

TOWARD A UNIFIED VIEW OF IS CERTIFICATION: A STRUCTURED LITERATURE REVIEW ON THEORETICAL LENSES

Research paper

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Abstract

IS certifications are frequently used measures to alleviate consumers' concerns or increase trustworthiness toward service providers. Yet, scholarly work trying to understand the effects of IS certification produces contradictory results. In particular, the diversity of theoretical lenses used renders it hard for researchers to stand on common ground. Utilizing a structured review of IS literature, we analyze more than 3100 articles to (1) identify commonly used theories for IS certification, (2) compare these theories using the certification ecosystem as conceptual basis, and (3) outline strengths and shortcomings of identified theoretical approaches. We contribute to the existent body of knowledge by presenting theoretical lenses in a structured way as well as evaluating their suitability in the context of IS certification. Our results suggest that some theories are well suited (e.g., Signaling Theory), yet researchers need to control for missing antecedents and avoid fragmentary use of theories. Further, we encourage researchers to draw on the Elaboration Likelihood Model and Cue Utilization/Consistency Theory as valuable, though underutilized theoretical lenses. Eventually, we suggest that future research should develop an integrated theoretical model since, according to our results, a blended theoretical lens may be most valuable to understand and predict the effectiveness of IS certification.

Keywords: IS Certification, IS Theory, Literature Review.

1 Introduction

Products and services based on information systems are experience goods (Nelson, 1970), hence, they inherently lack transparency as users usually (with the exception of open source systems) cannot inspect their inner workings (Neelamegham and Jain, 1999). Driven by the shift from a product to a more flexible digital service economy (Williams et al., 2008) consumers have to consider data security and privacy – which are also hard to evaluate – when thinking about adopting a service. While consumers benefit as they become able to combine and integrate services from different providers almost seamlessly and uniquely tailored to their requirements (Benlian et al., 2011), providers have a need to accentuate their services avoiding to become an easily exchangeable commodity. Especially as companies, to an increasing degree, move their IT toward public clouds (IDC, 2017). To face these challenges, mechanisms are required, which provide support to assess the hidden characteristics of information services. IS certifications are frequently used measures to alleviate consumers' concerns, regain consumers' control over the vendor's action (Mousavizadeh et al., 2016) or increase trustworthiness toward providers (Aiken and Boush, 2006). These certifications are third-party audits that evaluate a company's internal processes and services against a prescribed set of evaluation criteria (ISO/IEC, 2004). In response to the above mentioned challenges of information asymmetry, practitioners have an increasing demand for certifications in IS (KPMG, 2017) which is also reflected by a growing stream of IS certification research (e.g. Lansing and Sunyaev, 2013; Mavlanova et al., 2016; Lowry et al., 2012). Prior research

already investigated certifications in various application areas, such as assurance seals (Mauldin and Arunachalam, 2002; Park et al., 2010), trust marks (Aiken and Boush, 2006; Rüdiger and Rodríguez, 2013), authenticators (Rust et al., 2002), or third-party endorsements (Biswas and Biswas, 2004; Suri and Monroe, 2003). Notwithstanding the valuable contributions, research on IS certification still produces diverse results with no clear answer to whether, and if so under what circumstances, third-party certifications are effective (van Baal, 2015). Williams and Grimes (2010, p. 65) for example state, that “existing empirical evidence on their [trust marks] use is, however, at best mixed”. Others claim that the diversity of levels of analysis, contexts, and theoretical lenses resulted in a vast, heterogeneous body of knowledge, which prevents accumulation and consolidation of certifications’ effect mechanisms (Sturm et al., 2014). Especially the variety of theoretical lenses makes it hard for researchers to compare prior work and encumbers a more unified study approach. To enhance this situation, we are going to analyze theories used in prior investigations.

This paper strives to review prior relevant literature in the area of IS certification to investigate and compare the divergent theoretical lenses that were taken to understand and predict the effectiveness of IS certification. In doing so, we first provide theoretical background information on IS certifications and their surrounding ecosystem. Thereafter, we present the approach to our structured literature review, in which we investigated more than 3100 publications from 88 IS journals and major IS conferences. Systematically introducing and comparing the different theoretical lenses, we provide an overview on the theoretical landscape of IS certification research. With respect to the different aspects of the certification ecosystem, we identify strengths and shortcomings of particular theories. Finally, we argue to dissociate from a one-size-fits-all approach of theory application. Rather we encourage future research to develop an integrative theoretical model to enable for improved analysis.

2 Theoretical Background

IS certifications are a method in which the company’s internal processes and services are assessed using a prescribed set of evaluation criteria via an audit by a third instance. This audit formally accepts that the standards defined by the criteria is encountered (ISO/IEC, 2004). Such certifications provide assurances on certain aspects of the service or process and offer verified information about otherwise unobservable attributes (Kim and Benbasat, 2009; Tsai et al., 2011). There are three central structural elements to certification: (1) *content* (i.e. the assurances made), (2) *source* (i.e. the issuing and auditing instance), as well as (3) *process* (i.e. the rigor and frequency of the audit process) (Lansing et al., 2018; Lansing and Sunyaev, 2013). The value of certification derives from its effect to the parties involved in its use, supporting them in bridging informational gaps, which is why we are not going to analyze certifications in isolation but as part of a certification ecosystem.

The certification ecosystem describes the interplay between parties involved in the process of issuing, auditing, implementing and utilizing a certification. In analogy to natural ecosystems, describing a system of living organisms and the interaction with their non-living environment (Chapin et al., 2011), we use this term to refer to the social system surrounding and interacting with a certificate. The ecosystem analogy has previously been used, for example, in strategic management (Moore, 1997). Within this study we consider four types of stakeholders in the IS certification ecosystem: first, the provider of a product or service, who exploits IS certification for different reasons (e.g., to signal higher quality or compliance). Second, the consumer inspecting an IS certification, for instance in advance to a product or service adoption decision. Third, the auditor, who is evaluating the product, service or process to be certified against the predefined criteria. And finally, the issuer defining the certification criteria and eventually issuing the IS certificate (Windhorst and Sunyaev, 2013). Following Karimov et al. (2011), we utilize the IS certification ecosystem as a conceptual basis to assess and compare certification theories as well as their strengths and shortcomings.

Before elaborating on specific theoretical lenses within the IS certification ecosystem, one should recall the endemic general perception of theory in social science. Following Rudner (1966) the role of theory is to increase scientific understanding. More specifically, Bacharach (1989, p. 498) views a theory as “a system of constructs and variables in which the constructs are related to each other by propositions and

variables are related to each other by hypotheses”. Acknowledging that every theory is subject to certain bounding assumptions to define its application limits (Dubin, 1978), the objective of theory is twofold: first, theory should facilitate understanding of a phenomenon under investigation (i.e. process knowledge) and second, theory should allow for prediction (i.e. outcome knowledge) (Dubin, 1978). Thus, a good theory in IS certification research should allow both, to predict the outcome of certification implementation and help to understand why certification lead to the intended. While a variety of theoretical approaches on IS certification are applied in prior research, results on their effectiveness remain ambiguous and lack predictive power.

Regardless of the growing body of knowledge for IS certification, there is no unified view. However, previous studies can predominantly be assigned to one of the four following research perspectives (Gopal and Gao, 2009; Heras-Saizarbitoria and Boiral, 2013; Lins and Sunyaev, 2017): first, the efficiency gains perspective, exploring IS certifications to gain internal improvements (e.g. quality improvements) (Heras-Saizarbitoria and Boiral, 2013). Second, institutional perspective, utilizing IS certification to increase institutional legitimacy (Gopal and Gao, 2009). Third, signaling perspective, where IS certification are investigated as transmitters of information signals (Terlaak and King, 2006). Finally, trust perspective, in which the reassessment of belief formation related to the trustworthiness of a provider or its products or services is studied (Chang et al., 2012). Especially within the latter two research areas, various studies have used different theoretical lenses to analyze IS certification. However, obfuscation of the current theoretical landscape raises uncertainties to what extent the applied theories do support understanding of IS certification.

Acknowledging that: (1) theories in social science are adequate means to understand, explain and predict certain phenomena, and (2) recognizing the unsolved challenges in IS certification research in terms of effectiveness and predictive power of theories, the following questions remain unanswered: what are the dominant theoretical perspectives used in IS certification research, which aspects do they focus on and what are their strengths and weaknesses? The study at hand strives to shed light on these questions using a structured literature review.

3 Research Methodology

In this paper, we use a structured literature review approach to identify and analyze theoretical motivations and applications for IS certification. Literature reviews constitute an opportunity to make a vigorous contribution to the topic under study, regarding both, relevance and rigor (Vom Brocke et al., 2009; Schryen et al., 2015; Schryen et al., 2017). Whereas the former is improved by refraining from multiple reinvestigations in the same topic (Baker, 2000), the latter is enhanced through the effective use of the already existent knowledge base (Hevner et al., 2004). As suggested by Webster and Watson (2002, xiv) a literature review helps to “benefit from exposure to potential theoretical foundations” that are related to the topic under investigation (i.e. IS certification). In this literature review we collected a broad range of 88 IS journals as well as major IS conferences (e.g. International and European Conference on Information Systems) to ensure consideration of the most state-of-the-art research in the IS certifications area (Vom Brocke et al., 2015). Webster and Watson (2002, xvi) further state: “you often must look not only within the IS discipline when reviewing [...] theory”. Therefore, we included 64 high-ranked IS relevant journals from business administration, marketing and organizational research. As it was the aim to uncover theoretical perspectives used to explain perceptions and outcomes of IS certification, we used a rather broad set of keywords. Across the above-mentioned set of journals and conferences, we searched publications by title, abstract, and keywords using the search terms *certify** OR *seal** in the following databases: Scopus, IEEExplore, AISel, and ACM Digital Library.

3.1 Literature Selection Process

We acknowledge that the process of excluding (and including) literature has to be made as transparent to the reader as possible “in order for the review to proof credibility” (Vom Brocke et al., 2009, p. 2207). Our initial search resulted in a set of 1138 publications. This initial set was then analyzed using title, abstract, and keywords to filter those publications that are helpful in pursuing the research aim. We

excluded publications that were off-topic (e.g. dealing with irrelevant IS topics) (618), analyzed certification but in an, for this study, unrelated manner (e.g. health or human resource certification) (384), or where full-texts were not available (18). As expected, a majority of publications were excluded after this round and 118 articles remained. Thereafter, in-depth analysis of the remaining set of articles resulted in a further downsize to 57 publications. Using this set, forward (result: 1930 new articles) and backward searches (result: 40 new articles) were conducted to identify additional articles.

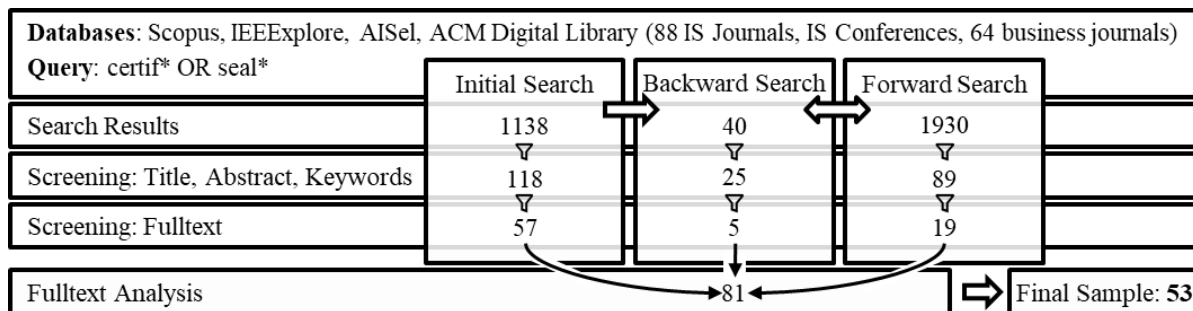


Figure 1: Literature Review Process

Again, a title, abstract, and keyword filtering process as well as in-depth analysis of the forward and backward search results led to a preliminary final set of 81 articles. During our research, a further reduction of 23 articles was performed. The reason for this was the identification of articles that did not support our research (e.g. research-in-progress or short papers without any explicit results). Additionally, since we only found five studies that were not conducted in an e-commerce context, we excluded them from our analysis to prevent potential biases. Thus, ultimately 53 articles were included in the literature review at hand. Figure 1 provides a visual overview on the selection process.

3.2 Classification of Data

In order to analyze and make sense of the literature in a best possible manner we classified the articles among a set of predefined attributes (Vom Brocke et al., 2009; Vom Brocke et al., 2015). We followed suggestions made by Hayes and Krippendorff (2007) and analyzed the data independently among authors to ensure best possible thoroughness, however, ultimately relied on a single final review made only by one of the authors. Although most of the attributes are self-explanatory, some require further elaboration. Hence, all ten classification attributes are shortly elucidated hereafter. *Theory* states the underlying theory that was used to explain and understand the effect of IS certification. For research that either used no theory at all or the results could not be traced back to a uniquely identifiable theory (according to the author's perception), "no explicit theory" was used as a term to indicate this fact. "Multi-theory approach" on the contrary was used to specify that multiple theories were consolidated. *Context* indicates the environmental context in which IS certifications were studied. Due to the fact that IS articles were primary included into the literature review, the lion's share of research was conducted in an e-commerce context (at a later stage we only included articles from e-commerce contexts to prevent potential biases). *Certification as the central research aspect* specifies whether the certificate evaluated in the respective research was analyzed in isolation or as one among other cues and signals such as policy statement or website design (Chang et al., 2013; Karimov et al., 2011). Moreover, articles evaluated in this review either examined the impact of a single certificate or multiple certificates at once, which we coded *single or multiple certificates*. Where possible, it is indicated which certificate or seal was actually analyzed. The *dependent variable* indicates the dependent or outcome variable(s) of each study. *Line of effects* was utilized to briefly expound the effects of certain variables on other variables of the research model. It further provides insights, if the certificate is a key component of the research analyzed or if it merely constitutes a marginal aspect among a set of other constructs or variables. Furthermore, *methodology* outlines which quantitative procedure was applied to the data in each paper. Similar to the context attribute, we suspect that the empirical method may have influential impact on the final result of a study (cf. van Baal, 2015). The *significance of effects* reports the effects of the variables

analyzed as well as their manifestation of significance. Additionally, *antecedents and contingency factors* summarized possible antecedents and contingency aspects that had an influence on a certain research model. Eventually, *summary of main findings* briefly reports the major contributions of each study. The results can be found in a concept matrix shown in Table 1, however, due to space constraints, only four attributes (i.e. theory, context, dependent variable, and certification as the central research aspect) are depicted. The entire matrix is available from the authors upon request.

In order to comprehensively analyze and compare the identified theories the following section first, shortly elucidates how each theory is applied in the context of IS certification. This step is helpful in that it provides the necessary, basic understanding to compare the theoretical perspectives. Second, the theories are compared using the certification ecosystem as a conceptual environment.

4 Theoretical Lenses of IS Certification

This section provides a comprehensive overview of the results of this literature review. The theories identified and analyzed herein are Signaling Theory (5 articles), Trust Theory (including Trust Transference) (18 articles), Theory of Reasoned Action (TRA) / Theory of Planned Behavior (TPB) (5 articles), Elaboration Likelihood Model of Persuasion (ELM) (4 articles), Social Exchange Theory (3 articles), Cue Utilization and Consistency Theory (1 article). Although the literature review revealed more theories than presented herein, some were omitted due to space constraints and lack of broader adoption. These theories are: Social Cognitive Theory (cf. Larose and Rifon, 2007), Processing Theory (cf. Williams and Grimes, 2010), Social Contract Theory (cf. Faja and Trimi, 2006), Prospect Theory (cf. Bahmanziari and Odom, 2015; Park et al., 2010) and Contemporary Choice Theory (cf. Hui et al., 2007). Eventually, a non-negligible share of studies either used no theory at all or applied a theoretical approach that could not be explicitly assigned to a theory. These articles were classified as “no explicit theory”. 5 studies used more than one theory (“Multi-theory approach”). Table 2 provides an overview of the theory distribution across analyzed studies.

4.1 Theories

4.1.1 Signaling Theory

Signaling Theory is a theoretical lens often taken in the area of information economics and can be found in a variety of settings. Among others, in job markets (Spence, 1973), real estate markets (Garmaise and Moskowitz, 2004), insurance (Rothschild and Stiglitz, 1976), or individual (Mavlanova et al., 2012) and organizational (Stump and Heide, 1996) commerce. The theory is often used to explain the effects of information (i.e. signals) on one party provided by the other party of a transaction. Drawing on this theory, IS certifications are modeled as signals. Connelly et al. (2010) distinguish two key characteristics of effective signals: (1) signal observability, representing the degree to which external parties are able to recognize a signal, and (2) signal cost which are the related costs to send a certain signal. Aiken and Boush (2006) found that internet trust marks, compared to consumer ratings of the provider and investments in advertising, have the strongest influence on the firm’s trustworthiness and willingness to provide personal information. Aiken et al. (2014) further elaborated that, expert-based certificates are more effective in South Korea compared to in the United States. However, in the United States, consumers rely more on government-affiliated certification than consumers in South Korea do. Van Baal (2015) on the contrary postulates no significant effectiveness on purchase probability of two tested third-party seals in Europe. Yet, a study in the US revealed that varying web assurance seals (i.e. TRUSTe, BBBOnline, and Verisign) all significantly affect willingness to provide personal information (Wang et al., 2004). Finally, other authors claim that external signals (e.g. third-party issued certification) have a stronger effect on consumers’ trust compared to internal signals (e.g. self-developed assurance statements) (Mavlanova et al., 2016).

Author(s) (Year)	Theory	Context	Dependent Variable	Certification as the Central Research Aspect
Aiken and Boush (2006)	Signaling	🛒	Perceived trustworthiness	No
Aiken et al. (2014)	Signaling; Trust Transfer	🛒	Purchase intention	Yes
Bahmanziari et al. (2009)	Trust	🛒	Purchase intention; Trust	No
Belanger et al. (2002)	Trust	🛒	Purchase intention; Willingness to disclose information	No
Chang et al. (2013)	Signaling	🛒	Trust in online vendor	No
Chang et al. (2012)	Social Exchange	🛒	Purchase intention	Yes
Clemons et al. (2016)	Trust	🛒	Willingness to purchase	No
Faja and Trimi (2006)	No explicit theory	🛒	Willingness to disclose information; Willingness to purchase	No
Fisher and Chu (2009)	TRA / TPB; Trust	🛒	Purchase Intention	No
Goethals et al. (2009)	Trust	🛒	Trust	No
Hassanein and Head (2002)	Trust	🛒	Purchase decision	Yes
Houston and Taylor (1999)	No explicit theory	🛒	Purchase intention; Product quality; [...]	No
Hu et al. (2010)	Cue Utilization; Cue Consistency	🛒	Initial online trust	Yes
Hu et al. (2002)	ELM	🛒	Willingness to purchase	Yes
Hui et al. (2007)	Contemporary Choice Theory	🛒	Information disclosure	No
Jiang et al. (2008)	Social Exchange; Trust Transfer	🛒	Trust transfer	Yes
Kaplan and Nieschwietz (2003a)	Trust	🛒	Willingness to purchase; perceived risk; perceived product quality	Yes
Kaplan and Nieschwietz (2003b)	Trust	🛒	Purchase intention	No
Ke et al. (2016)	Trust	🛒	Purchase intention	No
Kim (2008)	Trust	🛒	Willingness to use	No
Kim et al. (2008)	No explicit theory	🛒	Purchase behavior	No
Kim et al. (2015)	No explicit theory	🛒	Transaction intention	No
Kim and Tadisina (2010)	No explicit theory	🛒	Initial trust	No
Kim and Kim (2011)	No explicit theory	🛒	Initial trust; Perceived privacy empowerment	Yes
Kimery and McCord (2002)	Social Exchange; TRA / TPB	🛒	Purchase intention	Yes
Kovar et al. (2000)	ELM	🛒	Purchase intention	Yes
Lala et al. (2002)	No explicit theory	🛒	Purchase intention	Yes
Larose and Rifon (2007)	Social Cognitive Theory	🛒	Information disclosure intention; Purchase intention; Trust; [...]	No
Lee et al. (2004)	TAM; TRA / TPB	🛒	Purchase intention	No
Lowry et al. (2012)	ELM	🛒	Behavioral intention toward website	No
Mascha et al. (2011)	No explicit theory	🛒	Purchase intention	No
Mauldin and Arunachalam (2002)	TRA / TPB	🛒	Purchase intention	No
Mavlanova et al. (2016)	Signaling	🛒	Purchase intention	No
Miyazaki and Krishnamurthy (2002)	Valence Framework	🛒	Perceived risk; Information disclosure; [...]	Yes

Mousavizadeh et al. (2016)	Trust	🛒	Purchase intention	No
Nikitkov (2006)	No explicit theory	🛒	Purchase behavior	Yes
Noteberg et al. (2003)	No explicit theory	🛒	Purchase intention; Privacy concerns; Transaction integrity concerns	No
Özpolat et al. (2013)	Trust	🛒	Purchase conversion	Yes
Özpolat and Jank (2015)	Prospect Theory	🛒	Likelihood of shopping cart completion	Yes
Park et al. (2010)	TRA / TPB	🛒	Satisfaction; Repeat purchase intention	Yes
Pennington et al. (2003)	Trust	🛒	Purchase intention	No
Peterson et al. (2007)	No explicit theory	🛒	Information disclosure	No
Rifon et al. (2005)	No explicit theory	🛒	Information disclosure; Trust; Estimates of information practices; [...]	Yes
Wakefield and Whitten (2008)	Trust	🛒	Purchase intention	No
Sha (2009)	Social Contract Theory	🛒	Customer trusting intentions	No
Shareef et al. (2008)	No explicit theory	🛒	Trust formation; Purchase intention; Buying Satisfaction	No
Utz et al. (2012)	No explicit theory	🛒	Perceived trustworthiness	No
van Baal (2015)	Signaling	🛒	Purchase intention	Yes
Wang et al. (2004)	Trust Transfer	🛒	Bookmarking intention; Willingness to disclose information	No
West (2015)	No explicit theory	🛒	Trust	Yes
Wu et al. (2010)	ELM	🛒	Purchase intention	No
Yang et al. (2006)	No explicit theory	🛒	Trust	No
Zhang (2005)	No explicit theory	🛒	Willingness to purchase	Yes

Key: 🛒 E-Commerce

Table 1. Concept matrix

Signaling Theory	Trust Theory	Prospect Theory	TRA / TPB	TAM	Social Exchange Theory	Social Contract Theory	ELM	Social Cognitive Theory	Contemporary Choice Theory	Cue Utilization / Consistency Theory	Valence Framework	No explicit theory	Multi-theory approach
8,6%	31%	1,7%	8,6%	1,7%	5,2%	1,7%	6,9%	1,7%	1,7%	1,7%	1,7%	27,6%	8,6%
5	18	1	5	1	3	1	4	1	1	1	1	16	5

Table 2. Theory distribution across identified studies

4.1.2 Cue Utilization Theory and Cue Consistency Theory

Cue Utilization Theory is a theoretical lens mainly used in marketing science to explain consumer's perception of product quality and is similar to Signaling Theory. Following Cox (1967), any information cue originates from the actual product – i.e. intrinsic, not alterable cues - or from product related attributes (e.g. third-party seals and certifications) – i.e. extrinsic, alterable cues (cf. Hu et al., 2010; Richardson et al., 1994). Since digital good's intrinsic cues are hard to evaluate, consumers rely more on extrinsic cues (Hu et al., 2010; Suri and Monroe, 2003). Cue Consistency Theory moreover informs researchers about how consumers apply and process multiple, divergent cues in decision-making processes (Hu et al., 2010). In their study Hu et al. (2010) assessed different seal functions (i.e. security, privacy, and transaction-integrity assurances) and their influence on consumers initial trust. They found that the presence of one function (e.g. privacy) to enhance consumers' initial trust is negatively related to another function (e.g. security), concluding that an increase in seal functions' quantity not necessarily leads to an increase in consumers' initial trust.

4.1.3 TRA and TPB

A focal aspect of both theories is one's intention to perform a given behavior as well as the intention's influence on a specific behavior (Mauldin and Arunachalam, 2002). In both theories, intentions are influenced by attitudes, which are described as the positive or negative feelings about performing a behavior and their respective favorability of consequences (Ajzen, 1991; Eagly and Chaiken, 1993). Building on Mauldin and Arunachalam (2002), IS certifications provide more reliable information about a product, which may not alter consumers attitudes toward risk, but positively change their attitudes regarding the likelihood of certain risk occurrences. Therefore, it is theorized that IS certifications change consumers' intentions and, ultimately, behaviors. In their study, Fisher and Chu (2009) compared two different kinds of web assurance seals: one (TRUSTe) issued from an accounting authority and one (WebTrust) not issued from an official body. According to their empirical results, both seals only have little influence on online purchase intention. Contrary, Lee et al. (2004) assessed the same web assurance seals, but found strong significant support for their hypothesis that seals affect perceived trustworthiness. Interestingly, Wakefield and Whitten (2008) extended the – at that time – prevailing opinion and claimed that not only assurance seals itself are decisive to increase consumers' trust, but also the credibility of the third-party issuing the seal.

4.1.4 ELM

The ELM embodies a theory of attitude change through persuasive messages (Petty and Cacioppo, 1986a, 1986b). At the center of the ELM is the idea that humans put differing extents of mental effort (elaboration) into the processing of relevant arguments in persuasive messages. When high elaboration is present, central arguments are considered thoughtfully while in low elaboration, humans rely on peripheral cues. Bhattacharjee and Sanford (2006) have investigated its role for technology acceptance, Lowry et al. (2012) used it to analyze website privacy cues for online consumers and Wagner et al. (2014) analyzed the attitudes of customers using freemium music-as-a-service. In the context of IS certification, Kovar et al. (2000) first analyzed if (1) exposure to WebTrust seal advertising, (2) consumer's knowledge about certified public accountants (CPA), and (3) consumer's degree of attention to the seals influences their purchase intention and transaction expectations. Hu et al. (2002), evaluating five different web trust seals, concluded that only those seals are effective that guarantee insurance (e.g. in case of lost shipments), security, and service reliability to the customer. Contrary and more recently, scholars attributed that privacy seals have the strongest effect on behavioral intention toward the website (e.g. perform a purchase). Yet, only when an understanding of the seal is present (Lowry et al., 2012).

4.1.5 Trust Theory

The concept of trust has been applied to various contexts in the IS discipline, for instance in IT outsourcing (Lee et al., 2008) or corporate adoption of Software-as-a-Service (Heart, 2010). Mcknight et al. (2002) separate trusting beliefs (perceptions of trustworthiness), their influence on trusting intentions

(willingness to depend on the trusted party) and actual trusting behavior (e.g. sharing personal information) in a nomological trust model in the context of e-commerce. Certifications as cues are object to customers' trust beliefs and can thereby influence their trusting intentions and actual behavior (Mcknight et al., 2002; Mcknight et al., 2004). Closely interwoven with Trust Theory is the concept of Trust Transference. A trust transfer – in terms of certification – takes place when the trustor (i.e. consumer) attributes trustworthiness to an unfamiliar party (i.e. provider) based on the latter's relationship with a trusted third-party (e.g. issuer of the certificate) (Doney et al., 1998; Jiang et al., 2008; Zucker, 1986). Research using the theoretical lens of trust to examine IS certification infer various outcomes. For instance, Bahmanziari et al. (2009) claim that externally provided "e-Assurances" (e.g. third-party seals), compared to internally provided "e-Assurances", are useless to increase consumers trust. Finally, and most interesting, comparing the effect of third-party seals and industry endorsement seals using Trust Theory, Mcknight et al. (2004) posit that both have a slight negative influence on consumers' trusting beliefs and trusting intentions.

4.1.6 SET

As Jiang et al. (2008, p. 841) state, "Social Exchange Theory provides the framework for examining how trust is defined and how it is initiated and developed in interpersonal and exchange relationships". Each interaction or exchange resides somewhere between being beneficial or being costly, i.e., leads to a positive or negative emotional state (Blau, 1968). Among other aids, IS certification can act as viable means to positively influence consumers' emotional state, negatively affect perceived risk (Chang et al., 2013), and therefore improve their cost-benefit calculus. Studies in this research stream, for instance, evaluated certifications and seals with different functions (i.e. privacy, security, and reliability) on trust in the provider. In this regard, Jiang et al. (2008) claim, that intensity of seal exposure and consumers' disposition toward third-party certification moderate the aforementioned effect. Similarly, Kimery and McCord (2002) used SET to research the effect of the VersiSign, TRUSTe, and BBBOnline seal on consumers' purchase intention, concluding that no seal showed any improvement in purchase intention expect the TRUSTe certification. More recently, researchers prove that third-party certification, provider reputation as well as the idiosyncrasies of providers' return policies all increase consumers' trust in the provider (Chang et al., 2013).

4.1.7 No Explicit Theory

A non-negligible share of studies did not explicitly build their research on a distinct theory. For instance, two meta studies were identified (Sturm et al., 2014; van Baal, 2015), which did not conduct own experiments. While useful for an overview on prior work, the meta-approaches include multiple theories making it hard to assign an explicit theory label. Another group of publications expected certifications to have a significant effect, however, not based their work on theory but on prior studies ("we expect the same phenomenon" (Mascha et al., p. 405)) or practice ("one web site exhibiting the WebTrust seal reports that, after displaying the seal, sales increased" (Houston and Taylor, p. 93)). Others provide hypotheses on the effect of certifications without explicitly stating a theoretical background grounding these hypotheses on. For instance, Lala et al. (2002) expect certifications to act as "risk relievers" without clearly indicating why and how they relieve risk to customers. Moreover, a set of studies mention aspects of multiple theories, though, they do not fully apply these nor specify their interactions. Clemons et al. (2016) states that third-party certifications "can serve as a signal" (Clemons et al., p. 1122) while also claiming that they "would help create greater trust" (Clemons et al., p. 1125), tapping into both Signaling and Trust Theory. Miyazaki and Krishnamurthy (2002, pp. 31–32) conceptualize a seal of approval as to "attest to the particular privacy level that a particular online firm is providing" while stating it to be "a co-branding strategy" and "a one-principal [...] several-agents [...] problem".

4.2 Discussing Theoretical Lenses

This section compares the previous identified theories within the IS certification ecosystem to uncover potential overlaps, theoretical complementarities and deficiencies.

4.2.1 Certification in the Ecosystem

Signaling Theory provides a powerful means to analyze the effectiveness of certification as information transmitter, though, it neglects the influence of possible contingency factors. Signaling Theory informs about how to design information as to become effective signals that are able to bridge information asymmetries, for example, by indicating product or vendor quality (Aiken et al., 2014). Yet, it is less certain whether consumers have to recognize and/or understand the signal (McCoy et al., 2009) or not (Ray et al., 2011) in order for it to be effective. While Mavlanova et al. (2016) differentiated between internal (e.g. privacy and security policies) and external (e.g. third-party seals) signals and their impact on purchase intention, Wang et al. (2004) focused on elucidating how multiple online signals (i.e. seals of approval, privacy disclosures, return policy, awards, and security disclosures) influence consumers' willingness to disclose personal information. Nevertheless, external signals issued by a trusted third-party were found to be more salient to customers than internal signals developed by the respective provider or vendor (Wang et al., 2004). Interestingly, none of the analyzed publications considered recognition or understanding of signals as a possible influence or contingency factor.

Similarly, Cue Utilization Theory suggests that artifacts (e.g. digital products) bear a set of product cues, which can act as quality signals to potential customers (Cox, 1967) with the aim to reduce information asymmetries. Although only one study was found applying this theoretical lens to IS certification, results support the positive effectiveness of IS certification, yet in an interesting way: Hu et al. (2010) posit that third-party seals in general have a positive significant effect on initial online trust. They analyzed three types of seals simultaneously: privacy, security, and transaction-integrity assurance seals. The authors claim that the number of assurance functions in a certificate and consumers' initial trust follow a u-shaped curve. In-depth analysis revealed that only in the absence of security and transaction-integration assurances, privacy assurance certificates have a significant positive effect on consumers' initial trust. Oppositely, both security and transaction-integration assurances are only efficacious as long as privacy assurances are absent (Hu et al., 2010).

Analyzing Trust Theory in an IS certification context reveals that the theory is seldom used in isolation. Rather other theoretical lenses are combined with Trust Theory. However, in case it is, results mostly indicate no significant effects of IS certifications on dependent variables. Besides Signaling Theory (5 publications), Trust Theory was identified as the most commonly applied theoretical perspective (18 publications). Although, other studies (e.g. Kaplan and Nieschwietz, 2003a; Kim et al., 2008; Wu et al., 2010) used the term trust and occasionally integrated a trust construct in their research model, they did not necessarily rely comprehensively on trust as a theory. Interestingly, results, when utilizing Trust Theory, are considerably more diverse compared to Signaling and Cue Utilization Theory. The majority of research studies concluded that IS certifications do not yield a significant impact on trust (Bahmanziari et al., 2009; Goethals et al., 2009; Mcknight et al., 2004; Utz et al., 2012), purchase intention (Bahmanziari et al., 2009; Fisher and Chu, 2009), or willingness to use (Kim, 2008). Contrary, Chang et al. (2012) claim to find a positive impact on purchase intention in the event that the certificate is issued by a large trusted organization (compared to small trusted organizations), however without indicating dimensions of organizational size measurement.

Further, the literature review revealed, that the social exchange perspective (i.e. SET) is seldom, in fact only once (cf. Chang et al., 2013), applied alone. Rather it is used in conjunction with other perspectives like Trust Theory (e.g. Jiang et al., 2008) or the Theory of Planned Behavior (e.g. Kimery and McCord, 2002). Articles identified to apply SET demonstrated homogeneous results compared to Trust Theory itself. All studies considered in this literature review found at least some evidence for the effectiveness of third-party certification on trust in the online vendor (Chang et al., 2013; Jiang et al., 2008) or purchase intention (Kimery and McCord, 2002) regardless of analyzing third-party certificates alone or in combination with other measures (e.g. vendor reputation or return policies).

During our research it became obvious that IS certifications do not play a focal role in TRA, TPB, or the decomposed TPB – as it is for example the case with Signaling or Cue Utilization Theory – but was rather treated as an antecedent. In past research, IS certifications were theorized to influence a person's attitude in a way that positively changed their perception regarding the likelihood of certain risk and

henceforth affected their intention and behavior (Mauldin and Arunachalam, 2002). Comparable to the results of studies that were viewed through the lens of Trust or Social Exchange Theory, the above stated theories rendered divergent study outcomes. Within this research stream, research focused almost exclusively on purchase intention as a dependent variable. As one of the early studies, Lee et al. (2004) found that third-party seals have both significant positive effects on perceived risk (which in turn leads to increased purchase intention) and perceived trustworthiness. In this regard, they analyzed the effect of four commonly known web trust seals (i.e. BBBOnline, TRUSTe, WebTrust, VersiSign). In contrast, Kimery and McCord (2002) concluded that only the TRUSTe seal (assuring privacy related aspects) has a significant positive effect on trust and hence would increase purchase intention. Again, the lion's share of scholarly publications is not supporting the effectiveness of third-party certification. For instance, Fisher and Chu (2009) negate the significance of third-party seals on consumers trusting beliefs and therefore on online purchase intentions. In a similar stance, Mauldin and Arunachalam (2002) could not prove a direct effect of web assurances on purchase intention nor an interaction effect on the relationship between information risk and purchase intention.

Ultimately, corresponding to Cue Consistency Theory, the ELM is a theoretical perspective to illuminate in detail how consumers process informational cues. While some researchers concluded a positive impact of multiple certification and seals on willingness to buy (Hu et al., 2002), purchase intention (Lowry et al., 2012), and trust (Yang et al., 2006) using the ELM, Kovar et al. (2000) investigated a positive effect of a single third-party seal (i.e. WebTrust) on consumers intent to purchase. Yang et al. (2006) assert that the effect of third-party seals differs contingent upon the use of the central or peripheral cognitive route. Lowry et al. (2012) assert that third-party web assurance seals are most expedient when processed in combination with other web site cues (e.g. good website quality and brand image) via the peripheral route. This is due to the lack of consumer's attention and understanding of certification and seals (Milne and Culnan, 2004; Moores, 2005) and, following the ELM, a reason to process information on the peripheral route.

4.2.2 Stakeholder of the Ecosystem

To start with, Signaling Theory is able to provide a bilateral view on the IS certification ecosystem. On the one hand, researchers found that signals increase trust (Mavlanova et al., 2016) and therefore purchase intention of the consumer (Aiken et al., 2014) or willingness to provide personal information (Wang et al., 2004) (i.e. consumer side). On the other hand, Signaling Theory can inform about characteristics of signals, i.e. signal observability and signal costs (Connelly et al., 2010) allowing to optimize and improve the use of IS certification based signals (i.e. provider side). While signal observability determines the degree to which outsiders (e.g. customers) are able to observe and process signals, signal costs define the price for certain signals (Connelly et al., 2010). For instance, external signals (e.g. third-party certification) are usually associated with higher costs than internal signals (e.g. self-developed assurance statements) (Mavlanova et al., 2016). However, Signaling Theory completely neglects consideration of third-party institutions as an important stakeholder in the IS certification ecosystem. Even though not to the same extent as Signaling Theory, Cue Utilization and Consistency Theory may as well provide an understanding of how external cues are alterable in favor for providers. That is, providers knowing how customer adapt their information processing behavior when information cues are inconsistent can adjust their external, alterable information cues respectively. Miyazaki et al. (2005) for instance found that, given intrinsic cues are scarce, high price (extrinsic product quality cue) paired with a strong warranty (extrinsic vendor cue) has a synergetic interaction effect, in which either of both cues is strengthened by the presence of the other.

Contrary, TRA/TPB, Trust Theory, Social Exchange Theory and the ELM provide rather unilateral views on the IS certification ecosystem. All theories, with their own idiosyncrasies, are able to provide a great understanding of how consumers process IS certifications. TRA, TPB, and the decomposed TPB are adequate means to explain the formation of intentions, and hence, behaviors by the certifications' influence on customers' attitudes. Acknowledging that customers' attitudes are either evaluative (e.g. benefits and risks of a behavior) or affective (e.g. feelings toward a behavior) (Mauldin and Arunachalam, 2002) one is able to alter attitudinal beliefs by means of IS certification to his or her favor. The

ELM, in a different manner, provides insights about how (central vs. peripheral route) and under which circumstances (ability and motivation) (Petty and Cacioppo, 1986b) customers process information conveyed by IS certification. The concept of trust transference, as a reasonable evolved consumer heuristic (Aiken et al., 2014), is the only perspective found to include a trusted third-party to explain trust development. In this regard, trust transference claims that not only the certificate or seal itself should convey information so as to increase institution-based trust, but also the third-party itself should uphold a purposive reputation as trust, according to trust transference, will allocate from the third-party to the service provider.

5 Research Contributions

Based on our extensive literature review a set of contributions, and following in section 6, implications emerge. First of all, this review contributes to the existent body of knowledge by identifying relevant theoretical lenses used to explain and understand the effects of certification in the IS context. Further, through the detailed analysis of the identified theories, we are able to provide insights about strengths and shortcomings of the applied theoretical perspectives.

To start with, Signaling Theory provides a powerful means to investigate the certificate itself, however, disregards the influence of third-parties, which is central to certification. Researchers tried to integrate this aspect, for example, by examining certification stemming from different sources (e.g. government-affiliated, expert or consumer-based certification) (Aiken et al., 2014). Further, Signaling Theory assumes that the receiver of a signal recognizes and understands informational signals (Kimery and McCord, 2006; McCoy et al., 2009). However, most of the studies evaluated herein do not integrate signals' recognition and understanding as contingency or moderating factors or simply assume that signals are recognized and understood by consumers (e.g. Aiken and Boush, 2006; Wang et al., 2004). Yet, some scholars seem to direct their participants to be, in particular, aware of certain website stimuli. For example, Aiken et al. (2014, p. 99) instructed participants „to pay special attention to the website they were about to see” and Mavlanova et al. (2016, p. 63) state “participants were asked [...] to evaluate the website by examining the store's design and content”. Those instructions may bypass the need for consumers' own recognition of certifications, nevertheless, raises questions, if the respective experiments are prejudiced and hence, their results reliable. In contrast, we found that the ELM is able to touch upon the issue of missing recognition and understanding since it demonstrates how IS certifications are perceived via the central or peripheral route (Lowry et al., 2012; Milne and Culnan, 2004; Moores, 2005), contingent upon consumers' ability and motivation (Petty and Cacioppo, 1986b).

Trust Theory moreover, in most cases, is only applied partially. That is, authors claim to base their research on Trust Theory, however, only used a simplified or fragmented form of it (e.g. Kaplan and Nieschwietz, 2003a; Kaplan and Nieschwietz, 2003b; Nikitkov, 2006). Additionally, we found a variety of studies that blended Trust Theory with other approaches such as TRA / TPB (Fisher and Chu, 2009), SET (e.g. Chang et al., 2013; Jiang et al., 2008), or Signaling Theory (Clemons et al., 2016). Therefore, the question can be raised, if the application of Trust Theory in isolation is expedient to analyze the effectiveness of IS certification.

Likewise, TRA / TPB are often only applied to a minor extent. For instance, TPB claims that perceived behavioral control, subjective norms and attitude affect individuals intention, which in turn influences their behavior (Ajzen, 1985, 1991; Ajzen and Fishbein, 1973). The studies analyzed herein mostly postulate that IS certification and seals only affect attitudes (neglecting the influence of subjective norms and perceived behavioral control) and eventually their purchase intention (e.g. Kimery and McCord, 2002; Lee et al., 2004). Yet, studies conclude that IS certification have no effect on purchase intentions (Mauldin and Arunachalam, 2002; Pennington et al., 2003). Therefore, we scrutinize the correct application of such theories and reliability of results. Finally, we found that a non-negligible part of the research did not apply any theory at all. On the one hand, this lays research studies open to attack and questioning. On the other, allows scholars to conduct future research.

6 Scientific and Practical Implications

Our research implications can be summarized as follows: first, since various studies showed that consumers are mostly unaware or unable to understand IS certification (Kimery and McCord, 2006; Kovar et al., 2000; Yang et al., 2006) it may be beneficial to utilize the ELM as an extension to, for instance, Signaling Theory to explain consumers' behavior. Second, Cue Utilization in combination with Cue Consistency Theory are valuable means to more thoroughly understand and predict consumers' behavior. For example, in a way that "multiple sources of information are more useful when they provide corroborating information than when they offer disparate conclusions" (Miyazaki et al., p. 147). Interestingly, only one study applied Cue Utilization and Consistency Theory (cf. Hu et al., 2010), leaving great potential for future research to further exploit this theoretical perspective.

In terms of practical implications, we hope that the insights given in the paper at hand may direct future research more properly in applying relevant theoretical lenses that will then result in reliable study outcomes that practitioners can utilize. Choosing and applying appropriate certification that fits to customers' preferences may eventually lead to increased customer acquisition rates and revenue increases. Moreover, practitioners will be provided with detailed information on customer perception of IS certification. However, considering for example the ELM, practitioners may derive knowledge for future studies that go far beyond the boundaries of IS certification. We are convinced that practitioners applying or utilizing service-centric business models (e.g. based on Cloud Computing) can benefit greatly from multiple theoretical perspectives on IS certifications, as effective IS certifications can support the transformative potential of electronic markets and ecosystems in general (cf. Benlian et al., 2018).

7 Limitations and Future Research

This work is subject to multiple limitations. First, this literature review is restricted to the results that we identified by the use of our search terms and journal selection. Yet, reviewing more than 3100 articles from the IS literature, we are confident that we presented a representative perspective of theoretical lenses on IS certification. Nevertheless, theoretical lenses of certification used in other research areas such as computer science or health science might as well have revealed interesting insights. Second, we were only able to present, to our perception, the most common theories. Four other theories have been identified, however, were not analyzed and discussed due to missing broader application.

This study also provides a fundament for future research avenues. First, we advocate research aiming to evaluate IS certifications' recognition and understanding in context of Signaling Theory. We believe that consumers have to, at least some extent, recognize and understand IS certification in order for them to be effective. The mere presence of certification (particularly their visualization in form of, e.g., seals) is not sufficient. Moreover, scholars may administer to incorporating consideration of third-parties to Signaling Theory. Second, based on our review we are confident that ELM and Cue Consistency Theory are valuable perspectives to explain thoroughly how consumers process IS certification. Future research should therefore empirically investigate this possibility. Eventually, we believe that a single theory is merely able to comprehensively explain the effect of certifications. Hence, we encourage scholars to conduct research targeting a contingency approach to IS certification, for example by developing an integrative theoretical model. Structural contingency theory (cf. Hoffer, 1975) in IS research has, for instance, previously found appeal in IS outsourcing issues (cf. Cheon et al., 1995).

8 Conclusion

Prior research has found that studies aiming to investigate the effectiveness of IS certification produce diverse results. A major cause for this is the variety of theoretical approaches used in such studies. In this extensive review of more than 3100 scientific articles we identified and compared the six most widely used theories to understand IS certification. Thereby we disclosed central strengths and weaknesses of each theory, provide contributions and implications, and point to future research opportunities. Especially, we call upon future research to sound out opportunities to develop an integrative theoretical model that comprehensively explains and understands certification in the IS certification ecosystem.

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