligations. However, information about the past clearly prevails.

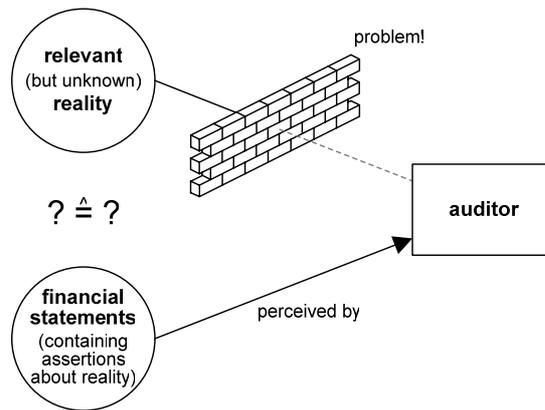


Figure 1: The auditor's "recognition-of-reality-problem"

For comparing the statements with the underlying reality and assessing their truth, the auditor is dependent on indications to draw conclusions about reality. This means that the auditor needs information about the reality, which is situated "in front of the wall" (see Figure 2 below). Such information ordinarily is called "audit evidence" and refers to any kind of "traces" of the relevant reality, for example documents prepared in the course of transactions, statements of individuals who observed the facts first hand, etc.⁴

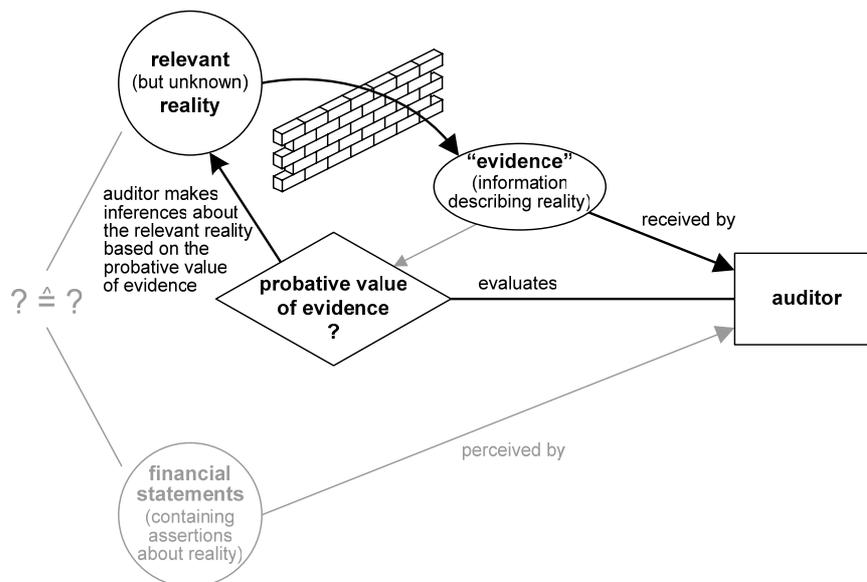


Figure 2: The auditor's recognition problem – the way out

In the figure, "evidence" is put into quotation marks to make clear that the term does not refer to pieces of information that necessarily are highly reliable or that verify the relevant reality "for sure". Rather, in this paper, "(audit) evidence" is used as neutral term with regard to reliability and is used synonymously to the term "(audit) information". The quality and strength of evidence is represented exclusively by the concept of "probative value"⁵. Evidence usually *indicates* a certain state of affairs. However, as the relevant reality remains unobservable, the auditor can only *indirectly* draw conclusions about this reality based on the evidence and its probative value. Only if the auditor correctly reconstructs the relevant reality, is he able to assess the truth of the financial statements and judge whether they present fairly the actual state of affairs. The correct recon-

⁴ For an enumeration of possible items of audit evidence see ISA 500.3-6; Proposed SAS "Audit Evidence", paragraphs 2-5.

⁵ Other terms used for "probative value" in auditing literature are "reliability" and "persuasiveness". All these terms relate to similar concepts and are used synonymously in this paper.

struction of the relevant reality depends on the appropriateness, i. e. the probative value, of the evidence used to draw conclusions about this reality.

1.2 The significance of understanding the probative value of evidence for audit practice and theory

The previous illustrations showed that assessing the probative value of evidence is of the utmost importance in audit practice. “The quality of the evidence and extent of it determine the terms of an auditor’s opinion or report, so that a vitally important task for auditors is to assess the meaning, significance and persuasiveness of evidence for the issue to which it relates.”⁶ The quality of an audit, measured by the correctness of judgment, directly depends on whether the evidence used for reconstructing the relevant reality is appropriate and whether the probative value of the evidence is properly evaluated. So a good understanding of the factors and processes that determine the probative value of audit evidence is crucial.

Correspondingly, professional auditing standards posit that audit evidence must be *sufficient* and *appropriate* to provide a reasonable basis for the audit opinion.⁷ While sufficiency is the measure of the quantity of evidence, appropriateness refers to its quality, which itself is defined as its relevance and reliability in providing support for the assertions in question or in detecting misstatements, respectively.⁸ This concept of appropriateness is closely related to the probative value of evidence. However, despite the importance and difficulty of assessing probative value, there is little guidance within the standards on this task. Only the source, nature, and individual circumstances under which evidence was obtained are mentioned as factors that influence its reliability, and some tentative rules on the reliability of audit evidence –though subject to exceptions– are offered.⁹

The real problem is, however, that an established theoretic foundation is missing. If such a theory was available, it would be quite easy to derive appropriate and well-founded recommendations for the auditor within professional standards. For auditing in general, to date there is no “all-embracing” theory. Only partial theories that address certain problem areas are available.¹⁰ The same is true for the topic of the probative value of audit evidence, which should be considered as a key topic within audit theory¹¹ – there is no “all-embracing” theory.¹² Rather, for covering the whole problem area, a “chain” of adequate partial theories must be applied. *Flint* points out: “The theory of audit evidence is at the core of audit theory. Development of a theoretical framework requires an identification and analysis of the characteristics of audit evidence and an interpretation of probability theory and statistical inference in relation to the persuasive value of different types of audit evidence.”¹³ Though on a quite general level, this statement mentions two basic “elements” that are necessary for developing a suitable “theory-chain” on audit evidence: qualitative approaches that aim to identify and analyze determining factors of the probative value of evidence on the one hand, and quantitative, mathematically founded models on probative value on the other hand.

⁶ *Flint* (1988, p. 106).

⁷ See ISA 500.2; Proposed Amendment to SAS No. 95, paragraph 3.2.3 (Third Standard of Field Work).

⁸ See ISA 500.7; Proposed SAS “Audit Evidence”, paragraph 6.

⁹ See ISA 500.9; Proposed SAS “Audit Evidence”, paragraph 8. According to these rules, (knowledgeable) sources outside the audited entity are more reliable, evidence from within the entity is more reliable when its generation was subject to effective controls, direct evidence is better than evidence obtained indirectly or by inference, documented evidence is more reliable, and original documents are more reliable than photocopies or facsimiles.

¹⁰ For instance, certain problems related to auditing may be investigated by means of principal-agent-theory or game-theory, like auditor independence and objectivity. Others may be addressed by mathematical models, like the audit-risk-approach for audit planning or statistical models for audit sampling, for example.

¹¹ See *Flint* (1988, p. 32); *Richter* (2002, p. 40); *Wyssocki* (2005, pp. 361-362).

¹² See also *Caster/Pincus* (1996, p. 1).

¹³ *Flint* (1988, p. 32).

Well-developed models to date only exist within the quantitative stream of research. They allow aggregating probative values of individual evidence items to an overall measure of probative value (especially applications of probability and belief-function-theory). However, these models need the probative values of the individual items of evidence to be given as an input. How these values should be determined, remains unanswered by those models, as they are not designed for solving this question. Indeed, to date there is no comprehensive theory that addresses the probative value of *single* items of evidence. That is, a crucial element of the “chain” of partial theories for understanding and explaining the probative value of audit evidence is extremely weak, which weakens the whole chain, having in mind that a chain is only as strong as its weakest element.

Consequently, research should put an emphasis on this part of the problem, i. e. on the probative value of *single* items of audit evidence, because improving the weakest element of the “theory chain” promises the biggest contribution to its overall strength. Prior research on this first step of the evidence evaluation problem is broadly scattered. After *Mautz/Sharaf* dedicated a chapter of their “Philosophy of Auditing” to the concept of evidence,¹⁴ a couple of authors dealt with specific aspects of the topic. However, a synthesis of the isolated research findings is still due. As a consequence, today’s auditing research virtually does not take note of this literature.¹⁵ Thus, for scientific progress in this field, it is important to synthesize the existing findings by a structured review. Making explicit the state of the art is a necessary preparatory step for any future research.

This review will be done in the present paper. Prior to carrying out the review, a conceptual framework will be presented. This is a model of the factors that determine the probative value of audit evidence, which also illustrates the relationships between them. The framework serves as a preliminary stage in theory development and should stimulate future empirical research. For the review carried out in this paper, the framework will be used as a reference for demonstrating the findings of prior research.

The remainder of this article is organized as follows: The next section explains the applied methodology. In section 3, a conceptual framework of the probative value of audit evidence is presented. Prior research on this topic is summarized in section 4, reviewing qualitative research in section 4.2 and quantitative research in section 4.3. The paper concludes in section 5 with a summary of the main findings and future research opportunities.

2. Methodology

2.1 Theoretic background: Cognitive-psychological orientation and situational approach

As outlined above, the existing quantitative approaches like applications of probability or belief-function theory deal with aggregating probative values of multiple pieces of audit evidence that must be *given*, but they do not address the question of how a probative value should be assigned to an individual piece of evidence. For developing a theoretic foundation for this question, a cognitive-psychological orientation is more promising,¹⁶ because auditors actually have to *evaluate* probative value. Likewise, cognitive information processing is relevant to sources that create and

¹⁴ See *Mautz/Sharaf* (1961, pp. 82-133).

¹⁵ Most of this literature is included in monographs, which are practically not perceived by today’s research – at least as far as the topic of probative value of evidence is concerned. For example, for the relevant monograph by *Hatherly* (1980), there is just one recorded citation in the *Social Sciences Citation Index* (2005). The article by *Caster/Pincus* (1996), which is the most recent one from the qualitative stream of research (that includes both conceptual and empirical research, see section 4.2), was only cited two times within auditing research according to the Index (without counting the two discussions of the articles by *Srivastava*, 1996, and *Hollingshead*, 1996). Research on quantitative models for aggregating multiple items of evidence (see section 4.3) is cited more frequently. For instance, for the article by *Dutta/Srivastava*, 1993, there are 11 citations recorded in the Index. However, these models do not provide assistance for judging the truth status of a particular piece of information. Thus, they do not offer any assistance for solving the auditor’s “recognition-of-reality-problem” outlined above.

¹⁶ For a general overview of approaches from cognitive psychology in auditing and auditor decision making research see *Davidson* (2001, pp. 563-578).

process evidence. Consequently, variables that affect information processing should be considered.

The auditor's evaluation of audit evidence is not independent from the situation in which it takes place, in particular from personal, situational, and information-related factors. These factors should be explicitly taken into consideration when the probative value of audit evidence is investigated and assessed. In order to cover the just mentioned aspects, a combined cognitive-psychological and situational (or contingency) approach¹⁷ in the broadest sense will be adopted in this paper.

2.2 Research strategy: Development of a conceptual framework

For assisting auditors in evaluating evidence, it would be important to develop an understanding of the diverse factors that determine the probative value of evidence. Due to the early stage of research on the probative value of individual items of evidence, a research strategy that aims at the development of a conceptual framework is most adequate. In 1972 already, *Caplan* stated that “[w]e need theoretical models to provide a conceptual basis for empirical research. [...] [T]heir function will be to identify problems and possible solutions; to establish the parameters of various problem areas; to suggest possible relationships among variables; and to highlight specific questions which need to be investigated.”¹⁸

Conceptual frameworks are these theoretical models called for by *Caplan*. They allow giving a theoretic account of a complex problem, for which there is not yet an established theory. So they are a (necessary!) preliminary stage in theory development.¹⁹ According to *Reichenbach's* distinction between the “context of discovery” and the “context of justification”,²⁰ the development of a conceptual framework primarily belongs to the “context of discovery”, as it provides a structured representation of the variables expected to be relevant and the expected relationships between them. At the next stage, i. e. within the “context of justification”, these variables and relationships must be justified. Support may be provided by (1) prior research findings and (2) future empirical research. A conceptual framework should facilitate future research by directing it, i. e. by making conscious and highlighting specific questions that need to be addressed. Results of this research should then lead to a refinement, extension, and/or revision of the conceptual framework. So, as a long-term objective, the framework should develop more and more towards a theory.²¹

A conceptual framework of the probative value of audit evidence will be presented in the next section. Its emphasis will be on the probative value of individual items of evidence. The review of prior literature in the subsequent section has a twofold purpose. Firstly, as outlined in the introduction, synthesizing the scattered research findings is a vital preparatory step for any future research and for scientific progress. Secondly, the literature review shall lend support to the conceptual framework itself. As mentioned above, prior research is one important source for backing a conceptual framework.

¹⁷ Stated generally, the situational approach assumes that an adequate handling of the investigated subject matter is contingent upon a variety of situational factors (e. g. personal traits and capabilities, characteristics of relevant objects, or environmental influences such as time pressure, accountability, or regulation). The situational or contingency approach originates from organization theory and was originally related to organizational structure, behavior, and efficiency, see *Lawrence* (2001); *Hatch* (1997, pp. 77-78); *Grandori* (1987, pp. 1-4); *Kieser* (1999); *Vahs* (2005, pp. 41-42).

¹⁸ *Caplan* (1972, p. 441).

¹⁹ For a detailed discussion of the purposes, functions, and characteristics of conceptual frameworks and their contribution to scientific progress see *Kubicek* (1977, pp. 12-28); *Wollnik* (1977, pp. 53-58); *Grochla* (1978, pp. 61-67); *Richter* (1997, pp. 30-32; 1999, pp. 265-266); *Schreiber* (2000, pp. 29-31).

²⁰ See *Reichenbach* (1938, pp. 6-7).

²¹ See *Richter* (1997, p. 31; 1999, p. 266).

3. A conceptual framework of the probative value of audit evidence

The auditor uses audit evidence to draw conclusions about the relevant reality, which cannot be observed anymore. How well a correct recognition of the relevant reality can be achieved, depends on the probative value of the evidence, which in turn depends on the accuracy of the evidence creation and transmission process. For studying the probative value, the whole process must be taken into consideration, starting from the original creation of a piece of evidence and ending with the reception and cognitive evaluation by the auditor. This process is modeled in the conceptual framework shown in Figure 3 below.

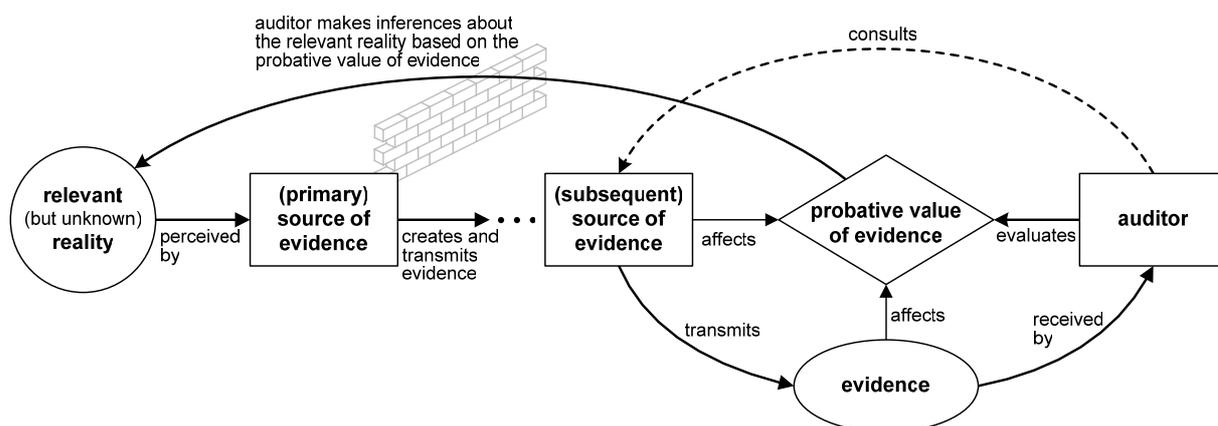


Figure 3: Framework of the probative value of audit evidence (single item of evidence)

The origin of the audit trail is the relevant reality asserted in the financial statements or, more generally, the reality underlying the assertions to be verified. This reality may be observed, memorized, and/or documented by persons, institutions, or technical devices (“sources of evidence”) as long as it is in existence. Later, during the audit, the auditor may consult these sources in order to obtain evidence from them. Of course, it is also possible that more than one intermediating sources are involved in the evidence creation and transmission process (see the distinction between primary and subsequent sources in the above figure).

For the probative value of evidence all variables included in the framework are important. Firstly, the auditor receives the evidence from a *source*. As sources control the evidence before it reaches the auditor, the source’s information processing influences the evidence’s probative value. Secondly, not only the “final” source that transmits the evidence to the auditor must be considered, but the evidence *creation and transmission process* as a whole, including the other sources that were previously involved.²² Thirdly, characteristics of the *evidence* itself may provide hints regarding its probative value. Fourthly, probative value is a latent construct that must be evaluated by the *auditor* and then used for drawing conclusions about the relevant reality by means of cognitive processing. Thus, the auditor and his information processing are relevant issues as well. Moreover, information typically is not transferred “accidentally”, but as a response to a request by the auditor or to another stimulus. Particularly for orally transmitted evidence, the way of question framing may have an influence on the information’s probative value. For example, if a suggestive question is asked, it is probable that the information received is of a limited value, as it might rather repeat what was put into the question, but not inform about the real situation.

Of course, the auditor may obtain more than one item of evidence for a specific assertion about reality. The *combination* of several items of evidence makes it necessary for the auditor to evaluate the probative value of the whole evidence set. This may be done by first assessing the probative values of the individual items and then aggregating these values to an overall probative value

²² For a detailed theoretic elaboration see Gronewold (2006).

of the evidence set. Figure 4 below shows the extension of the framework for multiple items of evidence.

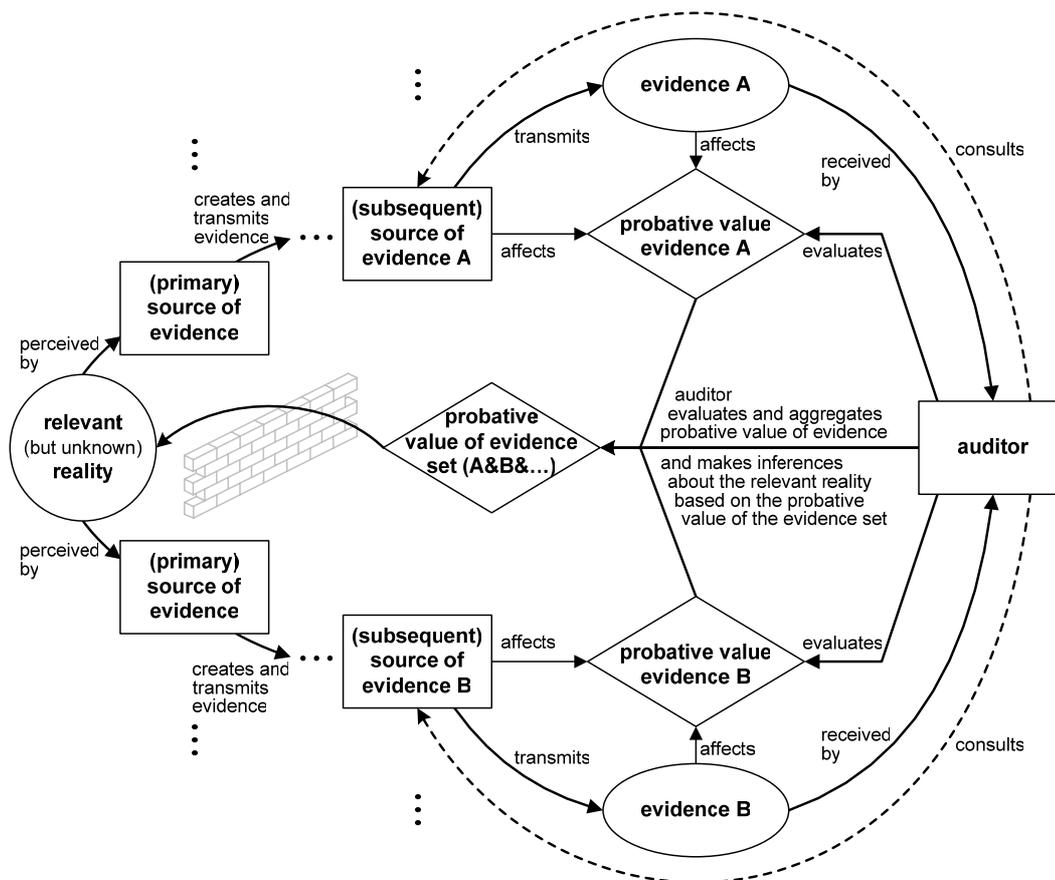


Figure 4: Framework of the probative value of audit evidence (multiple items of evidence)

4. Prior research on the probative value of audit evidence

4.1 Overview

There are two basic streams of prior research on the probative value of audit evidence: qualitative and quantitative approaches. *Quantitative* approaches provide formalized views that allow the application of mathematical methods, which can be used for aggregating the probative value of multiple items of evidence to create an overall value. *Qualitative* approaches also deal with the probative value of individual items of evidence. These approaches may be subdivided into those following a “substantive view”, which is based on a distinction between several types of audit evidence, and those following a “generic view”, which focuses on general determinants of the probative value of evidence.²³ For both views, the following review will be carried out separately for conceptual research on the one hand and empirical research on the other hand.

4.2 Qualitative approaches

4.2.1 Substantive view: research that focuses on types of evidence

4.2.1.1 Conceptual research

Most of the first articles that dealt with the probative value of audit evidence focused on the variable “evidence” itself (see Figure 3 above) and adopted a substantive view. The underlying idea of this view is that a distinction between several types of audit evidence allows –or at least facili-

²³ See Ashton, R. H. et al. (1988, pp. 98-99), who introduced the terms “substantive” and “generic view”.

tates— making generalizations about their probative value. Accordingly, the first step of these approaches is a distinction between various types of evidence. Next, the probative value of each type of evidence (or of specific procedures for acquiring evidence) is analyzed, either separately or comparatively. This analysis may involve the application of some general factors that influence the probative value. Thus, also when primarily a substantive view is adopted, generic aspects of the probative value of evidence may be included.

Table 1 below provides a synopsis of the taxonomies proposed by the authors who, at least partly, followed such a view. The categorizations offered by different authors deviate from each other. So, for instance, some authors categorize primarily by the form or “nature” of audit evidence (e. g., physical productions, written evidence, oral evidence, and deductive reasoning).²⁴ Others relate types of evidence to procedures that result in obtaining such evidence.²⁵ However, as suggested by the table, the different categorizations may be fitted into a comparative scheme. From this scheme, some basic types of evidence become apparent, including physical (“real”, “natural”) evidence, testimonial evidence (often provided orally as answers to inquiries), documentary evidence, and analytical evidence.

Most authors describe physical evidence and recomputations done by the auditor as providing a high level of assurance and being the most reliable types of evidence.²⁶ However, such evidence has only limited availability in an audit. Particularly, it may be available for the physical existence of machinery, stock, and the like, or for the mathematical correctness of calculations. For the other types of audit evidence, rankings of their relative reliability are normally not offered. An exception is *Mautz* who describes testimonial evidence as second best after real evidence and indirect evidence as the least reliable type; although *Mautz* refers to important exceptions to this generalization.²⁷ Most authors analyze each type of evidence separately, discussing peculiarities, exceptions, special factors that influence reliability, and then describe certain situations, in which evidence is either more or less reliable.

For instance, when discussing the reliability of documentary evidence, there is often a distinction made between documents that originated inside and outside the enterprise under audit and whether they passed through the client’s organization in the latter case. Documents that have not passed through the client’s organization are usually considered the most reliable ones, followed by those created outside that are in the possession of the client. Those that were prepared inside the client’s entity are considered the least reliable ones.²⁸ A similar distinction is made for testimonial evidence (statements by third parties vs. statements by officers and employees of the client organization).²⁹ The driving variable behind both distinctions is the independence of the evidence’s source.

For the development of a theory of the probative value of audit evidence, a substantive view with its focus on specific types of evidence is not an adequate starting point. Developing a theory requires generalization and abstraction. Therefore, as a first step, common features of *all* types of evidence that influence probative value must be looked for. Starting with a classification of types leads to introducing the same criteria several times and makes it more difficult to identify generally valid factors.

²⁴ See, e. g., *Flint* (1988, pp. 31-32 and 113-115).

²⁵ See, e. g., *Mautz* (1958); *Winald* (1961).

²⁶ See *Stettler* (1954, p. 123); *Mautz* (1958, p. 44); *Winald* (1961, pp. 396, 398, and 400); *Mautz/Sharaf* (1961, pp. 82 and 85); *Arens* (1970, pp. 110-112 and 121); *Hagest* (1975, pp. 51-53); *Hatherly* (1980, p. 14).

²⁷ See *Mautz* (1958, p. 44).

²⁸ See, e. g., *Stettler* (1954, pp. 123-125); *Arens* (1970, p. 117); *Hagest* (1975, pp. 53-55).

²⁹ See, e. g., *Arens* (1970, pp. 112-116); *Hagest* (1975, pp. 55-57).

Table 1: Synopsis of categorizations of different types of evidence (substantive-view-research)

Stettler (1954)	Mautz (1958) / Windal (1961) *	Mautz/Sharaf (1961) **	Arens (1970)	Hagest (1975)	Hatherly (1980)	Flint (1988)	Barnes (1991)
physical evidence	real evidence physical examination/ count	natural evidence physical examination	real evidence physical examination	physical inspection	physical observation	physical productions/ personal observation	physical evidence inspection or observation
	recomputation	calculations	recomputation		recomputation		
	retracing bookkeeping procedures						
	testimonial evidence inquiry	created evidence statements by independent third parties written oral	testimonial evidence statements by third parties	inquiry statements by third parties	statements by third parties	oral evidence	oral evidence
	confirmation						
		statements by officers and employees formal informal	statements by officers and employees	statements by management and employees formal informal	representations by management		
documentary evidence created externally; sent directly to the auditor created externally; in the client's possession origination within the client's organization	indirect evidence examination of authoritative documents	authoritative documents	documentary evidence originating outside the organization	documents created externally; not passed through client's organization created externally; in the client's possession	external documents	written evidence	documentary evidence
		prepared outside the enterprise					
		prepared inside the enterprise					
account books	examination of subsidiary records	subsidiary or detail records	other evidence subsidiary or detailed records		accounting records	deductive reasoning	analytical evidence reasoning, reclas- sification, compari- son, calculations
comparisons and ratios	scanning	interrelationships with other data	calculations or correlations		related accounts		
	correlation with related information				expectations		
		subsequent actions			post-balance sheet events		
					analytical review ***)		
		satisfactory internal control procedures			accounting system and its internal controls ***)		
			compliance evidence ***) detailed substantive tests ***)				

*) The assignment of the audit techniques to the three general categories of evidence is done by Mautz only; Windal just borrows the categorization of audit techniques from Mautz.

**) The assignment of audit evidence types to the broad categories as shown here is not provided by Mautz/Sharaf themselves, but was arranged by the author of this paper.

***) Not part of the list of audit evidence types offered by Hatherly, but part of the "audit evidence process" discussed by him in a separate analysis.

4.2.1.2 Empirical research

Considerable empirical research concerning the reliability of certain types of audit evidence has only been carried out for confirmations of accounts receivable and analytic procedures.³⁰ In several empirical studies, confirmation requests for accounts receivables with seeded errors were mailed to customers of real audit clients. These studies produced very similar results in that many errors remained undetected by the customers. Furthermore, errors unfavorable to the customers (overstatement of the balance) were reported more often than favorable understatement-errors.³¹ As a whole, the results of these studies show that errors detected by confirmations may not be representative of the actual errors in the population under audit, which places a significant limitation on the probative value of confirmations as audit evidence.

Archival studies showed that a considerable portion of misstatements was initially detected using analytical procedures,³² which could lead to a relatively high degree of reliability being attributed to this type of evidence. However, an important portion of misstatements are *not* detected by analytical procedures. Moreover, analytical procedures are inadequate for detecting the absence of error.³³ Furthermore, the effectiveness of audit procedures measured by the *initial* detection of errors depends on the timing of these audit procedures. As analytic procedures are usually performed at an early stage, their effectiveness may be systematically overestimated.³⁴ Overall, the reliability of analytic procedures alone is limited.³⁵

4.2.2 Generic view: research that focuses on general determinants of the probative value of evidence

4.2.2.1 Conceptual research

4.2.2.1.1 Synthesis of influencing factors identified or applied by prior research

The generic view focuses on general factors that influence the probative value of audit evidence. Therefore, research that adopted this view is not restricted to the variable “evidence”, but also deals with the other variables included in the above framework (see Figures 3 and 4). Several authors discussed these variables or specific influencing factors pertaining to them *explicitly*, as for instance *Windal*, *Arens*, *Hagest*, or *Knüppe*.³⁶ However, especially many of the authors who exclusively or partly adopted a substantive view did not do so. Although they applied some criteria for the analysis of the probative value of evidence, these factors were left more or less *implicit*. In part, even different criteria were used for the analyses of different types of evidence.

In order to synthesize the influencing factors of the probative value of audit evidence that were explicitly identified or implicitly applied by prior research, a synopsis in tabular form was created (see Table 2 below). The synopsis includes the articles already considered within the substantive-view-research, as well as specific contributions that follow a generic view. For the creation of the

³⁰ For reviews of this research see *Caster/Massey/Wright* (2000, pp. 76-77), and *Spires/Yardley* (1989). For confirmations of accounts receivable see *Gronewold* (2001, pp. 68-86), including a detailed analytic evaluation of their probative value.

³¹ See *Sauls* (1969), *Hubbard/Bullington* (1972), *Warren* (1973, 1974, and 1975), *Sorkin* (1977), *Armitage* (1990), *Caster* (1990), and *Engle/Hunton* (2001); whereas *Ford* (1974, pp. 59-61), and *Yeary* (1975, pp. 59-61), could not show favorable errors to be detected more likely than unfavorable errors.

³² See studies by *Hylas/Ashton* (1982), *Kreutzfeldt/Wallace* (1986), *Wright/Ashton* (1989), *Entwistle/Lindsay* (1994), *Bell/Knechel* (1994), *Maletta/Wright* (1996), and *Messier Jr./Eilifsen/Austen* (2004), as well as overviews of this research by *Eilifsen/Messier Jr.* (2000, p. 15), and *Caster/Massey/Wright* (2000, p. 77).

³³ See *Loebbecke/Steinbart* (1987, pp. 76 and 87); *Richter* (2005).

³⁴ See *Wright/Mock* (1985, p. 95).

³⁵ See *Hatherly* (1980, pp. 38-39) for analytic reasons for this conclusion.

³⁶ See *Windal* (1961); *Arens* (1970, pp. 109-110); *Hagest* (1975, pp. 43-65); *Knüppe* (1984, pp. 253-260).

table it was not important whether factors were stated explicitly as determinants of probative value, used implicitly, or mentioned for only specific cases and types of evidence.

The factors dealt with by the various authors differ from each other in both content and labeling. Consequently, the table shows the factors as labeled by the authors, but arranged in a comparative order, so that factors referring to the same or related issue are shown on the same line of the table. The factors were arranged in five major categories that correspond to the concepts of the above framework (see Figures 3 and 4): factors referring to the *source* of evidence, factors referring to the *creation and transmission* of evidence, characteristics of *evidence* and factors referring to the relation of evidence to the assertion in question, factors referring to the *auditor* as evaluator of evidence, and finally factors referring to the *combination* of several items of evidence.

For enhancing the clarity of the synthesis of factors dealt with in the reviewed literature, the table is further condensed. The resulting Table 3 below is ordered by the same categories as Table 2, but contains a uniform list of factors. For each author, all factors that were dealt with (both explicitly and implicitly) are marked with an “x”. In the following sub-sections, each category of factors will be shortly discussed.

Table 2: Synopsis of factors affecting the probative value of audit evidence (generic-view-research)

	Stettler (1954)	Mautz (1958)	Windal (1961)	Mautz/Sharaf (1961)	Arens (1970)	AAA, Committee on Basic Auditing Concepts (1973)	Kissinger (1974)	Hagest (1975)
factors referring to the source of evidence	independence of source *)	responsibility, integrity, bias, or self-interest of the one testifying *)	independence of source	independence of source *)	independence of source	independence of source	responsibility, integrity, bias, or self-interest of evidential source	independence of source; motivation to manipulation or false testimony *)
		knowledge of the one testifying *)	maintenance of formal accounting records; public/ personal responsibility by the source		qualification of source	competence of source (training, experience, responsibility)	qualifications (knowledge) of evidential source	ability of source *)
factors referring to the creation and transmission of evidence			effort required to handle confirmation request					
	adequacy of internal controls *)	adequacy of internal controls *)	adequacy of internal control			adequacy of internal control *)	adequacy of internal control	adequacy of internal controls *)
	directness of information transmission *)		directness of evidence acquisition					directness of information transmission *)
				formality of communication *)				formality of communication *)
characteristics of evidence and factors referring to the relation of evidence to the assertion in question				nature/type *)			type of evidence	form **)
	authenticity; ease of counterfeiting *)	possibility of manipulation or falsification *)	susceptibility to fraud	genuineness *)			susceptibility to suppression, manipulation, alteration, or counterfeiting	susceptibility to manipulation and counterfeiting *)
		pertinence to question at issue		pertinence to subject matter *)	relevance ***)		relevance	
		timeliness *)			timeliness ***)		timeliness	temporal distance between production of an information and its usage as evidence
					size and variance of population; expected error rate ***)		statistical parameters of population underlying the assertion in question (size, variance, rate of error)	
		conclusiveness	objectivity/requirement of judgment	conclusiveness *)	requirement of judgment		conclusiveness; degree of judgment required	logical distance (directness of relation between evidence and assertion to be proved)
		possibility of misinterpretation					possibility of misinterpretation	
factors referring to the auditor as evaluator of evidence	qualification of the auditor *)		qualification of the auditor	personality of auditor (experience, analytic skills, skepticism *)		competence of the auditor (experience and knowledge)	qualification of the auditor	
						errors and biases in auditor perception *)		
factors referring to the combination of several evidence items	adequate amount of evidence *)						adequate number of evidence items of different types	sufficient quantity of evidence
			conjunction effect of several audit techniques providing consistent evidence	combinative effect of different types of evidence	corroborative evidence ***)	existence of corroborative evidence from multiple and mutually independent sources	existence of corroborative evidence of different types	combinative effect of evidence from qualitatively different classes

*) Not stated explicitly as general determinant of audit evidence's probative value, but implicitly, or considered only for specific types of evidence.

**) Hagest differentiates between physical observation, documents, and inquiries. As generic term for this distinction he does not use "form" ("Form") but "source" ("Quelle"). However, in order to avoid misunderstandings, here the term "source" is used exclusively for individuals or institutions from which evidence is produced or transmitted.

***) Discussed by Arens as a variable that affects evidence accumulation, but not explicitly as a variable that affects the probative value of evidence.

Table 2 (continued): Synopsis of factors affecting the probative value of audit evidence (generic-view-research)

Schandl (1978)	Keenan (1979) / Keenan/Anderson (1979)	Hatherly (1980)	Knüppe (1984)	Flint (1988)	Gray (1991)	Barnes (1991)	Caster/Pincus (1996)	
motives and goals of source	independence and motivation of source	independence, integrity, and motive of source *)	trustworthiness of source independence and self-interest of source	reliability of source independence, integrity, and interest of source; intent to deceive	reliability of source independence of source	source credibility	source reliability independence of source	factors referring to the source of evidence
qualification of source	ability of source	ability of source *)	qualification of source					
way of data acquisition by the source; conditions under which surrogate (evidence) was prepared; communication errors		processes of creation and generation of evidence		care and diligence of preparation; security of arrangements for custody				factors referring to the creation and transmission of evidence
	adequacy of internal controls	adequacy and effectiveness of internal controls *)		effectiveness of controls *)		adequacy of internal controls		
geographical distance (steps in information transmission)	directness (primary vs. secondary vs. circumstantial evidence)		route of information transmission (number of steps)		directness (primary vs. secondary vs. circumstantial evidence)			
			form	nature of evidence				
susceptibility to distortion	possibility of alteration or failure *)	susceptibility to manipulation *)		authenticity	susceptibility to manipulation *)			characteristics of evidence and factors referring to the relation of evidence to the assertion in question
	relevance	relevance *)		pertinence	relevance	relevance		
temporal distance between surrogate (evidence) and ultimate principal (fact in question)			temporal congruence between the evidence and the point/period of time in question			timeliness		
						representativeness of evidence for assertion in question		
			congruence of content (directness of relation between evidence and issue in question)	degree of subjectivity	closeness of evidence to the thing being evidenced (as determined by the type of evidence)		directness (steps of reasoning required between evidence and issue in question)	
				danger of misunderstanding				
experience, knowledge, and mental situation of the auditor				advanced knowledge, skill, and experience				factors referring to the auditor as evaluator of evidence
				inspiration and sensitivity of recognition by the auditor				
				adequate question framing by the auditor		reasoning errors by the auditor		
							anticipation of evidence; deviations from expectations	
adequate number of surrogates (items of evidence)				sufficiency of evidence	sufficient quantity of evidence	completeness of evidence	amount of evidence	factors referring to the combination of several evidence items
							dispersion between items of evidence	
stereo/confirmation effect of consistent surrogates (items of evidence) from independent sources		synergy effect or diminishing marginal effect of consistent evidence; inconsistency effect of inconsistent evidence	existence of corroborative evidence obtained independently from each other	combinative effect of evidence of varied nature and from different sources	existence of corroborative evidence from independent sources	cumulative effect of corroborating evidence from different sources and of different types	consistency among items of evidence (one-sidedness)	

*) Not stated explicitly as general determinant of audit evidence's probative value, but implicitly, or considered only for specific types of evidence.

	Stettler (1954)	Mauitz (1958)	Windal (1961)	Mauitz/Sharaf (1961)	Arens (1970)	AAA, Committee on Basic Auditing Concepts (1973)	Kissinger (1974)	Hagest (1975)	Schandl (1978)	Keenan (1979) / Keenan/Anderson (1979)	Hatherly (1980)	Kruppe (1984)	Flint (1988)	Gray (1991)	Barnes (1991)	Caster/Pincus (1996)
source																
independence, integrity, motivation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ability, qualification, knowledge		x	x		x	x	x	x	x	x	x	x				
creation and transmission of evidence																
processes of evidence creation and custody; communication errors			x						x		x		x			
adequacy and effectiveness of controls	x	x	x			x	x	x		x	x		x		x	
directness, steps of evidence transmission	x		x					x	x	x		x		x		
formality of communication				x				x								
characteristics and relation of evidence to the assertion in question																
form, nature, type				x			x	x				x	x			
authenticity and susceptibility to suppression, manipulation, or counterfeiting	x	x	x	x			x	x	x	x	x		x	x		
relevance		x		x	x		x			x	x		x	x	x	
timeliness		x			x		x	x	x			x				x
representativeness					x		x									x
closeness, conclusiveness (degree of judgment required)		x	x	x	x		x	x				x	x	x		x
possibility of misinterpretation		x					x						x			
auditor																
qualification, competence, personality	x		x	x		x	x		x							
inspiration and sensitivity of recognition													x			
errors and biases in perception						x										
adequate question framing													x			
anticipation of evidence, deviations from expectations																x
combination of several evidence items																
amount of evidence	x						x	x	x				x	x	x	x
dispersion between items of evidence																x
consistency vs. inconsistency of evidence			x	x	x	x	x	x	x			x	x	x	x	x

Table 3: Synopsis of factors that influence the probative value of audit evidence (generic-view-research, condensed)

4.2.2.1.2 Factors referring to the source of evidence

All authors consider the reliability of the source an important determinant of the evidence's probative value. Most at least refer to the independence, integrity, self-interest, or motivation of the source, while others deal with the qualifications, competence, or ability as a second dimension of source reliability.³⁷

4.2.2.1.3 Factors referring to the creation and transmission of evidence

Most researchers mention that adequate and effective internal controls increase the reliability of "internal evidence" (evidence produced or transmitted by the entity under audit). *Hatherly* stresses the importance of generally assessing the process of evidence generation in order to judge its "quality"³⁸ or probative value. In a similar vein, *Schandl* mentions the way of data acquisition and the conditions under which evidence was prepared as important factors that affect its "truth value".³⁹ Furthermore, he discusses obstacles and errors during the communication process.⁴⁰ Likewise, *Flint*, while arguing for specific types of evidence, considers the care and diligence in the preparation of written evidence and the security of its custody.⁴¹ *Windal* refers to the effort required by the recipient to process a confirmation request.⁴² All of these factors enhance the probative value of evidence.

Of special interest is a concept offered by *Schandl*, who analyzes the process of generating and communicating information in an abstract manner.⁴³ The facts to be proved by the audit, the "principals", are gone. However, past events may have left traces or "surrogates", which may be used to draw inferences upon the principals. When present, principals may be observed by a person who prepares a surrogate. Surrogates may then be processed, classified, listed, or recorded. This leads to the production of secondary surrogates, and so on. *Schandl* refers to this process as the creation of a "data pyramid", which is built by layers of surrogates that become more general towards the peak of the pyramid. According to *Schandl*, the "truth value" of the surrogates depends on, among other factors, the "geographical distance" between the surrogate used by the auditor and the ultimate principal. The truth value diminishes with the length of the chain of surrogates, because alterations in content and distortions may occur at every step.

A similar idea is the "route of information transmission" discussed by *Knüppe*.⁴⁴ Related concepts are the "directness"⁴⁵ and the legal distinction between primary, secondary, and circumstantial evidence along with the "best evidence rule" referred to by *Keenan* and *Anderson*.⁴⁶ This rule requires the use of the best evidence available. For example, an original document would have precedence over a photocopy. A last variable in this group is the formality of the relevant communication. *Hagest* assumes that information gathered by informal conversation with employees of the audited organization is often of greater reliability than information obtained through official channels.⁴⁷

³⁷ See, e. g., *Kissinger* (1974, p. 90); *Knüppe* (1984, pp. 254-257).

³⁸ See *Hatherly* (1980, pp. 14-16).

³⁹ See *Schandl* (1978, p. 138).

⁴⁰ See *Schandl* (1978, pp. 56-68).

⁴¹ See *Flint* (1988, pp. 108 and 113).

⁴² See *Windal* (1961, pp. 395-397).

⁴³ See *Schandl* (1978, pp. 105-108, 125, 139-142, and 207) for the following description.

⁴⁴ See *Knüppe* (1984, pp. 257-258).

⁴⁵ Dealt with, e. g., by *Windal* (1961, p. 395).

⁴⁶ See *Keenan* (1979, pp. 96-97); *Keenan/Anderson* (1979, p. 119).

⁴⁷ See *Hagest* (1975, pp. 56-57).

4.2.2.1.4 Characteristics of evidence and relation to the assertion in question

Most authors point out that evidence must be relevant or pertinent to the assertion in question in order to have any probative value. Another factor is the timeliness (or temporal distance) of evidence, meaning how close the evidence is to the period or point of time of the assertion in question.⁴⁸ Furthermore, the probative value of evidence depends on whether it is representative of the assertion in question or whether it relates only to specific instances and therefore does not cover the assertion entirely.⁴⁹ To some authors, the nature, type, or form of evidence is directly relevant to the probative value of evidence.⁵⁰ This variable is the most extensively analyzed, as the peculiarities of specific types of evidence are the issue of the substantive-view-research.⁵¹

Another factor in this category is the authenticity or genuineness of the evidence. If it has been altered or distorted, the probative value would be diminished. However, most authors do not refer to actual alteration, but rather to the susceptibility of the evidence type to alteration, manipulation, fraud, counterfeiting, or suppression.⁵² Finally, the conclusiveness of the evidence is discussed, i. e. the degree of judgment required to draw an inference from the evidence upon the truth status of the assertion in question. This judgment may be coupled with the danger of misinterpretation.⁵³ Similar to this variable are the concepts of “logical distance” by *Hagest*, “congruence of content” by *Knüppe*, “closeness” by *Gray*, and “directness” by *Caster/Pincus*.⁵⁴

4.2.2.1.5 Factors referring to the auditor

The qualifications and competence (experience, knowledge) of the auditor are important, as they allow the auditor to draw inferences upon the truth status of the assertion in question based on the evidence.⁵⁵ *Mautz/Sharaf* describe the requirement of professional skepticism in evidence evaluation.⁵⁶ *Flint* points out the importance of proper question framing by the auditor in order to avoid misunderstandings, responses with intent to deceive, or other defects common to oral evidence.⁵⁷ Additionally, he refers to an “apparently inspirational element in audit enquiry by which the mind of an experienced auditor develops acute sensitivity to recognition of the abnormal or unexpected which is highly relevant to an opinion on the audited propositions.”⁵⁸ This element, in conjunction with a high degree of knowledge, skill, and experience, has “an indispensable and invaluable part to play in identifying the uniquely relevant evidence”⁵⁹.

The AAA’s *Committee on Basic Auditing Concepts* discusses possible errors and biases in auditor perception and observation, as well as means for reducing these deficiencies.⁶⁰ Finally, *Caster/Pincus* identify anticipation of evidence as a factor that influences the perception of the probative value of evidence. In particular, unanticipated evidence is perceived to be less persuasive.⁶¹

⁴⁸ See, e. g., *Arens* (1970, pp. 123-124); *Kissinger* (1974, p. 94); *Hagest* (1975, pp. 47-50); *Schandl* (1978, pp. 140 and 151); *Knüppe* (1984, pp. 254).

⁴⁹ See *Kissinger* (1974, pp. 96-101); *Barnes* (1991, p. 54).

⁵⁰ See, e. g., *Hagest* (1975, pp. 51-57); *Knüppe* (1984, pp. 258-259).

⁵¹ See section 4.2.1.

⁵² See, e. g., *Windal* (1961, p. 395); *Kissinger* (1974, p. 90).

⁵³ See, e. g., *Mautz* (1958, pp. 44-45); *Windal* (1961, p. 395); *Arens* (1970, p. 109); *Kissinger* (1974, pp. 89-90).

⁵⁴ See *Hagest* (1975, pp. 44-47); *Knüppe* (1984, p. 253); *Gray* (1991, pp. 132-133); *Caster/Pincus* (1996, pp. 6-7).

⁵⁵ See *Windal* (1961, p. 395); AAA, *Committee on Basic Auditing Concepts* (1973, pp. 17 and 40); *Kissinger* (1974, pp. 89-90); *Schandl* (1978, pp. 135-136 and 188-191).

⁵⁶ See *Mautz/Sharaf* (1961, pp. 117, 120, and 122-123).

⁵⁷ See *Flint* (1988, p. 113).

⁵⁸ *Flint* (1988, p. 114).

⁵⁹ *Flint* (1988, p. 115).

⁶⁰ See AAA, *Committee on Basic Auditing Concepts* (1973, pp. 28-34).

⁶¹ See *Caster/Pincus* (1996, p. 7).

4.2.2.1.6 Factors referring to the combination of evidence

The probative value of an evidence set may increase by increasing the number of evidence items, i. e. by increasing the quantity and completeness of evidence. The value may also increase by having corroborative evidence from independent sources or having multiple different types of evidence. In these cases, the probative value of the evidence set may exceed the sum of the probative values of the items considered individually.⁶² Inconsistent evidence leads to a “loss” of probative value greater than the mere “net effect” of the conflicting evidence items.⁶³ Additional evidence is usually required to resolve inconsistencies.

4.2.2.2 Empirical research

4.2.2.2.1 Explicit research on the probative value of audit evidence

To date, generic-view-research on the probative value of audit evidence has been almost exclusively conceptual in nature. The study by *Caster/Pincus* is an exception.⁶⁴ Referring back to *Bentham's* (1827) theory of the persuasiveness of evidence, the authors proposed and experimentally tested six hypotheses. They found that the persuasive value perceived by the participants (senior auditors) increased, when the number of relevant, non-redundant tests increased, when evidence was provided by an independent party and not by client personnel, when evidence was more direct (provided by substantive tests of details, not by analytical review), or when evidence conformed to expectations. Furthermore, sets of several items of evidence were deemed more persuasive when the sets became more one-sided in their composition or when the estimates in the set became less disperse.⁶⁵

4.2.2.2.2 Relevant research not explicitly addressing the probative value of audit evidence

There is additional empirical research that is relevant to the topic. This research usually does not refer to the probative value of evidence as outlined in this paper, but deals with specific aspects of auditors' information usage and processing behavior. In particular, a considerable amount of research was dedicated to auditors' assessment of information sources and the information they provide. The sources investigated to date include representatives from client management, the client's internal audit department, various external (third party) sources, other members of the audit team, and written or technical decision aids. Most studies found that auditors placed more reliance on information from sources judged more reliable, more competent, and/or of higher integrity,⁶⁶ although some studies revealed that auditors did not sufficiently consider the reliability of their sources.⁶⁷

⁶² See, e. g., *Mautz/Sharaf* (1961, pp. 118-120); *AAA, Committee on Basic Auditing Concepts* (1973, p. 41); *Kissinger* (1974, pp. 101-104); *Hagest* (1975, pp. 58-65); *Schandl* (1978, pp. 137, 141, 143, and 208-210); *Hatherly* (1980, pp. 17-24); *Flint* (1988, pp. 108-109); *Gray* (1991, pp. 132 and 135-136); *Barnes* (1991, pp. 54-55); *Caster/Pincus* (1996, pp. 4-6).

⁶³ See *Hatherly* (1980, pp. 21-22).

⁶⁴ See *Caster/Pincus* (1996, also included in Table 2).

⁶⁵ See *Caster/Pincus* (1996, pp. 12-14).

⁶⁶ See *Rebele/Heintz/Briden* (1988, pp. 47-48 and 50); *Hirst* (1994, pp. 120-121 and 124-125); *Anderson/Koonce/Marchant* (1994, pp. 141 and 145-146); *Margheim* (1986, pp. 200-203); *Goodwin/Trotman* (1996, pp. 163-167); *Qureshi* (1993, pp. 138-143); *Charitable* (1996, pp. 85-86); *Patel* (2001, pp. 12-13, 23, and 27); *Beaulieu* (2001, pp. 94-97); *Peecher* (1996, p. 133); *Goodwin* (1999, p. 9); *Anderson/Moreno/Mueller* (2003, pp. 6-7); *Kadous/Koonce/Towry* (2005, p. 671); *Anderson/Kadous/Koonce* (2004, pp. 18-24); *Glover/Prawitt/Wood* (2005, p. 15-16); *Haynes* (1993, pp. 69, 100-103, and 123-124); *Abdel-khalik/Snowball/Wragge* (1983, pp. 218-219 and 223-224); *Knechel/Messier Jr.* (1990, pp. 388-389 and 397-401); *Washington* (1987); *Bamber* (1983, pp. 405-408 and 410-411).

⁶⁷ See *Joyce/Biddle* (1981, pp. 340-341); *Reisch* (1997, pp. 95 and 132); *Margheim* (1986, pp. 200-203); *Myers* (1995, pp. 20-25, 40-41, and 44-49); *Peterson* (1994, pp. 96-97, 112, 147-149, and 166-167).

With regard to the creation and transmission of evidence, empirical research has focused on the assessment of and reliance on the firm's internal audit and controls by the auditor.⁶⁸ Akin to the factors that affect sources of evidence in general, the competence, objectivity (usually measured by organizational status), and performance of internal auditors were identified as factors affecting auditors on this decision.⁶⁹

There are also empirical results regarding characteristics of evidence and the evidence's relation to the assertion in question, especially regarding information relevance. Research on the so-called "dilution effect" revealed that relevant information is used less if irrelevant information is available.⁷⁰ Other studies showed that more experienced auditors were better able to recognize relevant information and concentrated better on using only this information.⁷¹ However, *Shanteau* refers to results that reveal that judgments by both novices and experts were influenced by irrelevant information.⁷² In a study by *Bonner*, experienced auditors from one of two participating firms erroneously judged irrelevant information to be relevant.⁷³ Finally, *Matson* found that auditors rated irrelevant information as more important when they were held accountable for their responses.⁷⁴

Kissinger investigated the factor "timeliness" in an analysis of auditors' working papers.⁷⁵ He found that auditors preferred acquiring evidence (substantive tests of details and confirmations of accounts receivable) at the "correct" point of time, usually the end of the financial year. Investigation of the representativeness of audit evidence to date has been limited to confirmations of accounts receivable.⁷⁶ The last factor in this group that was studied empirically is the closeness of evidence to the assertion in question.⁷⁷

Empirical research relevant to the combination of multiple items of evidence was also conducted. The effects of evidence amount and the dispersion of estimates among several pieces were studied by *Caster/Pincus*.⁷⁸ Concerning consistency among several items of evidence, *Moeckel* found that auditors committed errors when integrating evidence to form a global judgment.⁷⁹ In particular, contradictions between different items of evidence remained undetected. In part, this result was attributable to memory reconstruction errors. On the other hand, various studies showed that auditors normally do consider the consistency between several items of evidence when assessing their probative value.⁸⁰ Interestingly, *Knechel/Messier Jr.* found that corroborative evidence re-

⁶⁸ See *Krishnamoorthy* (2002) for an overview.

⁶⁹ See *Krishnamoorthy* (2002).

⁷⁰ See *Hackenbrack* (1992, pp. 133-135); *Hoffman/Patton* (1997, pp. 233-234); *Glover* (1997, p. 222; 1994, pp. 49-52, 56, and 79-80); *Shelton* (1999, pp. 222-223). *Shelton* found dilution for seniors only, but not for managers or partners.

⁷¹ See *Davis* (1996, pp. 20-21, 28-29, and 31); *Bédard/Mock* (1992, pp. 5, 10-13, and 15-16); *Shafer* (1994, pp. 103-130); *Comstock* (1991, pp. 50 and 75); in part (for auditors from one of two participating firms) *Bonner* (1990, pp. 78, 82-84, and 88). For further results see *Bédard/Chi* (1993, pp. 28-29). In a tax-related context, *Magro* (2003) found both tax experts and students to adequately consider directly relevant information from different tax-authorities for the decision of a specific estate tax issue. However, in contrast to the experts, the students apparently did not distinguish between indirectly relevant and irrelevant information. Additionally, the students either did not recognize irrelevance or they were unable to ignore irrelevant evidence when forming their judgment.

⁷² See *Shanteau* (1993, p. 53).

⁷³ See *Bonner* (1990, pp. 80-81, 83, and 88).

⁷⁴ See *Matson* (1997, pp. 54 and 63; 2003, pp. 17 and 19).

⁷⁵ See *Kissinger* (1974, pp. 251-258, 293, and 312-313).

⁷⁶ See section 4.2.1.2 above. For empirical research concerning specific types of evidence see the same section.

⁷⁷ See the study by *Caster/Pincus* (1996) that was presented above (section 4.2.2.2.1). *Caster/Pincus* call this variable "directness".

⁷⁸ See *Caster/Pincus* (1996, presented above, section 4.2.2.2.1).

⁷⁹ See *Moeckel* (1990, pp. 380-382; 1991, pp. 285 and 287-290).

⁸⁰ See *Caster/Pincus* (1996, pp. 5-6 and 12-13); *Anderson/Koonce/Marchant* (1995, pp. 29-33); *Goodwin* (1999, pp. 9-10 and 13); *Hirst/Koonce* (1996, pp. 471-474).

ceived later did not influence the auditors' assessments of corroborated evidence received earlier.⁸¹ Moreover, recency effects have been detected in sequential evaluation of inconsistent evidence by auditors.⁸² Finally, some authors observed confirmation effects, where evidence consistent with expectations was overvalued and inconsistent evidence was undervalued,⁸³ while other authors did not find this or even found that auditors put more weight on evidence that opposed expectations.⁸⁴

4.3 Quantitative approaches

4.3.1 The approach by *Toba/Kissinger/Gibbs* and *Smieliauskas/Smith*

Quantitative approaches represent another important stream of research on the probative value of audit evidence. The first contributions using formalizations to a considerable extent were the articles presented by *Toba, Kissinger, and Gibbs*.⁸⁵ The approach was first advanced by *Toba* and then refined and extended by *Kissinger* and *Gibbs*. It focuses on the relationship between concepts of evidence and the propositions to be proved in a financial statement audit. The process of splitting up the ultimate proposition ("fair presentation") into a number of elementary propositions that must be supported by evidence is described.

The formalization is based on a distinction between confirming and supporting evidence, each defined by formulas using conditional probabilities. The approach is normative in nature, as it deals with the support (or probative value) *required* for proving elementary propositions and finally the ultimate proposition. However, nothing is said about how to assess the probative value of audit evidence or which factors should influence this assessment. An empirical study by *Stephens* revealed little conformity between actual auditor judgments and the judgments prescribed by the normative model.⁸⁶

The approach was later extended by *Smieliauskas/Smith*.⁸⁷ In particular, these authors require an explanatory link between evidence and the assertion for the assertion to be confirmed by evidence. Besides this specific aspect, no hints are provided on how the actual probative value of evidence should be judged. With regard to the framework presented in section 3, the approach by *Toba/Kissinger/Gibbs* and *Smieliauskas/Smith* concerns the relationship between the evidence and the relevant reality, but rather on a meta-level, because the analysis is abstract and does not concern the factual transmission of evidence through a number of sources, as it is modeled in the framework.

4.3.2 Models for aggregating the probative value of multiple items of evidence

Considerable research has been dedicated to quantitative models for aggregating the probative values of multiple items of evidence to form an overall value. These approaches address the *combination* of evidence as illustrated schematically in Figure 4 above. These approaches are normative in nature and usually consist of three sequential steps: (1) explaining the structure and inter-

⁸¹ See *Knechel/Messier Jr.* (1990, pp. 397 and 402-403).

⁸² See, e. g., *Ashton/Ashton* (1988, pp. 633-639); *Tubbs/Messier Jr./Knechel* (1990, pp. 458-459); *Asare* (1992, pp. 388-391); *Messier Jr./Tubbs* (1994, pp. 64-67); *Reisch* (1997, pp. 83, 96, and 130); *Arnold et al.* (2000, pp. 117-120, 124-126, and 128-129); *Patel* (2001, pp. 21-23 and 25-28); *Hansen* (1993, pp. 101-103); *Pei/Reed/Koch* (1992, pp. 177-179 and 181).

⁸³ See results by *Asare/Wright/Wright* (1998); *Bamber/Ramsay/Tubbs* (1997, pp. 261-263); *Choo* (1993, pp. 105-108 and 120); *Church* (1991, pp. 523-528); *Earley* (2002, pp. 607-609).

⁸⁴ See *Smith/Kida* (1991, pp. 483-484); *Ashton/Ashton* (1988, pp. 637-639); *Asare* (1992, p. 391); *Reckers/Schultz Jr.* (1993, pp. 138-140); *Kerr/Ward* (1994, p. 34); *Coulter* (1994, pp. 73-90 and 119-121).

⁸⁵ See *Toba* (1975, 1977, and 1980); *Kissinger* (1977); *Gibbs* (1977). In his dissertation, *Kissinger* (1974) also worked with formalizations.

⁸⁶ See *Stephens* (1983).

⁸⁷ See *Smieliauskas/Smith* (1990).

dependencies between evidence and assertions, (2) quantifying the probative value of the individual pieces of evidence, and (3) aggregating these values by applying mathematical concepts and algorithms.⁸⁸ Simple conditional probabilities can be aggregated by applying *Bayes's* theorem in its basic form, though there are some conceptual deficiencies.⁸⁹ Therefore, more elaborate models are based on likelihood ratios⁹⁰ or belief functions⁹¹. To better account for uncertainty in evidence evaluation, fuzzy set theory could be applied.⁹² However, elaborate models for evidence aggregation using fuzzy set theory have not yet been advanced.

Boritz/Wensley and *Gillett* have developed expert systems that contain procedures for aggregating audit evidence.⁹³ Just as with the models mentioned earlier, these systems do not provide any method for evaluating the probative values of the individual items of evidence. Rather, they require that these values are judged subjectively by the auditor or by independent experts to provide the knowledge base for the expert systems. Despite this common problem of all quantitative models presented to date, empirical research shows that the application of these (normative) models can significantly improve the quantitative *aggregation* process of evidence.⁹⁴

Finally, *Hogarth/Einhorn's*⁹⁵ belief adjustment model was applied by several researchers in the context of an audit. In contrast to the models presented before, it is a descriptive model of evidence aggregation. A specific application is order effect prediction.⁹⁶ The descriptive validity of the model is supported by several empirical studies.⁹⁷ Again, the model does not address which variables affect the perception of individual items' probative value.

5. Conclusions and future research opportunities

Some authors have supposed that there would already be a "general theory" of audit evidence. For example, this is suggested by the title of *Toba's* article ("A General Theory of Evidence as the Conceptual Foundation in Auditing Theory"⁹⁸) and stated explicitly by *Srivastava*: "[...] general theories of evidence do exist in auditing and outside auditing too."⁹⁹ *Srivastava's* statement opposes *Caster/Pincus's* view that "to date, no general theory of audit evidence has been accepted in either the research or practice literature."¹⁰⁰ Both views are correct. *Srivastava* is right, because flexible and mathematically complete models for aggregating the probative value *do* exist. *Caster/Pincus* are also right, because these existing and well-founded models only cover one, although very important, aspect – namely evidence aggregation. None of these models provides assistance on how to quantify the probative value of individual items of evidence; all refer to the auditor's professional judgment. However, a *general* theory of probative value would need to also address the variables that affect the probative value of single items of evidence. A compre-

⁸⁸ See *Holstrum/Mock* (1985, p. 102).

⁸⁹ See *Akresh/Loebbecke/Scott* (1988, p. 46); *Srivastava/Shafer* (1992, p. 252); *Dutta/Srivastava* (1993, p. 138).

⁹⁰ See *Dutta/Srivastava* (1993); *Dutta* (1991); *Schum* (1989 and 1994); *Mock et al.* (1997); *Krishnamoorthy/Mock/Washington* (1999).

⁹¹ See *Srivastava/Shafer* (1992); *Shafer/Srivastava* (1990); *Dutta* (1991); *Dutta/Harrison/Srivastava* (1998); *Gillett* (1996); *Srivastava/Mock* (2000a, 2000b, and 2002); *Krishnamoorthy/Mock/Washington* (1999).

⁹² For a simple example see *Siegel/Rigsby/Bourgeois* (1995). For an introduction to the theory see *de Korvin* (1995); *Zebda* (1995 and 1998); *Schum* (1994, pp. 261-269).

⁹³ See *Boritz/Wensley* (1990); *Gillett* (1993).

⁹⁴ See *Krishnamoorthy/Mock/Washington* (1999); *Srinidhi/Vasarhelyi* (1986); *Schum/Martin* (1982), although this last study had students as participants in a legal evidence evaluation task.

⁹⁵ See *Hogarth/Einhorn* (1992).

⁹⁶ See section 4.2.2.2.

⁹⁷ See, e. g., *Bamber/Ramsay/Tubbs* (1997); *Krishnamoorthy/Mock/Washington* (1999); *Reisch* (1997, pp. 83, 96, and 130); *Ashton/Kennedy* (2002, pp. 222-223).

⁹⁸ *Toba* (1975, p. 7).

⁹⁹ *Srivastava* (1996, p. 23).

¹⁰⁰ *Caster/Pincus* (1996, p. 1).

hensive theory of this kind has not yet been presented – neither in auditing, nor in jurisprudence as a related field.¹⁰¹

Quantitative models for evidence aggregation have the advantage of appearing objective to the extent that they are based on “mathematical truths”. As mentioned in section 4.3.2, empirical results support the view that evidence aggregation is more accurate than personal judgment alone when assisted by such models. So for evidence aggregation, quantitative models have a very important function. But obviously, objectivity is strongly limited, because the starting values that the models process are entirely based on the auditor’s subjective judgment. The quantification of individual evidence items’ probative value cannot be derived formally. So it must be looked to conceptual and empirical research from the qualitative stream of research in order to provide insight into which variables to consider when evaluating audit evidence’s probative value. As mentioned in the introduction, the importance of understanding the factors that determine the probative value of audit evidence has increased, not least owing to recently revised professional standards requiring the auditor to responsibly and critically evaluate evidence and to consider the possibility of fraud.

In this paper, a conceptual framework of the probative value of audit evidence was presented. It might serve as a starting point for the development of a theory of probative value that explicitly takes into account the probative value of *single* items of evidence. The theoretic background is a combined cognitive psychological and situational approach. The framework represents the process of evidence creation and transmission by sources, which transmit the evidence to the auditor. It highlights several variables that influence the evidence’s probative value: the source that provides the evidence to the auditor, the evidence creation and transmission process including all other sources involved in that process, characteristics of the evidence itself, and finally the auditor who must evaluate the probative value and who also may exert an influence on it by his way of interacting with the sources, including the formulation of questions.

A review of the existing literature on the topic was carried out in order to make explicit and synthesize the already existing, though scattered knowledge (state of the art) on the one hand, and to lend support to the framework itself on the other hand. Different streams of research were identified and presented. In the qualitative stream of research, after emerging in the 1950s, a couple of contributions were made especially during the 1960s and 70s. One of the most promising contributions was the chapter on “Evidence” included in *Mautz/Sharaf*’s seminal work.¹⁰² However, with the emergence of quantitative models, qualitative research was largely abandoned without having developed a comprehensive and integrative theory. This research should be resumed and extended in order to develop and empirically test such a theory. Approaches that follow a generic view are the most promising ones for achieving this goal, as they focus on *general* determining factors of probative value, and generalizations and abstraction are just what is required for developing a theory.

To date, research in this area either explicitly identified or implicitly applied several general determining factors of probative value. Thus, this research makes contributions to all variables included in the framework. To sum up the insights gained in this paper, Figure 5 below shows the conceptual framework including the determining factors related to the different variables of the model that were identified in the literature review.

¹⁰¹ See *Gronewold* (2005, pp. 102-126) for a review of legal research on the probative value of evidence.

¹⁰² See *Mautz/Sharaf* (1961, pp. 82-133).

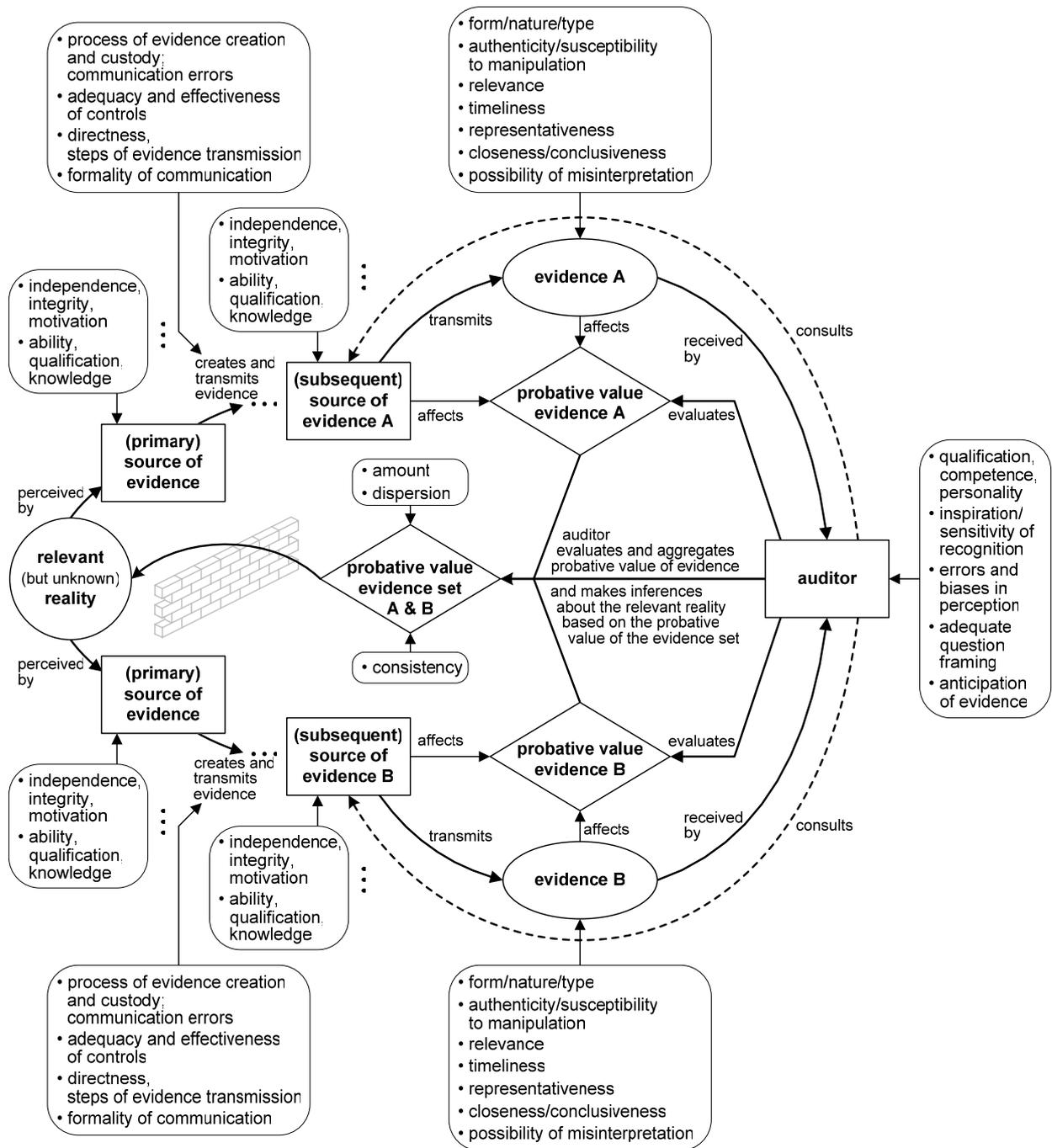


Figure 5: Framework of the probative value of audit evidence including determining factors

Future research should be conducted in both the conceptual and empirical areas. Conceptual research should extend and refine the framework presented in this paper. For example, additional characteristics of evidence relevant to the probative value may be identified and these variables, as well as the ones already included in the framework, should be analyzed in greater depth. Also, how sources (cognitively, manually, or technically) process evidence should be analyzed in a more detailed manner than it was done up to now, in order to understand the processes by which evidence is created, altered, or counterfeited. These processes are essential for the probative value and must play a central role within a theory of the probative value of audit evidence. Considering findings in psychology and jurisprudence may assist developments in this area. For example, findings concerning information processing, witness behavior, and the credibility of testimony could be helpful. Furthermore, how auditors evaluate probative value and what kinds of semantic and procedural knowledge are necessary for this evaluation task should be analyzed. Another important field for investigation is the relationship between proper auditor behavior (for instance,

adequate question framing), and the probative value of the evidence received (answers given by witnesses).

The framework presented here is general and abstract in nature. A specific task for future research is its adaptation to specific applications. The most important specification will probably concern the highly emerging topic of “electronic evidence”. Thus, the general model should be specified to take into account the particular features of electronic forms of evidence and of electronic information sources, including their information processing.

Alternatively, in its general form, the framework can be used as a guideline for an analytical evaluation of specific types of audit evidence. Early analyses of this kind (see section 4.2.1.1) often left the criteria implicit, and therefore their comparability is limited. In contrast, a more complete and refined general framework like the one presented in this paper with the criteria defined in advance, promises useful and comparable results. Moreover, the results of relevant empirical research already completed can add value to such an analysis. This could lead to a ranking of the relative probative value of different types of evidence or of the corresponding audit procedures, as was called for by *Caster/Massey/Wright*.¹⁰³

Empirical research should serve at least two purposes. Firstly, the reliability of evidence types besides the ones investigated to date (confirmations and analytic procedures, see section 4.2.1.2) can be studied, which would extend the empirical basis for elaborating the just mentioned ranking. Secondly, empirical research serves as an additional source for backing the significance and role of the variables included in the framework (see section 2.2). Aside from relevant empirical results for selected factors in studies that did not explicitly address the probative value of audit evidence, to date, the only empirical study explicitly related to the topic is by *Caster/Pincus*.¹⁰⁴ More research along this line is necessary, i. e. experimental studies that ask auditors to assess the probative value of certain items of evidence with experimentally manipulated characteristics. Moreover, information transmission routes should be varied, which has not been done by *Caster/Pincus*. Although this method provides insight into how auditors *perceive* or *evaluate* the probative value of evidence, measuring the “objective” probative value of evidence is hardly possible.¹⁰⁵ Therefore, experimental studies are the most important avenue for future empirical research, because they will provide empirical support to the model or indicate where revisions and adjustments are necessary. As outlined here, conceptual and empirical research should go hand-in-hand to achieve the development of a theory, which *in conjunction* with the existing quantitative approaches might deserve to be called “a general theory of the probative value of audit evidence”.

¹⁰³ See *Caster/Massey/Wright* (2000, p. 85).

¹⁰⁴ See *Caster/Pincus* (1996, presented above, section 4.2.2.2.1).

¹⁰⁵ Usually, there are no external criteria for validation that allow determining the true status of evidence regarding the fact to be proved, unless the relevant reality is still observable. This is just the core of the problem – if such criteria existed, assessing the probative value of evidence would not be a problem at all.

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